2017 Appalachian Student Research Forum

April 11 - 12, 2017

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

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coordinated by

The Office of Research
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EAST TENNESSEE STATE UNIVERSITY

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Schedule of Events

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

Tuesday, April 11, 2017

8:45 am – 4:00 pm Oral Presentations 3rd floor mtg rms

Post-Doctoral Fellows	East Tennessee Room, 1:00 -1:45 pm
Medical Residents and Clinical Fellows, Case Studies	East Tennessee Room 2:00 - 3:15 pm
Medical Residents and Clinical Fellows Biomedical and Health Sciences	Forum Room 9:00 - 10:30 am
Doctoral Candidates Natural, Biomedical and Health Sciences	Forum Room 1:00 - 3:45 pm
Doctoral Candidates Society, Behavior and Learning	Meeting Room 1, 9:00 - 10:15 am, and 1:00 - 2:45 pm
Master's Candidates Natural, Biomedical, and Health Sciences	Meeting Room 2 8:45 - 10:30 am, and 1:00 - 3:00 pm
Master's Candidates Society, Behavior and Learning	Meeting Room 3 8:45 - 11:15 am, and 1:00 - 3:45 pm

12:00 pm – 4:30 pm Poster Check-in and Set-up Ballroom

Wednesday, April 12, 2017

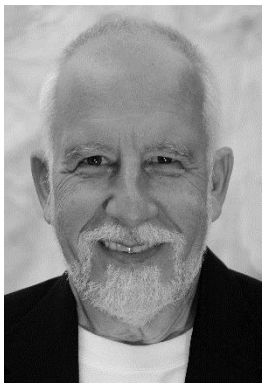
8:00 am – 3:00 pm	Poster Viewing	Ballroom
8:30 am – 12:00 pm	Poster Judging	Ballroom
8:00 am – 12:00 pm	Vendor Exhibition	Ballroom
12:00 pm – 1:00 pm	LUNCH	MarketPlace (with ticket)
1:00 pm – 2:00 pm	Keynote Address	Culp Auditorium

"From College to Space – Persistence Pays"

Dr. Karl H. Hasenstein
Endowed Professor and
Slemco/LEQSF Regents Professor of Science
Department of Biology, University of Louisiana at Lafayette

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

Keynote Presentation



Dr. Karl H. Hasenstein

Endowed Professor and
Slemco/LEQSF Regents
Professor of Science
Department of Biology
University of Louisiana at Lafayette

Karl Hasenstein grew up in a little town in Germany and attended the University of the Saarland in Saarbrücken. He studied Biology, Physics, and Chemistry and received his diploma (equivalent to M.S.) in 1977. After receiving his Ph.D. in 1982, he worked as post-doc in the laboratories of David Rayle (San Diego State University) and Michael Evans (Ohio State University) before accepting a faculty position at the University of Louisiana at Lafayette in 1988.

Dr. Hasenstein's interest in hormone biology, general physiology, metabolism, and physical effects on biological systems resulted in the development of experiments designed to investigate the interface between biology and physics – the process of gravisensing in plants. The use of high-gradient magnetic fields as surrogate for gravity resulted in a space experiment onboard of the ill-fated STS-107 before finally succeeding in a Space-X3 flight. Parallel studies investigated mechanical properties of cells, the effect of the cytoskeleton, and genetic analyses of physiological events at high spatial resolution using newly developed Solid-Phase Gene Extraction technology. His research is supported through NSF, DOE, NASA, and other funding agencies in excess of 7 million dollars. He graduated ten PhD and six MS students, published so far 108 peer reviewed papers presented his research in more than 180 conference presentation, and 65 invited talks. He serves as reviewer, editor and interim administrator and frequent panel member of various funding agencies.

From College to Space – Persistence Pays

The talk recounts the speaker's history as a student of the sciences - biology, physics and chemistry. The initial focus on early computation developed into modeling of plant-related processes and ultimately a research focus on plant hormones. The concept of changing hormonal relations applies to many processes in biology including the response to gravity. The attempt to apply insights in physics and biology to space exploration resulted in intense, NASA-sponsored research activities that included many preparatory tests, setbacks, and ultimately a successful experiment. Constantly-evolving questions about biology, students, technologies, motivation and coping with setbacks accompanied these activities. The journey to space may not be an exception but the future for many of us.

ASRF Task Force

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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
Katie Baker
Ginni Blackhart
Russ Brown
Stacy Brown
Donna Cherry
Gerardo Gomez
Nathan Hale
Michael Kruppa
Dhirendra Kumar
Sharon Loury
Diana Morelen
Matt Palmatier
Ken Phillips
Eric Sellers
Jill Stinson
Faustine Williams
Lev Yampolsky

Posters

Alok Agrawal
Arsham Alamian
Karin Bartoszuk
Patrick Bradshaw
Ranjan Chakraborty
Ivy Click
Suman Dalal
Julia Dodd
Andrew Dotterweich
Mohamed Elgazzar
Susan Epps
James Fox
Rosemary Geiken
Lee Glenn
Sam Harirforoosh
James Horton
Kiana Johnson
Karl Joplin
Scott Kirkby
Deb Knisley
Mildred Maisonet
Greta Marek
Catherine McCusker
Hua Mei
Darrell Moore
Victoria Palau
Matt Palmatier
Jonathan Peterson
Ken Phillips
Aaron Polichnowski
Brooks Pond
Jennifer Price
Megan Quinn
Diego Rodriguez-Gil
Karen Schetzina
Robert Schoborg
Dane Scott
Abbas Shilabin
Suhas Shinde
Sanjay Singh
Deb Slawson
Jody Southerland
Jill Stinson
Douglas Thewke
Mohammad Uddin
Flo Weierbach
Faustine Williams
Stacey Williams
Gary Wright
Qian Xie
Valentin Yakubenko

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Exhibitors

ETSU Exhibitors

The Department of Biomedical Communication

The Department of Health Services Management and Policy

School of Graduate Studies

Oral Presentation Abstracts

Post-Doctoral Fellows

E. TN Room 1:00

NF2 SIGNALING PATHWAY PLAYS A PRO-APOPTOTIC ROLE IN β -ADRENERGIC RECEPTOR –STIMULATED CARDIAC MYOCYTES APOPTOSIS

Suman Dalal[1], Barbara Connelly[1], Mahipal Singh[1], Krishna Singh[1,2]*.
[1] Department of Biomedical Sciences, Quillen College of Medicine, East Tennessee State University, Johnson City, TN;
[2] Veterans Affairs Medical Center, Mountain Home, TN.

Introduction: β-adrenergic receptor (β-AR) stimulation induces cardiac myocyte apoptosis in vitro and in vivo. Tumor suppressor protein NF2 (neurofibromin 2, also known as merlin) is a member of the ezrin/radixin/moesin (ERM) family of proteins. Post-translational modifications such as phosphorylation and sumoylation affect NF2 activity, subcellular localization and function. Role of NF2 in inhibition of cell growth and apoptosis is well established in a variety of cell types. However, the role of NF2 in β-AR-stimulated cardiac myocyte apoptosis remains to be investigated. Here, we tested the hypothesis that β-AR stimulation induces post-translational modifications of NF2, and NF2 plays a pro-apoptotic role in β-AR-stimulated apoptosis. Methods: Adult rat ventricular myocytes (ARVMs) were isolated from the myocardium of adult male Sprague Dawley rat. ARVMs and H9C2 cardiomyoblasts were cultured in DMEM. Cells were treated with isoproterenol in the presence or absence of other pharmacological agents. Cell lysates were analyzed by western blots and co-immunoprecipitation assays. Apoptosis was measured using TUNEL-staining assay. siRNA transfection was used to knock-down NF2. Results: Treatment of adult rat ventricular myocytes (ARVMs) with β-AR agonist (isoproterenol, ISO, 10 μM) increases phosphorylation (serine 518) and sumoylation of NF2. Co-immunoprecipitation assay confirmed β-AR-stimulated sumoylation of NF2. β-AR stimulation increased nuclear translocation of phosphorylated and sumoylated NF2. Activation of adenylyl cyclase using forskolin mimicked the effects of ISO. β1-AR receptor antagonist (CGP 20712A) and protein kinase A inhibitor (H89) decreased β-AR-stimulated increase in NF2 phosphorylation. Knockdown of NF2 using siRNA decreased ISO-mediated increase in the number of apoptotic ARVMs (CTL, 8.7±0.7; ISO, 23.2±1.0*; negSiRNA+ISO, 21.3±1.2*; NF2-SiRNA+ISO, 12.0±1.5$; *$p<0.05$ vs CTL; $^{\$}p<0.05$ vs ISO and negSiRNA+ISO, n=3-4). Adenoviral-mediated expression of WT-NF2 increased phosphorylation and sumoylation of NF2, and induced apoptosis in ARVMs. It also stimulated mitochondrial death pathway as demonstrated by the activation of JNKs (a pro-apoptotic kinase) and increased BAX expression. Treatment with ISO and forskolin, or adenoviral-mediated expression of NF2 increased phosphorylation (inactivation) of YAP, a downstream target of NF2. In H9C2 cardiomyocytes, knockdown of NF2 using siRNA decreased β-AR-stimulated increase in NF2 and YAP phosphorylation. Conclusion: These data suggest that β-AR stimulation affects post-translational modification of NF2 via the involvement β1-AR/PKA pathway, and NF2 plays a pro-apoptotic role in β-AR-stimulated myocyte apoptosis.

E. TN Room 1:15 **SEXUAL MINORITY WOMENS ACCESS TO HEALTHCARE**

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

Sexual minority women experience a number of physical and mental health disparities compared to their heterosexual peers. One factor contributing to this disparity is access to care, of which sexual minority women also report having less than heterosexual women. In this study I examine predictors of sexual minority women's access to care in three ecological contexts: structural, community, and interpersonal. Eighty-eight sexual minority women 22 and older from Davidson County, TN responded to an online survey that gathered information about demographic factors and various aspects access to care including accessing healthcare systems, gaining access within the system, and patient/provider relationships. Multiple regression analysis was used to determine whether demographic factors were significant predictors of access to care. Age, education, and degree to which participants were open with others about their sexual orientation were significant predictors of access. Results point to significant differences in access to care within this population that has multiple marginalized identity statuses, indicating a need for attention to within-population access needs. Sexual minority women who are younger, less educated, and less out to others about their sexual orientation may be at increased risk to face barriers to care. Implications for practice and policy include a need for increased cultural competence of healthcare providers, and changes in policies that will close the insurance gap between heterosexual and sexual minority adults in the U.S.

E. TN Room 1:30 **ANANDAMIDE: AN ENDOCANNABINOID IN THE MOSS AND ITS IMPLICATIONS AND METABOLISM**

Suhas Shinde[1], Shivakumar Devaiah[1], Ruth Welti[2], and Aruna Kilaru[1].
[1] Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City TN;
[2] Division of Biology, Kansas Lipidomics Research Center, Kansas State University, Manhattan, KS.

N-Acylethanolamines (NAEs) are bioactive acylamides which are involved in diverse biological functions in eukaryotes. Although NAEs are ubiquitous in plants and animals, occurrence of N-arachidonoylethanolamide (anandamide, AEA, NAE20:4) is limited to mammals and early land plants. Metabolism of NAEs and their functional implications in plants are yet to be fully discovered. Unlike seed plants, bryophytes possess unique fatty acid composition that includes abundance of polyunsaturated fatty acids such as arachidonic acid (AA, 20:4) and eicosapentaenoic acid (EPA, 20:5). Moss Physcomitrella patens contains ~18.7 and 15.9 % of AA in gametophores and protonemata, respectively. Therefore, it is hypothesized that P. patens may exhibit a unique NAE metabolite profile. To this extent, we performed lipid profiling and discovered long-chain NAEs and their corresponding N-acyl-phosphatidylethanolamine (NAPE) precursors in Physcomitrella and Selaginella. In protonemal tissues, N-arachidonyl-PE and N-20:5-PE contributed to about 49 % and 30 %, respectively. Matured gametophytes on the other hand showed a

12 % increase in N-20:4-PE and 20 % decline in N-20:5-PE, relative to NAPE content in protonemata. In all haploid developmental stages analyzed, NAE20:4 levels contributed to ~ 23 % of the total NAE while NAE 20:5 remained as a minor component (5 %). Interestingly, in Selaginella moellendorffi, an early vascular plant, N-18:2-PE species was most abundant; minor amounts of N-20:3-PE, N-20:4-PE and N-20:5-PE were also present with only a traceable quantity of NAE20:4. To understand biological implications of AEA, we examined the effects of exogenously applied AEA and its corresponding fatty acid (AA) on moss protonemata growth. Both AEA and AA inhibit growth of gametophytes and protonemata in a dose dependent manner. Additionally, we identified moss ortholog for NAPE-hydrolyzing phospholipase D (NAPE-PLD) enzyme that likely generates AEA. Putative PpNAPE-PLD has been expressed in E. coli for further characterization. Our data demonstrates the occurrence of evolutionarily conserved NAE metabolic pathway in the moss, with an exclusive occurrence of AEA. However, functional and evolutionary implications of this mammalian endocannabinoid in early land plants remain elusive.

Medical Residents and Clinical Fellows

❋ Case Studies ❋

E. TN Room 2:15

COMPLICATED ENTEROCOCCAL ENDOCARDITIS: CEFTRIAXONE-AMPICILLIN FAILURE IN NATIVE AORTIC VALVE INFECTION

Tarvinder Gilotra, MD and Taha, Yasir, MD.
Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Enterococcus endocarditis (EE) ranks as the third most common cause of infective endocarditis after *Streptococcus viridans* and *Staphylococcus aureus*. It is relatively rare accounting for 10-20% of cases, and is usually associated with damaged native or prosthetic valves. Predominantly left-sided, EE more commonly involves the aortic rather than mitral valve. Treatment of EE has been challenging since its first description in 1899 due to high level resistance of this species abolishing adequate bactericidal activity of antimicrobials. The standard treatment has conventionally included a synergism of penicillin (or Vancomycin in Penicillin allergies) and aminoglycoside (preferably Gentamycin). However, due to a recent upsurge of high level aminoglycoside resistance (HLAR) and long known nephrotoxicity with prolonged use of this drug class, newer drug regimens have been tried with documented success. A Ceftriaxone-Ampicillin combination has emerged as non-inferior to previous standard regimens despite inherent enterococcal resistance to cephalosporins. This regime is currently recommended by the AHA as an alternative for *Enterococcus faecalis* endocarditis with HLAR. Case Presentation: A 79 year old gentleman with severe aortic stenosis and recent coronary artery bypass grafting (CABG) was admitted for 3-4 days of increasing generalized weakness, intermittent chest pain, and subjective fevers/chills. While undergoing empiric hospital acquired pneumonia treatment, blood cultures grew pan-sensitive *Enterococcus faecalis.* Transesophageal echocardiography (TEE) revealed a 5mm mass along the ventricular surface of the aortic valve (AV) non-coronary cusp suspicious for endocarditis. Antibiotics were changed to Ampicillin and Ceftriaxone for 6 weeks followed by Augmentin. Patient was discharged with improving symptoms. He was readmitted two months later for worsening dyspnea, weight gain, and bilateral leg swelling. Transthoracic echocardiography revealed AV mass enlargement with two new smaller masses on the involved cusp. Moderate aortic regurgitation (AR) was also noted. LV ejection fraction (LVEF) significantly decreased to 35-40% from 55-60% on prior TEE. The patient was started on diuretics, Vancomycin and Piperacillin-Tazobactam. TEE confirmed LVEF reduction to 20-25%, AV destruction with multiple vegetations, and a 1x2.7cm abscess cavity at the posterior aspect of the affected AV cusp. Given these findings, new-onset atrial fibrillation, recent CABG and advanced age, surgery was contraindicated. Goal of treatment was transitioned to comfort care. Discussion: Reportedly, enterococcus native valve endocarditis (NVE) is more aggressive and refractory to medical management than prosthetic valve endocarditis (PVE). The case above describes enterococcus NVE treated with Ceftriaxone-Ampicillin with the rare

complication of aortic valve abscess and systolic heart failure. Adjunctive aminoglycosides might be synergistic for complicated EE.

E. TN Room 2:30 **STERNOCLAVICULAR JOINT SEPTIC ARTHRITIS PRESENTING AS EXCRUCIATING CERVICAL AND CHEST PAIN WITH INTRACTABLE HICCUPS**

Kim Phung L. Nguyen, MD., and Vandana Pai, MD.
Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Case Description: A 72-year-old man, fell 1 month ago, was admitted to hospital for GPC bacteremia. He was treated in the E.D. one day prior for CAP with nonproductive cough, WBC 19.7, CXR showing parapneumonic effusions with PNA involving right lung base. He was discharged home with lequavin after blood cultures were collected. Patient noted of having chest pain the past 3 days with subsequent hiccup development the last 2 days. Shoulder joint movement was restricted. Chest pain was right-sided, radiated from distal sternal border toward to neck. On examination, temp 98.2F, HR 111, BP 137/79, RR 20, SpO2 94% on RA. There was cervical/supraclavicular fullness, no crepitus, tender but without redness or warmth. Glenohumeral joint movement was limited. Lungs were clear to auscultation. Labs showed lactate 1.2 mmol/L, WBC 17.3 with left shift. Repeat CXR showed opacity in right lower lung without pleural effusion or bony abnormality. Patient was started on rocephin and doxycycline. Given recent fall, right-sided chest pain, intractable hiccup, fullness at neck region without crepitus, CT neck/soft tissue was order to evaluate for fracture, dislocation, subcutaneous emphysema, infection, or referred pain from diaphragmatic/pericardial pleural irritation in setting of RLL CAP. CT showed soft tissue infiltration centered in the right sternoclavicular region which extends inferiorly into the anterior mediastinum. There is superior extension along the right lateral anterior border of the thyroid, deep to the sternocleidomastoid. Infiltrated/inflamed fat interdigitates between the carotid artery and the thyroid on the right. No subcutaneous gas or venous thrombosis. These findings were most consistent with septic right sternoclavicular joint (SCJ), with cellulitis/myositis involving the right sternocleidomastoid, with phlegmon extending into the anterior mediastinum. ESR 72 mm/hr, CRP 248.3 mg/L. Blood cultures grew S. aureus pansensitive. TTE did not show evidence of infectious endocarditis. He was treated with IV ceftriaxone 2gm q24h for 6 weeks total. Patient did not have indication for acute surgical intervention, per thoracic surgery. On ID clinic follow up, WBC 5.5, ESR 51 mm/hr, CRP 40.6 mg/L. Discussion: The SCJ is an unusual site of septic arthritis. It is involved in 0.5-1.0% of all joint infections and <0.5% of joint infections in healthy patients. Common risk factors for SCJ septic arthritis include IVDU (21%), infection at distant site (15%), DM (13%), trauma (12%), and infected central venous line (9%). No risk factors were found in 23% of patients with SCJ septic arthritis. The route of infection is often unknown. The clinical signs of SCJ septic arthritis are chest pain localizing to SCJ (78%), fever (65%), and shoulder pain (24%). Management of SCJ septic arthritis consists of surgical debridement and IV antibiotics. The rate of positive cultures with needle aspiration is 77%, surgical debridement 36%, and blood cultures 13%. Typical causative organisms: S. aureus (49%), P. aeruginosa (10%), Brucella melitenis (7%), E. coli (5%), and less frequently M. tuberculosis. SCJ septic arthritis may lead to serious complications such as osteomyelitis, chest wall abscess, mediastinitis,

myositis, with irreversible tissue damage. Prompt diagnosis and appropriate surgical and antibacterial treatments are required.

E. TN Room 2:45 **ANAPLASTIC THYROID CARCINOMA: A HARSH HISTOLOGY AMIDST A GENERALLY CURABLE CANCER**

Dheeraj Reddy MD, Nagabhishek Moka MD, Koyamangalath Krishnan MD, and Devapiran Jaishankar MD. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Anaplastic thyroid carcinoma (ATC) is a rare andextremely aggressive neoplasmwith a dismal prognosis, making management very challenging.We present one such case of ATC. A fifty-five year-old female was hospitalized with a two week history of rapid onset of painless neck swelling, orthopnea, voice changes and progressive dysphagia. She had a history of a large neglected goiter for five years. On exam, inspiratory stridor was noted with a palpable 10cm nontender right neck mass extending past the midline with tracheal deviation.Her thyroid function test was unremarkable. CT neck demonstrateda 11.4 x 8.6 x 10.1 cm complex mass arising from the right thyroid lobe associated with right internal jugular thrombosis, severe tracheal deviation, esophageal compression and multiple pulmonary masses concerning for metastatic disease. Herrespiratory status deteriorated requiring emergent tracheostomy. Pathology demonstrated an extensively necrotic highly infiltrative carcinoma with atypical spindled epithelioid cells, staining for Vimentin and thyroglobulin confirming ATC.As her tumor was deemed unresectable and could not be cytoreduced with palliative radiation, she underwent 4 cycles of weekly palliative Carboplatin/Paclitaxel chemotherapy. She developed worsening dysphagia with repeat scans revealing an increase in the neck mass (12.4 x 9.1 x 12.3 cm). She opted for hospice and succumbed to her cancer 3 months after diagnosis. ATC occurs in 1% of all thyroid cancer cases affecting patients in the sixth to seventh decade of life, with an annual incidence of 1-2 per million/year and an average median survival of 5 months. Most patients with ATC have an antecedent goiter and seek attention with an enlarging neck mass and locoregional symptomssuch as pain, dyspnea, dysphagia or hoarseness. Different histopathologic patterns including spindle, pleomorphic, and squamoidcell morphologies have been described. The American Joint Committee on Cancer automaticallyclassifies ATC as a stage IV cancer highlighting its aggressive behavior.Treatment options include surgical resection to gross negative margins when possible,neoadjuvant or adjuvant chemotherapy and external beam radiation for palliation. Common chemotherapy regimens use Doxorubicin and Platinum based on a 15% to 25% response rate.Genotyping has shed light on the complex mutational landscape of ATC. The use of novel targeted therapies to target BRAF (vemurafenib), ALK(crizotinib)and PI3K/AKT/mTOR pathway (everolimus) have been promising in small case series. Other targeted therapies such as lenvatinib, a newer, VEGFR inhibitor and PDL-1 inhibitors are being investigated. The rarity and aggressive nature of ATC has been a major barrier in finding effective therapies due to low rates of accrual in clinical trials. Our case serves to highlight the rapid presentation, poor response to treatment and abysmal prognosis of ATC in comparison to most thyroid carcinomas that are highly curable.

E. TN Room 3:00

"THESE LIGHTS ARE TOO BRIGHT" : VARICELLA ZOSTER INFECTION WITH MENINGITIS AND SHINGLES IN A YOUNG IMMUNOCOMPETENT ADULT

Dr. Pratyaksha Sankhyan, Dr. Akhilesh Mahajan , Dr. Christopher Cook , Dr. Venugopal Bhattad , and Dr. Deidre Pierce. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

We report a rare case of Varicella zoster reactivation meningitis (incidence 0.5%) in a young immunocompetent adult. The patient is a healthy 39 year old white male who presented to the emergency room with complaints of a severe generalized headache of 1 day's duration. Associated symptoms included arthralgia, myalgia and a 102 Fahrenheit fever. Complete Blood Count demonstrated a normal white count with normal differential. Physical exam was significant only for mild neck stiffness. Computed Tomography of the head was performed and was within normal limits. Lumbar puncture was suggested but declined by the patient. He was ultimately discharged home. The following day he returned with progressively worsening headache, neck stiffness, photophobia and was admitted to the hospital. A careful medical history revealed sudden onset of burning pain in the right flank, followed a few hours later by a fever (101 F) with headache and associated photophobia, phonophobia, neck stiffness, myalgia and arthralgia. He was employed as a nurse at a local hospital with frequent contact with sick, elderly and immunocompromised patients. However, he had no medical problems predisposing him to an immune compromised state. His past medical history was significant only for provoked deep vein thrombosis following an ankle sprain, malignant melanoma stage 1 and a self limited varicella zoster infection during childhood. On physical examination, he had a few small vesicular eruptions below the right scapula, which progressed over the course of his hospitalization to a vesicular erythematous rash associated with severe burning pain in the T7-T8 dermatome, extending from the right scapular line posteriorly to the mid clavicular line anteriorly. A lumbar puncture performed in the Emergency Room showed increased protein (116mg/dL), pleocytosis (281/uL) with lymphocyte predominance (94%), 935/uL RBCs and normal glucose (55mg/dL). He had an Erythrocyte Sedimentation Rate of 2 mm/hr, C Reactive Protein 0.05 mg/dL and no leucocytosis. His Magnetic Resonance Imaging scan was within normal limits. At this point, we diagnosed him with aseptic meningitis and given his classic shingles rash, started treatment suspecting varicella infection. The patient was placed in a dimmed, quiet, isolation room and started on IV Acyclovir 10mg/kg 8 hourly. In the meantime his cerebrospinal Fluid was sent for Herpes polymerase chain reaction and returned positive 4 days after beginning treatment. He was discharged home on oral valcyclovir 1 gm, 8 hourly for 7 days. On a follow up phone call 10 days later, patient stated that he had improved significantly and was able to return to work with minimal fatigue and no sequelae.This case represents a rare presentation of Aseptic meningitis and shingles due to varicella zoster reactivation in a healthy young adult. This case should urge clinicians to keep a high index of suspicion in cases of new onset severe headaches with vesicular rash, even in healthy young adults. Timely start of antiviral treatment can help prevent complications like motor neuropathy, herpes encephalitis, post herpetic neuralgia and the vision-threatening complications herpes zoster ophthalmicus and acute retinal necrosis.

Medical Residents and Clinical Fellows

❋ Biomedical and Health Sciences ❋

Forum Room 9:00

YOU TUBE AS A SOURCE OF INFORMATION FOR IRRITABLE BOWEL SYNDROME: A CRITICAL APPRAISAL

Harika Balagoni[1], Rufaat Mando[1], Keerthy Reddy[2], Apurva Bansal[1], Adegbemisola Aregbe[3], Kailash Bajaj[1], Shimin Zheng[4], Mark Dula[4], Claudia Kozinetz[4], Nathaly Cuervo-Pardo[5], Mark Young[1], Chakradhar Reddy[1], and Alexei Gonzalez-Estrada[1]. Departments of [1] Internal Medicine and [2] Pediatrics, Quillen College of Medicine, East Tennessee State University, Johnson City, TN; Departments of [3] Health Sciences, and [4] Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN; [5] Universidad del Valle, Cali, Colombia.

Introduction: Irritable Bowel Syndrome (IBS) is estimated to affect 11% of the popula-tion globally with a significant female predominance. IBS appears to afflict all age groups and socioeconomic conditions, thus making it a disease that permeates a very large part of society. While often debilitating, only 30% of those with IBS will indeed visit their physician. In an era dominated by social media, it is no surprise that 40% of all consumers report that online information affects the way they deal with their health. YouTube is one of the top 5 most accessed online resources for medical information. The strong reliance on online information as well as the rising prevalence of IBS has prompted us to determine the educational quality of IBS YouTube videos. Methods: We performed a YouTube search using the keywords "Irritable Bowel Syndrome" from September 3-25, 2016. The top 297 most viewed videos were included and analyzed for characteristics, source, as well as content. The source was classified as healthcare provider, alternative medicine provider, patient and/or parents, company, media, or professional society. Content was further classified as medical professional education, advertisement, personal experience, patient education, alternative treatment or increase awareness. A scoring system was designed based on current accepted guidelines from multiple professional and academic societies to evaluate quality (-10 to +25 points). Negative points were assigned for misleading information. Videos were also scored by a global quality score. Six blinded reviewers were asked to view the videos and score each video independently. Results: A total of two-hundred and ninety-seven videos were analyzed, with a median of 6,671 views, 25 likes, and 2 dislikes. Females were most commonly depicted (36.4%). The most commonly depicted race was White/Caucasian (62.0%). Among video sources, alternative medicine was most represented (32.3%) with treatments that included water fasting, yoga, hypnotherapy, frequency healing, massage therapy, and essential oil therapy. The least represented source was professional societies such as hospitals (5.4%). Mean scores were statistically different from each other ($p<.0001$) [Table 1]. These differences were especially exaggerated when professional society, media, and healthcare providers (mean scores between 4.3 and 5.7) were compared to other video sources (mean scores between 1.7 and 2.0). There was a high degree of agreement between reviewers (Intraclass correlation= 0.775; $P<.0001$). Conclusion: YouTube videos on IBS are mostly produced by alternative treatment sources with often controversial treatments that did not align with

current evidence based guidelines. Furthermore, videos from healthcare professionals provided better and more accurate quality of information compared to other sources.

Forum Room 9:15

YOUTUBE AND EOSINOPHILIC ESOPHAGITIS: AN ASSESSMENT OF THE EDUCATIONAL QUALITY OF INFORMATION

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Introduction: Eosinophilic Esophagitis (EoE) is a rare allergic inflammatory disease affecting approximately 1-4 in every 10,000 individuals in the United States. With the dramatic increase in prevalence of EoE in recent years and the increasing use of the internet as a source of health care information, we sought to evaluate the educational quality of EoE videos on YouTube. Methods: We performed a YouTube search using the keyword "eosinophilic esophagitis" from September 8-27, 2016. All available videos were included and analyzed for video characteristics, source, and content. Source was further classified as health-care provider, alternative-medicine provider, patient and/or patient's parents, company, media, or professional society. A scoring system was created based on current guidelines to evaluate the quality of information (-10 to +30 points). Negative points were assigned for misleading information. Six blinded reviewers scored each video independently. Results: Two hundred and nine videos were analyzed, with a median of 507 views, 1 like, 0 dislikes, and 0 comments. More video presenters were male (50.9%), and the most commonly depicted race was Caucasian (73.6%). The most common type of video source was professional society (39.7%), and the least represented video source was company and media (8.6%). Among the four video sources, the mean scores showed a statistically significant difference from each other ($p<0.0001$). There was a higher mean score for videos by health care providers (5.7) when compared to other video sources (mean score between 3.3 and 4.6). Table 1 summarizes mean scores by video source, as well as intraclass correlation, which showed a high degree of agreement among reviewers (ICC = 0.843; $p < 0.001$). Conclusion: Youtube videos on EoE were shown to be a poor source of valid health care information. Videos by health-care providers were a better source of information compared to other sources. This study reiterates the need for higher quality educational videos on EoE by the medical community.

Forum Room 9:30

HOSPITAL READMISSIONS SECONDARY TO CONGESTIVE HEART FAILURE: CAUSES, PREVENTION MEASURES, AND RURAL EASTERN TENNESSEE READMISSION RATES COMPARED TO NATIONAL READMISSION RATES

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Introduction: Congestive Heart Failure (CHF) is the leading cause of hospital readmissions, which are admissions to the hospital that occur less than 30 days from previous hospital discharge. Hospital readmissions account for a large economic burden on the medical field and are potentially preventable. The Affordable Care Act includes the Hospital Readmission Reduction Program, which penalizes hospitals for readmission rates that are higher than the national average for targeted diagnoses, which include CHF, heart attacks, emphysema, and pneumonia. Tennessee consistently has readmission rates that are higher than the national average, and hospitals in eastern Tennessee are consistently penalized for the elevated readmission rates. The objectives of this study include analyzing the causes of hospital readmissions and methods to prevent readmissions secondary to CHF, assessing the effectiveness of recent legislation aimed at reducing readmissions secondary to CHF on the national level and in rural eastern Tennessee, and determining the effectiveness of readmission mitigation strategies implemented in healthcare facilities to inform future readmission reduction programs. Methods: Through a retrospective cohort study design, readmission rates secondary to CHF in the Tri-Cities region of eastern Tennessee will be analyzed and compared to published national readmission data. Readmission data is collected from the major hospital in each of the Tri-Cities (Johnson City Medical Center, Holston Valley Medical Center in Kingsport, and Bristol Regional Medical Center). Participants include adults greater than18 years old discharged from medical facilities in eastern Tennessee from 2012 to 2016, with readmission less than or equal to 30 days from prior hospital discharge for CHF. Results: National readmission rates have decreased for all causes of initial admission diagnosis but have decreased most for the targeted readmission diagnoses, which as of 2012 included CHF, heart attack, and pneumonia. Emphysema was added as a targeted diagnosis in 2015. There is no published data about national readmission rates since 2015. Tennessee as a state has higher readmission rates than the national average. This study will assess how the Tri-Cities eastern Tennessee region compares nationally. Conclusions: Although all-cause-readmissions have decreased over the past decade on the national level following initial admission due to a targeted admission diagnoses (including CHF), readmissions in Tennessee and the Tri-Cities region in particular remain higher than the national average. Elevated readmission rates for hospitals in the Tri-Cities region of eastern Tennessee has led to these hospitals having to pay penalties in accordance with the Hospital Readmission Reduction Program. In general, hospital readmissions are decreased through educating patients about disease processes, communication between patients and physicians, communication between inpatient and outpatient physicians to facilitate transition of care, and healthcare professionals helping patients address barriers to compliance. Following evaluation of readmission rates secondary to CHF in the Tri-Cities region, recommendations will be made for future programs to mitigate hospital readmissions that would apply to the rural eastern Tennessee region as well as nationally.

Mtg Rm 1 2:30 **DOES EARLY LEVEL OF AUTONOMY CORRELATE WITH RESIDENT CONFIDENCE?**

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Nationally, 85% of general surgery graduates pursue fellowships reducing the incoming "general" surgical workforce. The Association of American Medical Colleges predicts a shortage of 41,000 general surgeons by 2025. In recent studies, lack of confidence appears to be a major factor contributing to resident decision to pursue fellowship. The objective of this study was to compare levels of confidence in current general surgery residents with perceived level of autonomy at a hybrid academic/community program that historically produces 70% general surgeons. An anonymous survey was sent to current residents and attending surgeons at our institution. Participants responded to questions on their experiences of resident autonomy, level of confidence in technical skills and teaching using Likert scales. Descriptive statistics were calculated. There were 28 residents (90%) and 15 attending surgeons (54%) that responded. Current residents were performing >75% of major cases as surgeon junior at an earlier PGY level than experienced by attending surgeons. Both groups felt the current level of autonomy as a chief resident has declined. There was a decrease in the level of confidence of current chief residents in performing procedures independently at time graduation and in teaching junior residents technical skills. The level of autonomy given by attending surgeons on listed procedures to current residents was reflected in confidence levels of residents performing such procedures. 33% of our current chief residents and only 34% of the total general surgery residents at this institution plan to pursue fellowships. 67% of responding surgeon attendings were fellowship trained. Our study showed that although residents gained early technical experience in the operating room compared to current practicing surgeons, the level of confidence as a graduating chief did not improve. There was a larger correlation with the level of autonomy as a chief resident with level of confidence in surgical skills. A decrease in resident confidence at graduation did not correlate with the hypothesis that declining levels of technical confidence results in increased desire to pursue fellowship previously described. Questions arise whether there is an innate quality of community programs that contribute to resident decision to not specialize. Policies and practices should be considered to increase the level of autonomy as a chief resident as they are soon to be in the practicing physician population.

Doctoral Candidates

❋ Natural, Biomedical and Health Sciences ❋

Forum Room 1:00

CHARACTERIZATION OF SIR2 LIKE DEACETYLASE FOR ITS ROLE IN PLANT STRESS SIGNALING MECHANISM

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Salicylic acid (SA) is an important phenolic plant hormone responsible for inducing various plant defense genes in response to pathogenic infection. Synthesis of SA takes place in effector-triggered immune (ETI) response of the plant against the effector molecules released by the invading pathogen. SA is essential for activating the systemic acquired resistance (SAR), which is an important mechanism that protects the plant from subsequent infection by pathogens. MeSA (methyl SA) is the phloem-mobile signal for SAR. SABP2 is a critical enzyme which by its esterase activity catalyzes the conversion of methyl salicylate (an inactive form of SA) to SA (active). SABP2 is critical for mounting an effective SAR response. SIP-428 is one of the SABP2-interacting tobacco protein that shows high similarity with SIR2 (Silent Information Regulator 2) like proteins. SIR2 enzymes exhibit NAD+ dependent deacetylase activity and are known to catalyze the post-translational deacetylation of acetylated lysine residues. 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. The presence of acetylated lysine residue in a number of cellular and organellar proteins implicated in physiological and metabolic pathways open up the possible role of SIP-428 in plant physiology including plant immunity. Recombinant SIP-428 from tobacco, when expressed heterologously in E. coli, exhibited NAD+ dependent deacetylase activity but interestingly its lysine residue itself was found to be acetylated. This raises the possibility of a post-translation regulatory mechanism that is likely to modulate or activate SIP-428. To better understand the role of SIP-428 in plant physiology how it gets activated, what are its possible target protein, 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 SIP-428. We have already generated verified hairpin RNAi-silenced transgenic tobacco lines. Verified SIP-428 overexpression transgenic lines are also being generated under the control of an inducible promoter. T2 generation line of both SIP-428 silence and overexpression will be used for biotic and abiotic stress response analysis.

Forum Room **1:15**

REGULATION OF PRO-INFLAMMATORY (M1) AND ANTI-INFLAMMATORY (M2) MACROPHAGE MIGRATION BY β2 INTEGRINS DURING INFLAMMATION

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Background. The development of chronic inflammation depends on the balance between accumulation of pro-inflammatory (M1) and anti-inflammatory (M2) macrophages at the injury site. The migration and accumulation of macrophages in the inflamed sites largely depend on myeloid-specific αMβ2 and αDβ2 integrins, which share similar ligands but have different densities on different subsets of macrophages. The level of integrin expression regulates cell migration. Namely, a low-intermediate expression supports cell motility, while a high expression generates strong adhesion that prevents cell migration. In this project, we tested how αMβ2 and αDβ2 integrins are involved in the migration and retention of M1 and M2 macrophages at the site of inflammation. Method and Results**.** To test our hypothesis, wild type (WT), αD-/- and αM-/- mice were intraperitoneally injected with thioglycollate to generate macrophages. Isolated macrophages were treated with IFN-γ and IL-4 for 4 days to activate M1 and M2 phenotypes, respectively. Integrin levels on macrophages were evaluated by qPCR and FACS. We found that the expression of αD was strongly upregulated on M1 macrophages, but not on M2 macrophages, while the level of αM remained unchanged on both subsets. To test the effect of integrins on the migration of M1 and M2 macrophages, we labeled cells with red and green fluorescent dyes and applied in vitro migration assay in 3D fibrin matrix. Our results showed that WT M2 macrophages possess significantly stronger migratory properties compared to WT M1 macrophages. To understand the contribution of individual integrins we used αD-/- and αM-/- macrophages. The results demonstrated that while αM-deficiency had no significant effect, αD-deficiency improved the migration of M1 macrophages. In contrast, both αD- and αM-deficiency reduced the migration of M2 macrophages. To verify these results we tested in vivo macrophage migration using the model of resolution of peritoneal inflammation. M1 and M2 macrophages, labeled with red and green fluorescent dyes respectively, were injected into the peritoneal cavity of mice with induced peritoneal inflammation. After 3 days, we evaluated the ability of macrophages to emigrate from the peritoneal cavity to lymphatics. Our results corresponded to our in vitro migratory assay. M2 macrophages emigrate significantly faster, αD-deficiency improves the efflux of M1 macrophages and αD- and αM-deficiency reduced the emigration of M2 macrophages. Conclusion**.** Taken together, these data suggest that integrin αM, which has an intermediate expression on M1 and M2 macrophages, supports macrophage migration. In contrast, integrin αD, which has a high expression on M1 macrophages, prevents the migration of these cells and can promote the retention of M1 macrophages in the inflamed sites. Therefore, integrin αD is a potential therapeutic target to prevent pro-inflammatory macrophage accumulation and development of chronic inflammation.

Forum Room 1:30

THE TYPE-2 CANNABINOID RECEPTOR MODULATES OSTEOBLASTIC TRANSDIFFERENTIATION OF VASCULAR SMOOTH MUSCLE CELLS INVOLVED IN ATHEROSCLEROTIC AND VASCULAR CALCIFICATION

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

Introduction: Atherosclerosis is a chronic inflammatory disease of the vascular system that is characterized by the buildup of cholesterol-rich plaques within arterial walls. As plaques mature they can become unstable and prone to rupture, manifesting serious health consequences such as myocardial infarction or stroke. A major contributor to plaque instability is the deposition of calcium within the plaque and vessel wall, which occurs through complex cellular and molecular mechanisms that resemble the osteogenic processes involved in bone development and remodeling. The type-2 cannabinoid receptor (CB2) is a well-known modulator of bone remodeling and our prior studies determined that systemic CB2 gene deletion significantly increases calcification of advanced plaques in Ldlr-null mice, a murine model of atherosclerosis, but the mechanisms involved have not yet been elucidated. Atherosclerotic calcification is known to involve the transdifferentiation of vascular smooth muscle cells (VSMCs) into osteoblast-like cells capable of depositing calcium. Therefore, we hypothesized that CB2 modulates calcification by affecting the expression of proteins involved in osteoblastic transdifferentiation (OBT) of VSMCs, such as Runx2, Osterix (OSX), and Osteopontin (OPN). We tested this hypothesis by evaluating the expression of these proteins in atherosclerotic plaques from Ldlr-null mice with and without CB2. We further tested our hypothesis by determining the effects of pharmacologically activating and inhibiting CB2 in an in vitro cell culture model of VSMC OBT. Methods and Results: Groups (n=8) of 8-week old Ldlr-null mice with CB2 (CB2+) and without CB2 (CB2-) were placed on a high-fat diet (HFD) to induce advanced atherosclerosis. Western blot analysis showed a 3.7-fold increase of OPN, a potent inhibitor of calcification, in aortas of CB2+ mice compared to CB2- mice after 20 weeks of HFD. Runx2 was 2.5-fold higher in aortas of CB2+ mice compared to CB2- mice, but no observed difference in OSX expression was seen between either genotype. MOVAS cells (mouse VSMCs shown to transdifferentiate into osteoblast-like cells when cultured in osteogenic media) were cultured in osteogenic media with or without CB2-selective agonist (HU-308) and antagonist (SR144528) to determine CB2-dependent effects on OBT and calcium deposition. Alizarin red staining showed a 44% reduction in calcification in MOVAS cells treated with HU-308, and a 238% increase in calcification in SR144528-treated MOVAS cells compared to the untreated cells. Conclusion: These results support our hypothesis that CB2 modulates atherosclerotic calcification, at least in part, by affecting expression of regulatory proteins involved in OBT of VSMCs. Information from this study can be used to further develop CB2-selective therapies aimed at reducing the burden of atherosclerotic plaque calcification and therefore reduce rates of mortality in patients with cardiovascular diseases.

Forum Room 2:00

AVOCADO DIACYLGLYCEROL ACYLTRANSFERASE 1 IS A KEY ENZYME TO GENERATE HEALTHY OILS

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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 was 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 DGAT1s. 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 DGAT1 was expressed in H1246, a TAG-deficient yeast strain and lipotoxicity rescue assays, TLC analysis, Nile Red staining were conducted. The complementation of this yeast strain confirmed enzyme activity and supported the possible role of avocado DGAT1 in TAG biosynthesis. Finally, substrate specificity of DGAT was determined by incubating microsomes with different radiolabeled substances and found that avocado DGAT1 has a preference toward oleic acid (18:1) compare to palmitic acid (16:0) while it is converting diacylglycerol (DAG) to triacylglycerol. All these data suggested that avocado DGAT1 is functional and making TAG with high preference of oleic acid over palmitic acid.

Forum Room 2:15

ALPHA-V BETA-5 INTEGRIN MEDIATES VITRONECTIN-INDUCED PRO-INFLAMMATORY CYTOKINES IN THE BRAIN AFTER STROKE

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Background: There is high incidence and high mortality rate of stroke in the US. With no FDA-approved neuroprotective treatments for stroke, this study aims at finding new strategies and methods of bettering the outcome of stroke patients. Increasing proliferation of neuronal stem cells in the subventricular zone (SVZ) of the brain to replace lost cells (neurogenesis) may be a way to improve outcomes after stroke, in

addition to protecting against tissue loss. Stroke causes increased expression in the SVZ of ciliary neurotrophic factor (CNTF), which promotes neurogenesis, alongside the pro-inflammatory interleukin-6 (IL-6) and leukemia inhibitory factor (LIF), which inhibit it, in the SVZ and the injury epicenter of the striatum. This rapid and robust cytokine induction is caused by leaked vitronectin (VTN) from blood. Here, I determined the role of the VTN receptor, av β 5 integrin, the only one containing the β 5 subunit, in promoting cytokine expression in the brain after stroke. Methods: I injected recombinant human VTN close to the SVZ in wild-type and β 5 integrin knock-out mice. In other sets of mice, stroke was performed by middle cerebral artery occlusion (MCAO) for 30 minutes in wild-type and β 5 integrin knock-out mice. In both sets, cytokine expression in the SVZ and striatum was measured after 24 hours by real-time PCR. Results: Intracerebral injection of VTN induced CNTF (1.5 fold), IL-6 (3.5 fold) and LIF (2.6 fold) in the SVZ of wild-type mice but not in β 5 integrin knock-out mice. Under stroke conditions, induction of IL-6 and LIF was 40% and 58% lower in the SVZ of β 5 integrin knock-out mice compared to wild-type littermates. Similarly, infarcted striatal tissues showed 24% and 40% lower induction of IL-6 and LIF respectively. In the SVZ, MCAO still induced CNTF in β 5 integrin knock-out mice. Conclusion: VTN induces IL-6 and LIF to a large extent via αvβ5 integrin. We expect enhanced neurogenesis with reduced IL-6 and LIF in the SVZ after stroke, and improved tissue sparing due to reduced detrimental immune cell infiltration, something I will investigate next.

Forum Room 2:30

CARDIOPROTECTIVE EFFECTS OF EXOGENOUS UBIQUITIN INVOLVE DECREASED INFLAMMATORY AND FIBROTIC RESPONSE IN THE HEART FOLLOWING MYOCARDIAL ISCHEMIA/REPERFUSION INJURY

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Heart disease, including myocardial infarction (heart attack), is the leading cause of mortality in the United States each year. The ischemia/reperfusion (I/R) model is a clinically relevant animal model that parallels the inflammation and fibrosis (scar formation) response associated with myocardial infarction. Ubiquitin (UB) is a small molecular weight protein best known for its role in the proteasomal degradation of damaged proteins. Previously, our lab demonstrated that sympathetic stimulation increases extracellular levels of UB independent of necrosis, and extracellular UB ameliorates the adverse effects of chronic sympathetic stimulation, namely: increases in workload, function and myocyte apoptosis. Here we tested the hypothesis that extracellular UB improves cardiac function and decreases adverse remodeling by reducing inflammation and influencing fibrosis, thereby playing a protective role in myocardial ischemia/reperfusion injury. This study used 8-12 week male C57Bl/6 mice. One day prior to ischemia/reperfusion injury, mice were infused with vehicle (saline) or UB (1μg/g/h) using micro-osmotic pumps which osmotically released UB over 3 days. The hearts were subject to ischemia for 45 min followed by reperfusion for 3 days. Heart function was assessed by m-mode echocardiography in terms of percent fractional shortening (%FS) and ejection fraction (%EF). Infarct size was determined using Masson's trichrome staining of heart sections. Inflammatory response was measured using hematoxylin and eosin (H&E) staining, napthol-ASD chloroacetate esterase leukocyte activity staining, and by immunohistochemical staining using anti-neutrophil and anti-F4/80 (macrophage) antibodies. Left ventricular tissue lysates were analyzed for expression of fibrosis related proteins; matrix metalloproteinase (MMP)-2 and -9 as well as transforming growth factor (TGF)-β by western blots. Infarct size was significantly smaller in UB-infused group. Echocardiographic analyses showed that I/R decreases heart function as measured by decreased %FS and %EF versus sham. UB treatment significantly improved %FS and %EF when compared to Vehicle-I/R group. H&E staining showed a significant decrease in inflammatory cells in UB-I/R group. Likewise, the number of neutrophils and macrophages was significantly lower in UB-infused hearts following I/R injury. Leukocyte activity assay confirmed decreased number of neutrophils in UB-I/R group. MMP-2 protein levels were higher in UB-I/R, while MMP-9 and TGF-β protein levels were lower UB-I/R group vs Vehicle-I/R group. These data suggest that exogenous UB decreases infarct size, improves heart function, decreases inflammatory response and affects fibrotic response in the heart following myocardial I/R injury. Thus, exogenous UB plays a protective role in myocardial I/R injury, possibly by limiting the extent of the inflammatory and fibrotic responses.

Forum Room 3:00

RSMA REGULATES PYOCYANIN IN PSEUDOMONAS AERUGINOSA

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Pseudomonas aeruginosa is an opportunistic pathogen able to colonize a variety of environments. *P. aeruginosa* also infects any tissue in the human body. *P. aeruginosa* causes serious complications in people with compromised immune systems like those with HIV, using chemotherapy, have burns on a majority of their body, or with cystic fibrosis. *P. aeruginosa* uses a wide variety of virulence factors to evade the immune system and create a chronic niche in its host. Pyocyanin is a virulence factor secreted by *P. aeruginosa* that inactivates host immune defenses. Here we show that the post-transcriptional regulator RsmA regulates pyocyanin production in both models for acute and chronic infection. After construction of Δ*rsmA* mutants in PAO1 and *mucA22*, our chronic infection strain model, we observed production of a blue pigment. Due to this observation we assayed pyocyanin production. Our Δ*rsmA* mutants show a significant increase in pyocyanin production. We confirmed these results by doing a catalase test on our strains. Pyocyanin is known to inhibit catalase production. Lastly, we performed a fast killing assay using *C. elegans* to examine ability for the pyocyanin producing strains to kill worms. Overall, RsmA plays a significant role in pyocyanin production in *P. aeruginosa* and elucidating its complicated regulation can lead to improvements in treating *P. aeruginosa* infections.

Forum Room 3:15

INVESTIGATING THE INFLUENCE OF BIOGENIC AMINES ON THE CIRCADIAN RHYTHMICITY OF ANTI-PREDATOR BEHAVIOR IN ORB-WEAVING SPIDERS

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While it is widely assumed that circadian rhythms benefit organisms by allowing them to anticipate changing conditions, only a few studies have directly tested this. Being both predator and prey, orb-weaving spiders offer a novel, tractable model system to test whether circadian rhythms are adaptive due to their variety of temporal foraging strategies across species. Previous work suggests that spiders modulate their aggression/wariness over the 24-cycle and that aggression and wariness are modulated by biogenic amines (neurohormones). In this study, we analyzed temporal changes in biogenic amine levels and transcriptional regulation in the orb-weaving spider Larinioides cornutus. L.cornutus individuals were collected from sites in northeast TN. After a 7-day entrainment period, spider cephalothoraxes were dissected and haemolymph was collected at 4 different time points over a 24-hour cycle. We measured gene transcription levels and neurohormone levels in haemolymph and cephalothoraxes using RNA-sequencing and HPLC-ED, respectively. Levels of individual catecholamine neurohormones did not change over the 24-hour period however, there appears to be a pattern with the ratio of octopamine to serotonin levels fluctuating over the course of the day. In addition, patterns in gene expression, specifically octopamine receptor expression, also appear to fluctuate throughout the day. Our findings demonstrate a role of not only catecholamine levels, but also underlying changes in gene expression in producing the circadian rhythmicity of aggression in the spider L. cornutus.

Forum Room 3:30

INVESTIGATION OF AUDITORY PROCESSING IN SUBJECTS WITH DIABETES MELLITUS

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Diabetes mellitus (DM) is a systemic disease that affects a number of sensory systems and is a major public health concern. A common, but under-recognized complication of DM is hearing difficulty. However, research on DM-related auditory deficits is relatively sparse. Recent data shows over a two-fold higher prevalence of hearing impairment in diabetic patients compared to non-diabetic individuals, further solidifying this strong association between diabetes and hearing loss. However, the nature of these hearing difficulties has not been clearly elucidated. In the present study, the auditory processing abilities of a group of adults (N = 9; mean age = 53.3) with type 2 DM was compared to an age matched control group (N = 9; mean age= 47.6). In addition, visual processing abilities of the participants were examined to determine if the hearing difficulties associated with DM were a function of a more global sensory deficit. The selection criteria for the DM group included age, duration of diabetes (> 5 years), and recent measures of diabetic control (hemoglobin A1C and blood sugar). Further, all participants in the test and control groups had a comprehensive hearing evaluation and had hearing (measured with pure tones 250-4000 Hz) within normal limits bilaterally. The following test measures were recorded. The Michigan Neuropathy Screening Instrument (MNSI) was administered to screen each subject for peripheral neuropathy symptoms. The Speech, Spatial & Qualities (SSQ12) questionnaire was administered to attain a measure of each individuals subjective hearing complaints. Subtle deficits in the peripheral auditory system were examined using (a) Extended high frequency audiometry, that assessed ultra high frequencies from 9000-16000 Hz bilaterally, (b) The Threshold Equalizing Noise (TEN) test, to assess for potential dead regions within the cochlea, and (c) Distortion product otoacoustic emissions (DPOAE) were collected bilaterally to assess frequency specific cochlear outer hair cell function. Higher-order auditory processing was examined with the Quick Speech in Noise Test (QuickSIN), the Listening in Spatial Noise test-Sentences (LiSN-S) and the Random gap detection, to measure temporal processing abilities. Further, the Text Reception Threshold Test (TRT) was employed to examine visual processing abilities. The results revealed that individuals with DM had significantly (a) Elevated high frequency (> 4 kHz) pure tone thresholds; (b) Increased self-reported hearing difficulties based on SSQ12 scores (c) Poorer spatial listening in noise skills based on LiSN results, (d) Lower DPOAE amplitudes for higher frequencies, and (e) Poorer temporal processing skills based on the average gap detection thresholds, when compared to the age-matched controls. These findings not only support the strong association between diabetes and hearing loss, they suggest that that even individuals with controlled diabetes potentially suffer with subclinical auditory processing deficits that may affect their quality of life. These findings have implications in the management of DM in the future. Further research is needed in order to determine clinically feasible means of evaluating DM subjects.

Doctoral Candidates

❋ Society, Behavior and Learning, Group A ❋

Mtg Rm 1
9:00

CORRELATES OF HUMAN PAPILLOMAVIRUS (HPV) VACCINE ACCEPTANCE IN APPALACHIAN TENNESSEE

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Human papilloma virus (HPV) is the most common sexually transmitted infection in the U.S. HPV is so widespread that 9 out of 10 people will be infected during their lifetime. Every 20 minutes, one HPV-related cancer is diagnosed in the U.S., the most common of which is cervical cancer, with an estimated incidence of 12,000 cases annually, a third of which lead to death. Cervical cancer disparately affects women of ethnic minority groups and geographically isolated regions, such as Appalachia. Many cases of cervical cancer can be prevented through vaccination against HPV. However, vaccination rates for females in Tennessee are among the lowest in the country. This mixed-methods study conducted an in-depth exploration of the underlying themes which influence HPV vaccine acceptance in Appalachian Tennessee. Between the 3-month period from October 2016 to January 2017, 12 healthcare providers with practices in Northeast Tennessee were interviewed, three focus groups were held with mothers of adolescent girls (n=13), and a survey was administered to college women. Interview and focus group sessions were audio-recorded, transcribed verbatim and analyzed using a thematic framework. Survey responses (n=479) were analyzed using descriptive tests, comparison of means, and regression analyses. Findings from each phase of the study were then triangulated to identify diverging and converging themes across the triad. Recurrent themes revealed that cost and age of the vaccine, concerns about vaccine safety, the vaccine's requirement status, and its implication for adolescents' sexual activity were predominant barriers to vaccine acceptance. Most of these perceptions appeared to stem from the underlying climate on sex-related topics within the larger community. On the other hand, perceived benefits of the vaccine's utility in cancer prevention, receipt of strong and personal provider recommendations, and maternal endorsement appeared to facilitate vaccine acceptance. Additionally, college students who reported vaccine acceptance also reported discussing sexual health topics with their mothers. These findings provide foundational insights about the facilitators and barriers of HPV vaccine acceptance in Appalachian Tennessee. To increase vaccination rates in the region, health education and recommendation messages should focus on the vaccine's utility in cancer prevention. Also, future studies should build on these findings to develop validated models and measures which verify the specific sociocultural predictors of HPV vaccine acceptance in Appalachian Tennessee. Identifying and understanding these factors is crucial to improving HPV vaccination rates, and essential to maximizing the primary benefit of the vaccine in addressing the existing cervical cancer disparity in the region.

Mtg Rm 1 9:15 **RECONCEPTUALIZING SELF-CONTROL AS A MOTIVATIONAL CONSTRUCT**

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Previous theorizing has considered self-control to simply reflect an individual's ability to suppress impulses. Those who are better as inhibiting impulsive behavior have higher self-control. Further research has even suggested that this ability to suppress impulses is limited, and may become depleted with overuse (the strength model of self-control). However, recent work suggests that self-control consists of more than the mere suppression of impulses, and is not necessarily depleted by extensive use. The current research conceptualizes of self-control as a complex construct governed by the interaction of short-term desires, long-term goals, and current context. Here, it is suggested that self-control is dependent upon people's motives, which may interact with the present context to predict whether or not self-control is exercised. Indeed, self-control should be highly dependent on people's motives. It is precisely due to the fact that we pursue long-term goals that we must regulate our behavior in the here and now. Evidence for this is reviewed. First, classical measures of self-control (such as resisting tempting food) have often produced mixed results, and do not correlate well with self-report measures of self-control. If these measures are tapping the same construct, then they should correlate. It is proposed that this disconnect is due to the fact that different people have different motives, and thus behavioral measures of self-control will not generalize well across individuals. Second, data is presented showing that people's motivations for attaining long-term goals predict self-reported self-control. These findings are explained by suggesting that stronger motives for long term goals enable people to better regulate their current behavior. Based on these findings, it is suggested that self-control is not just the mere suppression of impulses, but rather a much more nuanced motivational construct.

Mtg Rm 1 9:30 **SERIOUS MENTAL ILLNESS PRESENTED IN PRIMARY CARE SETTINGS**

Lydia Eisenbrandt and Jill D. Stinson, Ph.D. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Serious Mental Illness (SMI) is a severe and complex psychiatric condition with significant medical comorbidity. Although many patients with SMI utilize substantial healthcare resources, their healthcare outcomes are far worse than those of persons without SMI, often leading to early death. There are numerous barriers preventing these patients from obtaining optimal healthcare. The current study focused on available research emphasizing appropriate healthcare for persons with SMI who live in rural communities. The goals of the current study were to 1) to establish base rates of SMI presenting in rural primary care practices, 2) to identify and describe interventions to help individuals with SMI seek and adhere to appropriate treatment from their PCPs in rural

areas, and 3) to investigate any existing interventions designed to educate or train primary care providers who serve patients with SMI, and to evaluate the effectiveness of such practices. This study involved a systematic review of the literature following the PRISMA guidelines. Results suggest that base rates of SMI in rural primary care settings have not been reported, and that there are few interventions available that are effective in increasing access to resources, adherence to treatment, and education for healthcare professionals working with patients with SMI. These findings have crucial implications for preventative healthcare screenings and medical and psychiatric interventions, yet more research is needed to determine whether these interventions could be feasible and successful for patients with SMI in rural community settings.

Mtg Rm 1
9:45

LGBT COMMUNITY CONNECTEDNESS AND ALCOHOL USE

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

Of growing interest in the study of sexual minority experiences is the concept of community connectedness. Community connectedness reflects the cognitive and affective components of being affiliated with a particular community of similar others. Within the limited work that has been done, lesbian, gay, bisexual, and transgender (LGBT) community connectedness has typically been looked at as a predictor of positive outcomes, such as increased psychological well-being. However, there is limited evidence that LGBT community connectedness may be related to higher levels of substance use. This study aimed to explore the relationship that LGBT community connectedness has with alcohol use, taking into account a variety of potential confounding variables, including race, socioeconomic status, religiosity, and positive feelings towards one's sexual orientation. A total of 243 sexual minority participants (19.8% asexual, 29.2% bisexual, 22.2% gay/lesbian, 16.0% pansexual, and 12.8% other) were gathered through the use of targeted online social media advertising. A directed acyclic graph (DAG) was created to identify implications regarding variable covariance. Following the creation of the DAG, the implications were tested using bivariate correlations and the DAG was adjusted based on significant statistical relationships between variables. After the testing of the implications, we tested the hypothesis that LGBT community connectedness would predict alcohol use by regressing alcohol use on community connectedness controlling for the confounding variables identified using the DAG (age, LGB positive identity, race, religiosity, SES, and sexual orientation). The variables accounted for 11.37% variance in alcohol use, and higher community connectedness predicted more alcohol use ($b=0.81$, $SEB=0.33$, $p=0.01$). While connection to the LGBT community is typically explored as a positive form of social support, the current work found positive relationship between community connectedness and alcohol use for sexual minorities. The relationship between LGBT community connectedness and alcohol use should be explored in more depth to understand the pathways between a sense of connection and alcohol use. The work may indicate the need for non-alcohol based LGBT spaces to be more prevalent, so that community connection is not reliant on the use of alcohol-based spaces such as gay bars.

Mtg Rm 1
10:00

FREE TO BE ME: THE RELATIONSHIP BETWEEN THE TRUE SELF, SELF-DISCLOSURE, REJECTION SENSITIVITY, AND USE OF ONLINE DATING SITES

Margaret Hance and Dr. Ginette Blackhart. Department of Psychology, College of Arts and Sciences, East Tennesse State University, Johnson City, TN.

Prior research (Blackhart et al., 2014) found that rejection sensitive individuals are more likely to use online dating sites. The purpose of the current research was to explain the relationship between rejection sensitivity and online dating site usage. Study 1 examined whether true self mediated the relation between rejection sensitivity and online dating. Study 2 sought to replicate the findings of Study 1 and to examine whether self-disclosure also acted as a mediator. Results replicated those found by Blackhart et al. and also found that true self and self-disclosure acted as mediators in the relationship between rejection sensitivity and online dating site usage. These findings suggest that rejection sensitive individuals feel they can more easily represent their "true" selves in online environments, such as online dating sites, and may engage in more self-disclosure in such environments, which partially explains why they are more likely to engage in online dating.

Doctoral Candidates

✵ Society, Behavior and Learning, Group B ✵

Mtg Rm 1 **END OF LIFE CARE AND THE ROLE OF THE PSYCHOLOGIST**
1:00
Carrie C. LeMay, Peggy Cantrell, PhD, and Jill D. Stinson, PhD.
Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

As technological and medical advances have allowed for more effective medical treatment of individuals in the United States, many patients live extended periods of time with progressive, and, often, co-morbid chronic illnesses. This in turn leads to exponentially higher numbers of patients requiring end of life care within hospice and palliative care systems. Few individuals in any healthcare profession choose to specialize in end of life care, and education and training in this field are not integrated sufficiently into general professional training. As such, the general health care workforce is not being prepared in the basic competencies in working with patients at the end of life. The most promising avenue for end of life care is in integrated delivery systems that operate with the goal of coordinating palliative and hospice care across settings to provide comprehensive advocacy, information, assistance, and management from diagnosis through disease progression and end of life to bereavement care. Two national systems have established the most progressive and integrated approaches to end of life care: the Veteran's Administration (VA) health system and the United States Department of Corrections and Federal Bureau of Prisons health systems. To meet the complex goals of end of life care, a multidimensional, integrated approach with multiple health care professionals, including psychologists, must be applied. Of professionals currently providing end of life care as part of an integrated team, psychologists have been notably absent. Little evidence suggests that mental health oriented disciplines have considered end of life issues to be an important area. More troublesome is the evidence that other professions do not generally view psychologists as central to end of life decision-making and care. The process of dying, from diagnosis to death, is a complex phenomenon causing physical, psychological, existential, interpersonal, and spiritual distress. No profession is better equipped to working with this complexity at the individual, provider, and system levels than psychologists. Grounded in the review of current end of life care models and protocols, a proposal for the potential role of the psychologist will be defined at patient, family, and system levels including roles within provision of care, the healthcare team, providing education, research and program development. Psychologists have the ability to transform the way we care for people at the end of their lives because of the unique skills and expertise the profession can add to the existing foundation of care.

Mtg Rm 1 1:15 **POSTTRAUMATIC GROWTH AND SHAME/GUILT IN VETERANS: DOES TIME (PERSPECTIVE) REALLY HEAL ALL WOUNDS?**

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[2] Department of Psychology, University of Sheffield, Shefield, UK

Prevalence of PTSD is higher in veterans compared to the general population, with between 12 and 31% of veterans, across combat eras, developing PTSD during their lifetime, compared to 7-8% of civilians, perhaps as a result of military-related experiences (e.g., combat, sexual trauma). Such experiences contribute to the detrimental cognitive-emotional processes, including shame and guilt, which precipitate and maintain post-traumatic stress disorder. Yet, some persons experiencing trauma also experience post-traumatic growth as a result, exhibiting resiliency and, in some cases, even thriving. The mechanism of action for post-traumatic growth (PTG), which is conceptualized as a positive change following trauma (i.e., finding purpose and meaning in life), is unknown, but may involve adaptive schema restructuring (e.g., temporal shifts). Specifically, PTG may involve changes to time-perspective, or the tendency for a person to consider their life as a function of, or in the context of, the past (e.g., past trauma, nostalgia), present (e.g., positive/negative) or future (e.g., goals). The ability, for instance, to temporally transcend the past or present and focus on a more-adaptive future, may contribute to a reduction in the ruminative processes so often involved in shame and guilt, whereas maladaptive temporal views (e.g., negative past and present) may exacerbate guilt and shame. However, this premise has not been tested. We hypothesized that time perspective would mediate the association between PTG and shame/guilt, such that higher levels of PTG would be associated with higher levels of adaptive temporality/lower levels of maladaptive temporality and, in turn, to lower /higher levels of shame and guilt. 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, Zimbardo Time Perspective Inventory, and Differential Emotions Scale-IV. Bivariate correlations and simple mediation analyses were conducted covarying age, sex, ethnicity, VHA usage, and service era. Supporting hypotheses, in simple mediation analyses (10000 bootstrapped samples), the direct effect of PTG on shame (DE=-.0134, SE=.0098, p=.1720, IE 95% CI=-.0327 to .0059) and guilt (DE=-.0085, SE=.0100, p=.3919, IE 95% CI=-.0281 to .0110) was reduced, and fell out of significance, when future time perspective was added as a mediator, indicating full mediation. The direct effects of PTG on shame and guilt were reduced, but remained significant, when present hedonistic, present fatalistic, past negative, and past positive were added as mediators, indicating partial mediation. Our results suggest that the relation between posttraumatic growth and shame/guilt may be due, in part, to changes in cognitive-emotional processing related to temporality. The PTG process may involve adaptive shifts in time perspective that, in turn, beneficially impact negative emotions associated with trauma exposure. Our findings may have clinical implications. Promotion of acceptance and meaning (e.g., via Acceptance and Commitment Therapy) to foster posttraumatic growth, and encouraging temporal holism (e.g., Cognitive Processing Therapy, Time Perspective Therapy), may reduce shame and guilt associated with trauma in the veteran population.

Mtg Rm 1
1:30

FUTURE RISK FROM THE AE. AEGYPTI VECTOR: MODELING THE EFFECTS OF CLIMATE CHANGE AND HUMAN POPULATION DENSITY ON HABITAT SUITABILITY

Julie Obenauer[1], Megan Quinn, DrPH[1], Ying Li, PhD[2], and Andrew Joyner, PhD[3].
Departments of [1] Biostatistics and Epidemiology and [2] Environmental Health, College of Public Health, and [3] Department of Geosciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN

Introduction: The Aedes aegypti mosquito is responsible for the transmission of Yellow Fever, Dengue, Chikungunya and Zikavirus, making it a deadly vector and global public health threat. Zikavirus and Chikungunya, which were previously restricted to smaller geographic areas, have both appeared in the Western Hemisphere in the past three years and spread to areas where A. aegypti are present. This means that the pathogens have now entered areas in which the population has no previous immunity, which can lead to extensive outbreaks and epidemics. As the effects of global climate change become apparent, the areas of the globe that are suitable for inhabitance by A. aegypti may change. Additionally, this vector prefers human hosts for blood meals and requires standing water to breed, which is often created by water storage containers. This means that increasing urbanization and human population density are likely to put populations at higher risk of exposure to this vector. Methods: To create maps of the future risk of exposure to Aedes aegypti globally, species occurrence data for the vector and the Maxent modeling approach were used. Current and projected climate data were downloaded from WorldClim.org for the four representative concentration pathways (RCPs) used to model future climate change. Human population density, projected to 2050, the same timeframe as the future climate data, were used to model changes in human populations. To identify areas at high risk for future presence of A. aegypti populations, current and future models were compared across areas with at least a 50% probability of increased risk. These results where then used to create maps displaying high risk areas. Results: The AUC, an indicator of model fit, signaled that the models had high predictive power. However, high omission rates indicated that the trade-off of risk mapping may be a need to decrease probability thresholds below 50% to capture the full at-risk population. Future high-risk areas were most often those surrounding current cities, which supports the idea that the combination of urbanization and increasing human population density will work synergistically to increase the disease burden within and around urban centers. Additionally, expansion at the current geographic margins of this species shows that incursion into currently non-endemic areas is possible. Conclusions: Urban and peri-urban populations are likely to be at higher risk of exposure compared to rural areas due to global climate change and changes in population density. Attempts to model expansion of vector habitats should consider how these human population characteristics will change the risk to populations and how to best identify the areas at highest risk. Thresholds for the probability of a population being at risk of exposure to a vector may need to be different from those required to determine whether or not a habitat is suitable for a species. Appropriately determining which areas are high-risk results in maps and models can then be used to identify areas where climate change mitigation and vector control efforts are likely to have the highest impacts.

Mtg Rm 1
1:45

META-ANALYSIS TO DETERMINE VULNERABILITY OF RURAL AREAS TO HEAT MORTALITY

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Background: Numerous epidemiological studies have demonstrated a possible correlation between high temperature and mortality in different settings. Most of these studies have focused on urban settings in industrialized countries, concluding that urban populations are more vulnerable to heat effects than rural populations. This has mainly been attributed to the urban heat island (UHI) effect, a phenomenon which explains the elevated temperatures in urban areas. Others have contradicted this finding and concluded that rural residents are more vulnerable. For this study, we test the hypothesis that rural populations and sub-populations are also vulnerable to heat mortality. Method: A comprehensive literature search was conducted using PubMed, Web of Science and Google Scholar to identify peer-reviewed studies investigating heat mortality in rural settings. Using keywords and a set of rigorous inclusion and exclusion criteria, ten studies were selected. Meta-analysis was then performed using the Comprehensive Meta-Analysis V3.exe software. Results and discussion: The pooled relative risk (RR) was 1.191 (95% confidence interval: 1.130-1.251). Although rural populations may not be exposed to as high temperatures as urban populations, they remain vulnerable to heat effects. Conclusion: There is evidence of heat vulnerability in rural populations and sub-populations. Heat vulnerability is not only determined by heat exposure, but also by sensitivity and adaptive capacity. Rural populations and sub-populations may be vulnerable to heat mortality due to low adaptive capacity. Further studies are needed to assess risk factors that predispose rural populations and sub-populations to heat mortality in order to develop effective public health interventions.

Mtg Rm 1
2:15

SELF-COMPASSION AND SUICIDE RISK: INDIRECT EFFECTS OF DEPRESSION, ANXIETY, AND HOPELESSNESS ACROSS INCREASINGLY VULNERABLE SAMPLES

Jessica Kelliher Rabon[1], Fuschia M. Sirois, Ph.D.[2], Edward C. Chang, Ph.D.[3], and Jameson K. Hirsch, Ph.D.[1]
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[2] Department of Psychology, University of Sheffield, Sheffield, United Kingdom;
[3] Department of Psychology, University of Michigan, Ann Arbor, MI.

Suicide is the 10th leading cause of death in the United States, with certain groups at greater risk, including college students and those with chronic illness, such as fibromyalgia and cancer. Suicide risk factors are well-established, and include depression, anxiety and hopelessness; however, protective factors are less researched. Self-compassion, a kindness toward oneself and acceptance of one's suffering as part of the human condition, is beneficially related to mental and physical health; yet, limited research has examined its relation to suicide risk. We examined the link between self-

compassion and suicide, and the mediating roles of depression, anxiety and hopelessness, across groups with increasing suicide risk: community, collegiate, fibromyalgia, and cancer samples. At the bivariate level, we hypothesized that self-compassion would be inversely related to depression, anxiety, hopelessness, and suicide risk. At the multivariate level, we hypothesized that depression, anxiety, and hopelessness would mediate the relation between self-compassion and suicide risk in a parallel fashion across all samples. The community (N=623), collegiate (N=338), fibromyalgia (N=508), and cancer samples (N=235) were comprised of majority White and female participants. Measures completed included: community: Self-Compassion Scale – Short Form (SCS-SF) and Kessler Psychological Distress Scale; college: Self-Compassion Scale, Suicidal Behaviors Questionnaire – Revised (SBQ-R), Beck Depression Inventory – II, Beck Anxiety Inventory, and Beck Hopelessness Scale (BHS); fibromyalgia: SCS-SF, SBQ-R, BHS, and Depression, Anxiety, and Stress Scales; cancer: SCS-SF, SBQ-R, BHS, and Multidimensional Health Profile-Psychosocial Functioning. Bivariate correlations and mediation analyses were conducted covarying age, sex, and race. All variables were significantly associated in the predicted directions, across samples ($p < .05$). In mediation analyses (10,000 bootstrapped samples), self-compassion had a significant total effect on suicidality; however, this effect was no longer significant after the inclusion of depression, anxiety, and hopelessness as mediators, in all samples. Depression was the only mediator to have a specific indirect effect in the community (IE = -.20, lower 95% CI = -.30, upper 95% CI = -.11) and fibromyalgia (IE = -1.14, lower 95% CI = -1.72, upper 95% CI = -.61) samples. Among college students, depression (IE = -.14, lower 95% CI = -.24, upper 95% CI = -.05), anxiety (IE = -.07, lower 95% CI = -.12, upper 95% CI = -.02), and hopelessness (IE = -.06, lower 95% CI = -.12, upper 95% CI = -.001) had specific indirect effects on suicide risk. In the cancer sample, depression (IE = -.44, lower 95% CI = -.98, upper 95% CI = -.03) and hopelessness (IE = -.43, lower 95% CI = -.87, upper 95% CI = -.14) had specific indirect effects on suicide risk. Our findings suggest that self-compassion exerts beneficial effects on suicide risk in increasingly-vulnerable populations and this relation is mediated by risk factors; in other words, self-compassion contributes to less likelihood of emotional distress and psychopathology and, in turn, to less suicide risk. Therapeutically bolstering self-compassion (e.g., via loving-kindness meditation, self-compassion journaling) and directly addressing depression, anxiety, and hopelessness (e.g., via Cognitive Behavioral Therapy), may reduce suicide risk in community and clinical samples.

Mtg Rm 2
9:30

EFFECT OF SYSTEMIC HYPERTENSION ON AORTIC DIAMETERS IN RURAL APPALACHIAN POPULATION, UNITES STATES

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[4] David Geffen School of Medicine, University of California, Los Angeles, CA.

Background: Hypertension (HTN) is one of the major risk factors for cardiovascular diseases (CVD) affecting one-third of the population in the United States. The diameter of the aorta (the largest vessel in the body) is influenced by age, sex and body mass index (BMI). Long standing systemic HTN may cause significant dilatation of the aorta at different levels predisposing to aortic root enlargement and consequent aortic regurgitation. Objectives: This study aimed to identify the association between systemic hypertension and the diameter of the aorta measured at the level of ascending aorta (AA), descending aorta (DA), and aortic sinus in rural Appalachia. Methods: From January 2014 to December 2016, community dwelling asymptomatic individuals (n=1629) in central Appalachia who participated in screening of sub-clinical atherosclerosis were surveyed. Information on demographics and risk factors of cardiovascular disease (smoking, BMI, diabetes, hypertension, hypercholesterolemia, and history of Coronary Artery Disease) were collected. The diameters of the aorta at 3 levels: AA, DA and aortic sinus were measured using Computed Tomography method. Descriptive and multiple regression analyses were completed using SAS 9.4. Results: The average age of the participants was 57.67 years (SD=9.88). Around half of the participants were females (50.72%) and majorities were whites (98.63%). Around 49% of them reported to be hypertensive. The average AA, DA, and aortic sinus diameters for the population were 33.71mm (SD=4.45), 26.05mm (SD=3.64), and 34.07mm (SD=4.53), respectively. In the unadjusted models, being hypertensive was found to be significantly associated with increase in the aortic diameters in all three levels ($p<0.001$). However, this association became insignificant in the final adjusted model. Males and older population had significantly higher aortic diameter measurements for all three levels. Individuals with higher BMI were found to present with higher aortic diameters (Aortic sinus: Beta=0.05, $p=0.002$; AA: Beta=0.14, $p<0.001$; DA: Beta=0.08, $p<0.001$). In contrast, having hypercholesterolemia significantly reduced the diameter of ascending (Beta=-0.49, $p=0.02$) and descending aorta (Beta=-0.44, $p= 0.01$). History of Coronary Artery Disease was associated with smaller DA (Beta=-0.49219, $p=0.0091$) but larger AA (Beta=0.67,

p=0.005) and aortic sinus diameter (Beta=0.8, p=<0.001). Conclusion: The study did not find an association between hypertension and aortic diameters at the three measured levels. However, age, sex, BMI were associated with higher aortic diameters. Further studies to assess the effects of HTN on aortic diameters are needed.

Mtg Rm 2
9:45

ENEMY EXACERBATION: EFFECTS OF PREDATOR STRESS ON SULFATE TOXICITY IN FRESHWATER AMPHIPODS

Trevor Chapman and Dr. Joseph P. Bidwell. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The field of ecotoxicology is focused on understanding how human interactions can effect natural populations and ecosystems. Single species toxicity tests are a commonly used method for assessing the impact of a contaminant on a natural community. In single species tests, one species is exposed to a single contaminant in a controlled environment, and this is often repeated with several model species. These studies can provide valuable information about contaminant lethality, but lack any element of community interaction that takes place in a natural environment. Researchers have begun to incorporate natural stressors into toxicity tests, and results suggest that single species toxicity tests are likely underestimating the effects of contaminants in natural systems. This study examined the effects of predator cues on sulfate lethality in amphipods (Gammarus sp). The goals of the study were to determine whether there was a synergistic interaction, and further analyze the possible cause of the interaction, which has yet to be identified. The initial focus 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, whereas alarm cues are chemical signals that are released by injured conspecifics. Response to predator cues was verified with behavior trials, in which organisms were exposed to both types of predator cues and a predator avoidance behavior was quantified by measuring time spent active and sheltering in a refuge. The second phase of the study involved toxicity tests with combined stressors. Amphipods were exposed to different concentrations of sulfate both with and without predator cues during 96 hour lethality trials. Finally, the influence of predator cues on the metabolic rate of amphipods was quantified to determine if a generalized stress response was indicated. One possible explanation for the effect of combined stressors is that the general fear response to a predator (flight or fight) could help explain increased toxicity of chemicals when predation cues are present. Behavior trials indicated that amphipods respond to both alarm cue and kairomone. However, the toxicity tests only showed a significant increase in response to the chemical stressor when kairomone was present. Oxygen consumption trials are currently underway. This study indicates that natural stressors do influence sensitivity to contaminants, but the results also provide new and interesting information. Although behavior trials indicated that both types of predator cues induced a response, behavior may not always be a reliable indicator of which natural stressors actually cause a physiological stress response.

Mtg Rm 2
10:00

THE ROLE OF ACETYLCHOLINE IN UROGENITAL CHLAMYDIAL INFECTION

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Each year, approximately 1.4 million chlamydial genital tract infections are reported, and it is estimated that just as many cases go unreported. In fact, the intracellular bacterium, Chlamydia trachomatis, is the most prevalent bacterial sexually transmitted infection in the United States and worldwide. Despite available treatments, many women that are diagnosed with C. trachomatis infection have lasting problems, such as pelvic inflammatory disease, ectopic pregnancies, infertility, and chronic pain. Since it is now known that vagal nerve fibers reach the female genital tract and we know that vagal nerve stimulation regulates the innate immune system, the possibility that C. trachomatis and other genital pathogens manipulate this system to evade the host's immune response should be considered. Infection or injury in the body leads to activation of vagal nerve fibers, which ultimately leads to the release of non-neuronal acetylcholine (ACh) from T-lymphocytes. ACh plays a significant role in the immune response as part of the cholinergic anti-inflammatory pathway (CAP). ACh binds to cholinergic receptors, and as a result, decreases inflammation. This decrease in inflammation may help the pathogen evade the host's immune response. Our preliminary finding that choline acetyltransferase (ChAT), an enzyme required for acetylcholine synthesis, is significantly increased nine days after genital tract (GT) chlamydial infection suggested the hypothesis that acetylcholine enhances GT chlamydial infection. To begin testing this hypothesis, we infected transgenic mice that have a ChAT-promoter driver GFP reporter gene (ChAT-GFP mice; Jackson Labs, Inc.). The mice were vaginally infected with C. muridarum (a chlamydial species that infects mice). Tissue and vaginal swab samples were collected at days 3, 9, 15, and 21 post-infection. Immunohistochemistry was used to visualize chlamydial inclusions and to allow counting of ChAT-positive cells, and two-way ANOVA tests were used to analyze this data. Titers were also collected to confirm infection, and the mean titers were analyzed using a two-sample T test. These analyses indicate that there is a significant increase in the number of ChAT-positive cells in infected mice as opposed to the mock-infected mice. Thus, our current results support the hypothesis that ACh levels are increased in mock-infected mice, and that this may play a key role in the pathogenicity of chlamydial infection. With support from future planned work, the role of ACh in chlamydial infection may be manipulated to develop potential treatment mechanisms taking advantage of this process.

Mtg Rm 2
10:30

EXAMINING THE UNDERSTANDING OF INQUIRY-BASED LEARNING AND TEACHING AMONG UNDERGRADUATE TEACHERS AND STUDENTS

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

Recently science education has been moving from a traditional, teacher-centered instruction to more inquiry-based learning that places the student in charge of his/her own learning experience. This method is focused on students learning science-practice skills in order to synthesize, interpret and evaluate information. One of the main aims of inquiry is to engage students as active, not passive, participants in science courses. There are, however, disagreements about the definition of inquiry as well as how to implement inquiry-based practices in the classroom. It has been defined in a number of ways including: the work scientists do, a way of student learning, a teaching method, and specific curriculum materials. The purpose of this study is to describe science educators and students' views about inquiry-based teaching and learning. Inquiry-based techniques have been shown to improve student understanding of scientific concepts, however, there are discrepancies in how educators define and implement these techniques in their classroom. It is hypothesized that trends will be observed in faculty as well as students that indicate multiple distinct viewpoints on the definition and implementation of inquiry-based learning within the classroom. If this is true, then analysis will reveal multiple factors of differing viewpoints related to inquiry and traditional teaching methods that students and faculty will be organized into. Q Methodology will be used for data collection and PQ Method will be used for analysis. This research method specializes in collecting information about respondent's subjectivity, or specific views and opinions. Faculty and students from the college of education and college of arts and sciences that have an emphasis in science education with be solicited for participation. Respondents will sort a set of 36 statements about inquiry-based teaching and learning according to how well those statements represent their views and opinions on the subject. Participants will be asked to record their sort and fill out a survey that includes demographic profiles. Analysis will include correlation matrix and factor analysis via PQ Method statistical software. It is expected that the factor analysis will place individuals with similar viewpoints about inquiry teaching and learning into distinctive groups. Follow-up interviews will be conducted with respondents who choose to participate in order to confirm viewpoint and allow for explanation. Previous data gathered suggest distinct groups of which educators fall into based upon their view on inquiry-based practices. We intend to use this study to better understand science educators' use of inquiry as well as students' understanding of inquiry based teaching. The information gained from this study can help to better understand how inquiry methods are used in science classrooms as well as pinpoint any difficulties that teachers, teacher educators, and science education researchers may have when implementing inquiry practices. Information gathered will also help identify difficulties students may have when using inquiry practices.

Mtg Rm 2
10:45

STUDY OF 2,5-DIAMINOIMIDAZOLONE, A MUTAGENIC PRODUCT OF OXIDATION OF GUANINE IN DNA

Hannah Janson[1], Dr. Yuriy Razskazovskiy[2], and Dr. Marina Roginskaya[1]. Departments of [1] Chemistry, and [2] Physics and Astronomy, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Excessive oxidation of biomolecules by reactive oxygen species (ROS) in aerobic organisms can lead to a state of oxidative stress, which has been associated with a number of pathological conditions such as cancer, cardiovascular and neurodegenerative diseases. As deoxyribonucleic acid (DNA) is the major hereditary molecule for all biological organisms, damage to the DNA structure due to oxidative stress has been extensively investigated. The hydroxyl radical ($^{\bullet}OH$) is one of major biologically important ROS. Guanine (G) is the most oxidizable moiety of DNA and thus it is the primary target of ROS. 2,5-diaminoimidazolone (Iz) is an important 4-electron product of G oxidation, which until recently has been poorly studied, primarily because of the lack of a method of its quantification. The present research was conducted to test the hypothesis that Iz can be produced in significant amounts in DNA via pathways initiated by removal of one electron from G by a one-electron oxidant (OEO). This hypothesis has been tested by measuring the yields of Iz in reactions of DNA with different types of natural and model OEOs using a High Performance Liquid Chromatography (HPLC)-based quantitative analysis of low-molecular product of the reaction of DNA-bound Iz with primary amines (AIz). Data on kinetics of formation of Iz as a result of oxidation of DNA by two OEOs, hydroxyl radicals, $^{\bullet}OH$, and dibromide radical anions, $Br_2^{\bullet-}$, have been obtained. Both OEOs were generated by X-radiolysis of aqueous solutions of 10 mM salmon testes (ST) DNA in 10 mM phosphate buffer, pH 6.9. For generation of $Br_2^{\bullet-}$, X-radiolysis was performed in the presence of 100 mM NaBr. Upon X-radiolysis, the samples were treated by 0.1 M ethanolamine (a primary amine) during 30 min at 45°C. After precipitation of polymerized DNA, the supernatants were analyzed by reverse-phase HPLC. Radiation chemical yields (in nmol/J) for Iz and FBR (free DNA release, which reflects the yield of strand breaks in DNA) have been obtained as follows: for $^{\bullet}OH$: Iz, 1.39 and FBR, 42.2; for $Br_2^{\bullet-}$: Iz, 0.526 and FBR, 1.17. Comparison of the yields of Iz and FBR for $^{\bullet}OH$ and $Br_2^{\bullet-}$ indicates that while the absolute yield of Iz is higher for $^{\bullet}OH$, which correlates with its high standard reduction potential, $Br_2^{\bullet-}$ is significantly more selective for production of Iz. This finding is in agreement with the known reactivities of both radicals: $Br_2^{\bullet-}$ acts exclusively as an OEO, while $^{\bullet}OH$ preferentially attacks DNA nucleobases by hydrogen abstraction and double bond addition.

Master's Candidates

Natural, Biomedical and Health Sciences, Group B

Mtg Rm 2
1:00

A STUDY OF DENSITY DEPENDENCE BETWEEN NATIVE BROOK TROUT AND EXOTIC RAINBOW TROUT POPULATIONS IN TWO SOUTHERN APPALACHIAN STREAMS

Joshua Argo, Dr. Fred J. Alsop, III, Dr. Joe Bidwell, Dr. Istvan Karsai, and Dr. Tom Laughlin. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Brook trout Salvelinus fontinalis is the only species of salmonid native to the eastern United States, with populations of the species found in southern Appalachia that are adapted to high-elevation mountain streams known as the southern-strain or Appalachian brook trout. Their populations once existed in many streams throughout Appalachia, but the species has been in decline since the turn of the 20th Century with evidence suggesting the current range being approximately 20% of the historical range. This decline has been investigated from many perspectives including interspecific competition with exotic rainbow trout Oncorhynchus mykiss, habitat loss/deforestation, the effects of stream chemistry on growth, the threat of catastrophe like flood and/or drought, and climate change. Over the past 50 years, there has been an effort to re-introduce brook trout to their native ranges and study these pressures to determine to what degree they influence the success of brook trout populations. Dr. Jerry Nagel, a former ETSU faculty member of Biological Sciences, conducted a study in the 1980s by monitoring the re-introduction of brook trout into a small local stream, Briar Creek, that was currently supporting exotic rainbow trout. Results of the study and that of his graduate student, Terry Lambert, suggested that brook trout could compete with rainbow trout of similar size within a stream's headwaters. This thesis project sampled re-introduced brook trout populations at Briar Creek (a sympatric salmonid population) and Hampton Creek (an allopatric salmonid population) to not only observe the distribution of salmonid populations within these streams, but also the age-specific growth by individual length and mass measurements. The current salmonid distribution at Briar Creek will be compared to Nagel and Lambert's previous estimates to determine if significant changes in age and distribution have occurred since their studies. Analysis of age-specific growth of the populations were performed by von Bertalanffy Growth Function. At the time of composing this abstract, the data is still in the process of analysis. It is hypothesized that these populations will fit a von Bertalanffy growth curve, suggesting a successful re-establishment of the populations. However, it is also hypothesized that the allopatric population at Hampton Creek will display higher age-specific growth due to the lack of interspecific competition with rainbow trout.

Mtg Rm 2
1:15

FUNCTIONAL VALIDATION OF WRINKLED ORTHOLOGS IN AVOCADO OIL BIOSYNTHESIS

Shina Bhatia, M. M. Rahman and Aruna Kilaru. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

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. Based on the transcriptome data, I hypothesize that putative WRI genes (WRI1, 2, 3) of avocado enhance oil content in nonseed tissues. 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. Full-length cDNA for PaWRI genes (1 & 2) were amplified and cloned into pK34 entry vector followed by sequence confirmation. PaWRI genes (1 & 2) were subcloned into pB110 destination vector and will be transformed into agrobacterium for their integration into the plants. Cloning of WRI3 is still ongoing. Transient expression of putative PaWRI 1, 2 and 3 genes, will be validated using tobacco leaf assay, are expected to enhance oil accumulation in leaf tissues. Agrobacterium bearing PaWRI genes and a viral silencing protein (p19) will be co-infiltrated on to the underside of Nicotiana benthamiana leaves. Infiltrated plants will be placed in growth room with 16:8 light/dark cycle. Four days post infiltration, infected leaf areas will be harvested and 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.

Mtg Rm 2
1:30

EFFECTS OF PREDATORY CUES ON COPPER SENSITIVTY AND METABOLIC RATE IN GAMBUSIA AFFINIS

Melissa Campbell and Dr. Joseph Bidwell. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Organisms living in aquatic environments are subject to a number of stressors from natural (temperature, predation, food availability) and anthropogenic origins (pesticides, metals, etc) that can impact their fitness. Natural stressors may amplify the effects of

contaminants and increase an organism's sensitivity to them. Understanding the impact of these combined factors is therefore essential for the practical management of contaminants. This study sought to examine how predatory cues affect copper tolerance in the mosquitofish, Gambusia affinis. The influence of predatory cues on fish metabolic rate was also evaluated to gain insight on any interactive effects between the natural stressor and copper. Alarm cues, chemicals released into the water when prey are injured were obtained from humanely sacrificed G. affinis, and kairomones, were obtained from adult bluegill (Lepomis macrochirus). Paired 96-h toxicity tests with copper and predatory cue and with copper alone were conducted to determine the influence of predatory cues on G. affinis sensitivity to the metal. Survival was recorded and analyzed using a two factor general linear model with copper concentration and predatory cue as main effects. Metabolic rate of fish exposed to predatory cues was determined using intermittent flow respirometry. In the presence of alarm cue neither G. affinis copper tolerance or metabolic rate was altered. At copper concentrations ranging from 0.25 mg Cu/L - 0.50 mg Cu/L kairomone presence had no influence on survival, while between 0.50 mg Cu/L and 1.0 mg Cu/L, kairomone presence increased survival. Kairomone had no significant effect on metabolic rate. The apparent antagonistic effect between kairomone and copper may have resulted from the presence of organic material from predator-derived cues or from potential changes in fish behavior. This study adds to the growing body of literature which illustrates the complexity of stressor interactions in aquatic systems.

Mtg Rm 2 **TOWARD THE SYNTHESIS OF HYDROXYTYROSOL POLYPHENOL**

2:15 Emmanuel Onobun and Ismail Kady. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Hydroxytyrosol, 2-(3,4-dihydroxyphenoyl)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 inexpensive precursor such as catechol; this can satisfy the increasing market demand and provide a more economical alternative source for this valuable polyphenol.

Mtg Rm 2
2:30

EFFICIENT ADSORBENT FOR CLEAN-UP OF WATER AFTER A NUCLEAR ACCIDENT

Kenneth Seaton, Iuliia Little and Dr. Aleksey Vasiliev. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Radioactive isotopes cesium-134 and cesium-137 are among the most hazardous chemical, biological, radiological and nuclear (CBRN) agents that can be released into the environment at accidental or intentional nuclear incidents. This contaminant is easily introduced to food and potable water because of the unique mobility of the cesium ion in the environment. Sometimes control of radioactive sources is lost, and subsequently they pose a potential threat that the public may be exposed to radiation. The International Atomic Energy Agency is aware of more than 2,000 confirmed cases of illicit trafficking and other unauthorized activities involving radioactive material in the past 18 years. It may be used as a "dirty bomb" by putting the isotope within a conventional weapon, detonating it, and spreading radioactive particles. Currently, the development of materials that can absorb cesium selectively in the presence of sodium and potassium is a challenging problem. While other radionuclides, e.g., cobalt-60 or strontium-90, can be separated easily due to their ability to form insoluble products with many anions, most compounds of cesium are soluble and, therefore, highly mobile in aqueous media. Our novel approach to the synthesis of highly selective adsorbents for cesium involves the formation of specific adsorption sites for selective cesium uptake in a mesoporous material with high surface area. The adsorbents were successfully synthesized using the sol-gel method by polycondensation of tetraethoxysilane in the presence of phosphotungstic acid (PTA) as a cesium scavenger. Porous structure and, respectively, high surface area of the materials was formed due to the presence of surfactants in the reaction mixture. The obtained mesoporous material demonstrated effectiveness in adsorption of cesium from aqueous solutions. The adsorption occurred on acidic sites of two types: PTA anions and silanol groups. However, at increased temperatures, cesium cations were adsorbed on PTA only. Isotherms of adsorption fitted Langmuir and Temkin models. Study of the adsorption dependence on contact time showed that this process proceeds in two steps. In the first step, rapid adsorption occurred. Most Cs+ ions were adsorbed during this step. Following this, the adsorption continued at a slower rate. The adsorption proceeded in accordance with the pseudo-second-order rate law. In the experiments with other salts of alkali metals, their competing effect was evident. However, the adsorbent maintained good characteristics in the selective adsorption of cesium in the presence of sodium and potassium cations. Successful completion of this work might result in development of a highly selective adsorbent that can reduce the risk of environmental contamination from CBRN incidents.

Mtg Rm 2
2:45

NOVEL REGULATORS OF ALGZ EXPRESSION IN PSEUDOMONAS AERUGINOSA

Danielle A Williams and Christopher L Pritchett. Department of Health Sciences, College of Public Health, East Tennessee State University, Johnson City, TN.

Pseudomonas aeruginosa is a common opportunistic pathogen that most frequently affects those with compromised immune systems, such as burn victims or individuals with cystic fibrosis. In many such cases, *P. aeruginosa* infection can lead to significant morbidity and mortality due to the difficulty in treating it, as well as the plethora of virulence factors the bacteria can produce. The AlgZ/R two-component system is responsible for regulation of many of these factors, such as Type IV Pili (TFP) and biofilm formation, and is a critical aspect of virulence in the bacteria. The genes encoding the AlgZ and AlgR proteins are in an operon, with *algR* having additional promoters, and while expression of *algR* has been well-studied, not much is known about the regulation of *algZ* expression. In order to further examine regulation of *algZ* expression, a transposon mutagenesis screen was performed on a Δ*pilW* strain, which has increased *algZ* expression, but shows no change in *algR* expression. From this screen, thirteen mutants showed a change in *algZ* expression, and four were identified via arbitrary PCR and rescue cloning: *pslA*, PA5567, PA4873, and the intergenic region between PA2770 and PA2771. Clean mutants were made of *pslA* and PA5567 and analyzed for *algZ* expression. A Δ*pilW*Δ*pslA* mutant showed increased *algZ* expression while a Δ*pslA* single mutant did not, indicating that PslA works in tandem with PilW to negatively regulate *algZ* expression. In contrast to this, a Δ5567 single mutant showed a decrease in *algZ* expression. This implicates the product of PA5567 as a positive regulator of *algZ* expression. While these mutants require further characterization, elucidating the regulatory roles of these proteins in regard to *algZ* expression could increase our understanding of *P. aeruginosa* virulence and provide novel targets for anti-virulence drugs.

Mtg Rm 2 **QUANTIFYING THE STRUCTURE OF MISFOLDED PROTEINS**
3:00 **USING GRAPH THEORY**

Walter G. Witt, Dr. Debra Knisley and Dr. Jeff Knisley. Department of Mathematics and Statistics, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The structure of a protein molecule is highly correlated to its function. Some diseases such as cystic fibrosis are the result of a change in the structure of a protein so that this change interferes or inhibits its function. Often these changes in structure are caused by a misfolding of the protein molecule. Consequently, there is a great deal of work being done in computational biology to quantify protein structural characteristics and therefore identify and predict when a protein molecule will misfold. To assist computational biologists in this endeavor, there is a database of proteins together with their misfolded versions, called decoys, that can be used to test the accuracy of protein structure prediction algorithms. In our work we use a nested graph model to quantify a selected set of proteins that have two single misfold decoys. The graph theoretic model used is a three tiered, nested graph in which the first level, is a highly connected contact graph of the amino acid chain. The second level is comprised of subdomains of the protein molecule that are determined spectral clustering. The third level is a graph whose vertices are the subdomains of the second level and whose edges are determined by a distance threshold in the protein molecule. Measures based on the vertex weights are calculated and we compare the quantification of the proteins with their decoys. Our method is able to separate the misfolded proteins from the correctly folded proteins and therefore may prove to be a valuable addition to protein structure prediction algorithms.

Master's Candidates

Society, Behavior and Learning, Group A

Mtg Rm 3 **THE ROLE OF LOCAL PUBLIC HEALTH FUNDING**
8:45

Olayemi Adeniran and Dr. Kate Beatty. Department of Health Management and Policy, College of Public Health, East Tennessee State University, Johnson City, TN.

Local Health Departments (LHDs) are administrative unit of a local or state government, concerned with the health of a community or county. There are approximately 2,800 agencies or units that meet the profile definition of LHD. These LHDs vary in size and composition depending on the population they serve. However, all these community-based agencies share a common mission of "protecting and improving community well-being by preventing disease, illness, and injury while impacting social, economic, and environmental factors fundamental to excellent health". One of the ongoing challenge of

a focus on community-level, population-based prevention is the manner in which local public health agencies have been funded. Most LHDs funding comes from federal funds, supplemented by state and local funds. Many of these funds come to LHDs through competitive grants programs. This study was therefore undertaken to investigate the sources of funding for the Local Public Health Agencies, according to geography specifically rurality. We utilized the data already compiled by the National Association of County & City Health Officials (NACCHO) in 2013. The population served by these health agencies were compared to the funding sources, and one –way ANOVA to estimate the significance between these variables. Our dependent variables were assigned to be the funding sources, while the independent variables were the two population categories –rural and urban. A categorical variable reflecting three levels of rurality was constructed using RUCA codes. "Urban" included census tracts with towns with populations >50,000. "Large rural" included census tracts with towns of between 10,000 and 49,999 population and census tracts tied to these towns through commuting. "Small rural" included census tracts with small towns of fewer than 10,000 population, tracts tied to small towns, and isolated census tracts. Furthermore, we also determined the proportion of revenue from these funding sources received by these three population groups. All analyses were completed using SPSS. There were no differences in the amount of revenues received by both the large and small rural and urban agencies from the State & Federal sources (p value = 0.182). However, urban agencies receive more funding from Medicare and Medicaid services (19.9%) compared to small rural with 6.9% ($p<0.001$). Comparatively, the amount of revenue generated by rural agencies is just a fraction of what the urban agencies generate. Residents of rural areas in the United States tend to be older and poorer, report more risky health behaviors, have more barriers to accessing health care, and have worse health status and health outcomes than do their urban counterparts. These rural LHDs have fewer resources and face strenuous challenges in carrying out their activities of keeping the community safe due to limited revenues. Until public health agencies are firmly connected to payment and funding mechanisms across the health system, communities, the overall health system and accountable care organizations will not see the true benefits of population-focused, community-based, prevention services.

Mtg Rm 3
9:00

INCLUSIVE TEACHING STRATEGIES: AN EVALUATION OF COURSE STRUCTURE AND SUMMATIVE ASSESSMENT IN INTRODUCTORY BIOLOGY

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

Increased course structure improves student learning in introductory STEM courses by offering students opportunities to frequently assess their progress. Several active learning strategies like the use of clickers, case studies and peer learning have been used when increasing the structure of a course. Much has been studied on the value of frequent formative assessment; however, few studies have evaluated the frequency and modes of effective summative assessment delivery. With summative assessment, teachers can review data from assessment results of previous years or other courses to identify

students who are struggling academically in certain subject areas or concepts. This strategy may be useful for bridging the gaps in college readiness among at-risk students. This study examined the use of summative assessment as an inclusive teaching practice to improve first generation college student success in Introductory Biology at a regional university and also surveyed faculty across southeastern universities to find out how they structure their introductory biology course and why they are structured that way. The study analyzed exam data and end of semester surveys for three semesters of an introductory biology course for science majors and observed trends in student performance along three different modes of delivery for post-lecture work in which each semester varied: in-class, online, and hybridized (some online, some in-class) summative assessment delivery. Final exams were evaluated and categorized by Bloom's Taxonomy of Learning and questions categorized as testing either higher order cognitive skills or lower order cognitive skills. Student performance and preference for mode of delivery of summative assessments are fairly consistent with the hybridized mode of course delivery being the least preferred and least successful in achieving higher order cognitive skill development. Survey results showed that most instructors used online activities before and after instruction. Time constraint, class size and shortage of teaching assistants were considered the major barriers to having these activities in class. Questions that tested student lower order cognitive skills were usually asked before and after class while instructors addressed questions that tested student higher order cognitive skills in class. The use of feedback, teaching evaluations and challenges faced by at-risk students were also considered in the survey. This study serves as a basis for a broader study on what instructors can include in their teaching and assessment to promote student success in class, especially the at-risk groups, regardless of the mode of course delivery.

Mtg Rm 3
9:15

LAW ENFORCEMENT OFFICERS' PERCEPTIONS IN REGARD TO SEX OFFENDERS, SORN, AND RESIDENCY RESTRICTIONS LAWS

Maria Aparcero-Suero and Dr. Chris Rush. Department of Criminal Justice and Criminology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The purpose of this study was to extend current knowledge regarding law enforcement's perceptions of sex offenders. Law enforcement's views of sex offenders and the fairness and efficacy of sex offender laws were examined through the utilization of a 60 closed-ended question survey. The survey included questions about sex offender myths, sex offender laws, police officers' experience in working with sex offenders, specialized training, and demographics. The sample consisted of 74 sworn police officers from a Southeastern state. The results showed that, despite having a mostly empirical based view of sex offenders, sworn police officers were likely to support sex offender laws shown by some scholars to be ineffective in reducing crime and at times counterproductive.

Mtg Rm 3
9:45

COPD AS A RISK FACTOR FOR CORONARY HEART DISEASE: RESULTS FROM THE 2015 NATIONAL HEALTH INTERVIEW SURVEY

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

Background: Little is known about the effect of chronic obstructive pulmonary disease (COPD) with coronary heart disease (CHD) in the US adults. This study estimated the association of COPD and other risk factors with prevalence of CHD among US adults, and tested whether such association differs by gender. Methods: A total of 1,740 adults with CHD and 31,932 controls were selected from the 2015 National Health Interview Survey (NHIS) data. Weighted univariate and multiple logistic regression analyses were used to estimate the odds ratio (OR) with 95% confidence interval (CI). Results: The overall prevalence of CHD was 4.5%. The prevalence increased with age (0.67%, 5.2% and 14.7% for age groups <50, 50-64 and 65+, respectively). The prevalence in those with COPD (22.6%) was significantly higher (p=0.0001) than those without it (3.9%). Multiple logistic regression analysis showed that high cholesterol level (OR=3.22, 95%CI=2.74-3.78, p<.0.001), other heart diseases (OR=4.71, 95%CI=3.95-5.61, p<.0001), COPD (OR=2.11, 95%CI=1.55-2.88 p<.0001), adults in the ages of 65+ years (OR=11.15, 95%CI=12.97-32.36, p<.0001) were positively associated with CHD. Compared to Whites, Asians (OR=0.72, 95%CI=0.47-1.12, p=0.1456) have no association with CHD. Females (OR=0.48, 95%CI=0.41-0.56 p=<.0001), sleeping daily for duration between 6hrs to 9hrs (OR=0.72, 95%CI=0.58-.090, p=0.0033) and above 10hrs (OR=0.886, 95%CI=0.66-1.19, p=0.4248) were also less like to have CHD. Gender-stratified analysis showed that high cholesterol level in male (OR=3.42, 95%CI=2.75-4.26, p<.0001) and female (OR=2.99, 95%CI=2.31-3.86, p<.0001); other heart condition in male (OR=4.77, 95%CI=3.72-6.12, p<.0001) and female (OR=4.61, 95%CI=3.58-5.96, p<.0001); Other races in female (OR=2.21, 95%CI=1.20-4.07 p=0.01), age group 65+ in male (OR=13.75, 95%CI=9.23-20.46 p<.0001) and female (OR=8.17, 95%CI=5.25-12.72, p=<.0001) were positively associated with CHD. Conclusion: High cholesterol level, previous heart condition, age, COPD, other races were positively associated with CHD; while risk factors for CHD vary between males and females. Intervention strategies that target risk reduction of CHD may be tailored accordingly.

Mtg Rm 3
10:00

AN ANALYSIS OF CORRELATION BETWEEN SOCIETAL INFLUENCES AND REPORTED UFO ENCOUNTERS

Isaac Boven and Dr. Jay Jarman. Department of Computing, College of Business and Technology, East Tennessee State University, Johnson City, TN.

Every year American citizens report thousands of encounters with unidentified flying objects (UFOs). While some of these reports may currently have no logical explanations, it is proposed the majority of said reports may be fabrications of one's social environment. This study will attempt to determine if there are any possible correlations between UFO encounters throughout the United States of America and other metrics such as rates of alcoholism, levels of education, and religious and political affiliation in local populations. This will be done in an attempt to quantify the effects that societal

influences have on an individual's ability to interpret the nature of interactions with unknown entities. To attain the aforementioned insights, a piece of software will be constructed that will extract data from The National UFO Reporting Center Online Database. This data pertains to thousands of reported UFO encounters dating back hundreds of years. The data will be structured in a new database that is specifically architected to perform highly efficient data analytics. Multiple aggregations will be performed on different aspects of the UFO encounters. The results of these aggregations will be cross examined with data relating to the aforementioned societal influences. This data will be gathered from national census reports and other government records. The expected result of this study is that there will be multiple points of strong correlation between certain UFO encounter characteristics and their influencing societal themes. These initial correlations could be expanded upon in later research in effort to prove true causation. If none of the expected correlations are found, it will imply there are most likely other causal factors in this relationship that still need to be identified. This would open avenues for further research into the topic.

Mtg Rm 3
10:15

ANTICIPATED DISCRIMINATION AND SUICIDE RISK AMONG SEXUAL MINORITIES AFTER THE 2016 PRESIDENTIAL ELECTION: DOES LOSS OF HOPE AND FEELING STRESSED OUT EXPLAIN THE LINK?

Byron D. Brooks[1], Andrea R. Kaniuka[1], Jessica Kelliher-Rabon[1], Mariah Montgomery[1], Kittye K. Hirsch[2], Tracy Cohn, Ph.D.[3], K. Bryant Smalley, Psy.D.[4], Jacob Warren, Ph.D.[5], and Jameson K. Hirsch, Ph.D.[1]
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Suicide is a significant public health concern, and a leading cause of death among sexual minority populations; for instance, LGBTQ persons are four times more likely to attempt suicide compared to heterosexual, cisgender counterparts. Previous research suggests increased risk for suicide may be due, in part, to minority stress from discrimination and, given the current sociopolitical climate, LGBTQ communities may be experiencing fears of increased discrimination, the potential for possible denial of civil rights, and reduced hopefulness about the future. Although the associations between discrimination and/or stress and suicide are well-established, the underlying mechanisms of action explaining the transition from discrimination to stress and, finally, to suicidal behavior are less clear. However, not all individuals who identify as LGBTQ and who experience discrimination go on to engage in suicidal behavior, perhaps due to individual-level protective factors that buffer risk. For example, hopefulness, a cognitive-emotional construct reflective of one's motivation toward goal attainment and problem-solving ability to attain goals, may help to explain the discrimination-suicide linkage. We examined the associations between anticipated discrimination after the 2016 election, hopefulness, perceived stress and

suicidal behavior. We hypothesized that positive relations would exist between anticipated discrimination, perceived stress, and suicide risk, and that those variables would have inverse relations to hope. We also hypothesized that discrimination would be indirectly related to suicide risk; specifically, in serial fashion, increased anticipated discrimination would be associated with less hopefulness (1st order mediator), greater perceived stress (2nd order mediator) and, in turn, to greater suicide risk. Our national sample (N=496) was primarily White (81.7%;n=365), lesbian, gay, or bisexual (65.1%;n=291), and identified as female (44.8%;n=201) with a mean age of 35.18 years (SD =16.31). Participants completed the Trait Hope Scale, Perceived Stress Scale - Brief, and Suicide Behaviors Questionnaire–Revised. Anticipated discrimination was measured via the question, "After the election, how much are you concerned or worried that your rights will be infringed upon, restricted, or taken away?" Bivariate correlations and serial mediation analyses, per Hayes (2013) were conducted. Bivariate relations were in the expected directions, supporting hypotheses ($p<.05$). At the multivariate level, the direct effect of anticipated discrimination on suicide risk decreased in significance, when hope and perceived stress were added as mediators (DE=.466, SE=.147, p=.01, IE 95% [.176, .756]), indicating serial mediation. Our results indicate that greater anticipated discrimination is related, serially, to less hope and greater perceived stress and, in turn, to greater suicide risk. Our results may have clinical implications. Therapeutic efforts to increase hopefulness (e.g., via Problem-Solving Therapy), and to increase ability to tolerate distress and move toward value-driven behaviors (e.g., Acceptance and Commitment Therapy), may reduce suicide risk among sexual minority populations anticipating discrimination in the current sociopolitical climate.

Mtg Rm 3
10:45

EFFECTIVE INSTRUCTIONAL DESIGN FOR ONLINE ACTIVITIES: DEVELOPMENT OF AN INQUIRY BASED ACTIVITY FOR PHYLOGENETICS

W. David Ford, Dr. Anna Hiatt, Dr. Thomas Jones, and Dr. Rebecca Pyles. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Phylogenetics is often described as the foundation of evolution (and by extension, biology itself), but many students and professional biologists struggle with misconceptions that impair their ability to accurately collect information on evolutionary relationships from phylogenies. One possible way to remedy this problem is by utilizing online learning activities. There is ample evidence that indicates online activities can be effective learning tools for students across multiple fields and grades. One of the biggest benefits of online activities is that students are able to learn at their own pace, resulting in a deeper conceptual understanding. However, how the different aspects of an activity (appearance, duration, focal scenarios, etc.) impact student learning is still largely under-examined. Of particular interest for this study is how elaborative feedback affects student knowledge of phylogenetics. Several studies have failed to find differences between elaborative and correct answer feedback, but this could be due to how learning is evaluated. To test the effectiveness of elaborative feedback, two versions of the same activity were developed, and the only difference between the two versions is that one only has correct answer feedback while the other has elaborative feedback. Participants

were recruited from an introductory biology and an upper level biology class at East Tennessee State University. At the beginning of the study, students completed a pretest on phylogenetics that also included self-efficacy questions on the process of science. Students were then randomly assigned one of the two activity versions to complete, and had one week to do so. Two weeks after the deadline to complete the activity students completed a posttest with similar questions to the pretest. Student scores are used to calculate learning gains to determine differences between students who received elaborative feedback compared to those who only received correct answer feedback. Additionally, comparisons are made between the introductory and upper level class to determine the influence of biology-related coursework on the efficacy of the online activity and to see whether there are common mistakes among introductory and/or upper level biology students. Results from this study will contribute to the body of research on online activity development as well as providing instructors feedback on some of the problems preventing their students from developing an accurate understanding of phylogenetics.

Mtg Rm 3
11:00

COMFORTABLE IN SOMEONE ELSE'S SKIN: HOW SCANDINAVIAN CRIME FICTION REPRESENTS A REGION'S PLAYACTING

Bradley Hartsell. Department of Literature and Language, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Despite being the world's leading power, the United States is disproportionately ranked in global violent crime statistics. Beneath the country's wealth and expanse, Americans have demonstrated a willingness to murder over a small pocket-full of money or a sudden rush of jealousy. It is no surprise then that crime fiction surged in popularity following Dashiell Hammett's early twentieth-century creation of the hard-boiled genre. Sweden, however, ranks among the world's best, in terms of both low murder rate and greater gender equality, yet, for more than fifty years, has become a hotbed of crime fiction in its own right. Sweden's penchant for novels that seemingly go against their cultural identity has long fascinated international readers. The explanation for this may lie in performance, perhaps best seen in Maj Sjöwall and Per Wahlöö's 1965 *Roseanna*, which first introduced their stalwart Swedish detective, Martin Beck. The American title character is murdered as she travels through Europe; to lure the suspected killer back out, a Swedish female police officer, Sonja, imitates Roseanna. Thus, this paper will show how Sonja's performance of an American female reflects Sjöwall and Wahlöö's performance of an American genre, reimagining America's violent culture into a form of Swedish escapism.

Master's Candidates

Society, Behavior and Learning, Group B

Mtg Rm 3
1:00

EFFECTS OF BUPRENORPHINE AND METHADONE ON HYPERTENSION IN PATIENTS WITH OPIOID DEPENDENCE: A RANDOMIZED CLINICAL TRIAL STUDY

Charvi Choksi, Kesheng Wang, Ying Liu, Olakunle Oni, Youssoufou Ouedraogo, and Shimin Zheng.
Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Background: The misuse and addiction to opioids are one of the major health and social problem that is associated with an increase in morbidity and mortality. Both Buprenorphine (BUP) and Methadone (MET) are FDA-approved treatments for opioid dependence. This longitudinal study is to determine the effects of BUP and MET on hypertension in patients with opioid dependence using a Generalized Estimating Equation (GEE) Model. Methods: The data is from National Drug Abuse Treatment Clinical Trials Network (CTN) protocol CTN-0027. This is a randomized study of 1,934 opioid-dependence participants seeking treatment that followed for up to 32 weeks. A total of 1,284 males and 631 females participated at the Baseline (visit1) of the study. At the end of 32 weeks (10 visits), 499 males and 243 female patients completed the study. Blood pressure of all the patients was checked at every visit beginning visit 1 to visit 10. For this analysis, the dependent variable was hypertension which was defined as having a systolic blood pressure higher than 140 mmHg and/or a diastolic blood pressure higher than 90 mmHg. These participants were randomly assigned to receive BUP (n= 740) or MET (n= 529). The GEE model with exchangeable correlation was used to determine the efficacy of both the drugs on hypertension. The analysis was performed using PROC GENMOD in SAS 9.4. Results: Time increased the odds of hypertension (adjusted odds ratio (aOR): 1.04, 95% confidence interval (CI): 1.02-1.06, $p<0.0001$), which implies, overall speaking, that neither BUP or MET had any effect on hypertension among patients with opioid dependence. The African American patients with opioid dependence who were taking either BUP or MET were 5.53 times likely to have hypertension (aOR: 5.53, CI: 4.15-7.37, $p<0.0001$) and Hispanic patients with opioid dependence were 1.40 times likely to have hypertension (aOR: 1.40, CI: 1.05-1.87, $p=0.024$), compared to White patients with opioid dependence. Male patients with opioid dependence who were taking either BUP or MET were 1.53 times likely to have hypertension compared to female patients with opioid dependence (aOR: 1.53, CI: 1.21-1.93, $p<0.001$). No significant difference between BUP or MET was found, although BUP had a slightly less chance of causing hypertension among patients with opioid dependence than MET treatment (aOR: 0.94, CI: 0.77-1.17, $p=0.60$). Conclusion: Findings suggest that BUP had a slightly less chance of causing hypertension among patients with opioid dependence comparing with MET controlling for other risk factors, but neither one of

them had any significant effect on hypertension among patients with opioid dependence. Further analysis will be essential to detect gender x treatment interaction.

Mtg Rm 3
1:15

ASSOCIATION BETWEEN ASTHMA, OBESITY, SLEEP LOSS, PHYSICAL ACTIVITY AND SUBSTANCE USE AMONG THE U.S. ADOLESCENTS: FINDINGS FROM YRBS 2015.

Hilary Elom[1], Dr. Ying Liu[1], Zhao Peng[2], Titilayo James[1], and Dr. Shimin Zheng.[1]
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[2] The Travelers Companies, Inc., USA

Objectives: Asthma is a genetic disease that requires an environmental trigger to manifest in predisposed individuals. This study aims to assess the prevalence of asthma among U.S. adolescents and possible environmental triggers to asthma. Methods: This is a secondary analysis of the Youth Risk Behavioral Survey 2015 (YRBS 2015). A total of 15,624 high school students in the U.S. were included in this analysis. The YRBS was established by Center for disease control and prevention (CDC) in 1991 to monitor six priority health risk behaviors among youths and young adults. Data were collected via self-administered questionnaire which was validated by CDC through a two test reliability studies. The Data was analyzed using SAS v 9.4. Results: The overall prevalence of asthma was 23.08% with no significant difference between male (22.84%) and female (23.31%). Simple logistic regression analysis showed that the estimated odds of having asthma among individuals that initiated cigarette smoking before the age of 13 years was about 40% higher than those who did not (Odds Ratio (OR): 1.40, 95% CI: 1.22-1.62, p<0.0001). The odds of having asthma was also significantly higher among individuals who used marijuana before the age of 13 years (OR: 1.25, 95% CI: 1.11-1.46, p<0.001) than those who did not. Furthermore, the estimated odds of having asthma was 25% higher in individuals currently using marijuana (OR: 1.25, 95%CI: 1.14-1.37, p<0.0001) than those who do not and 44% higher among obese individuals (OR: 1.44, 95%CI: 1.29-1.60, p<0.0001) compared to non-obese individuals. Sleeping eight or more hours per day was protective against asthma (OR: 0.81, 95% CI: 0.74-0.88, P<0.0001). After adjusting for age and other factors, multiple logistic regression showed that the odds of having asthma was approximately 26% higher among individuals who initiated cigarette smoking before the age of 13 years (adjusted OR (aOR): 1.26, 95% CI: 1.01-1.57, P=0.037) than those who did not. Moreover, the odds of having asthma was 18% higher among those who initiated alcohol drinking before the age of 13 years (aOR: 1.18, 95%CI: 1.04-1.35, P=0.014), compared to those who did not. There was no association found between asthma and physical activity, the use of marijuana after adjusting for age and other potential risk factors. Conclusion: While sleeping more than eight hours per day was protective against asthma, early initiation of cigarette smoking, marijuana, and alcohol drinking was positively associated with asthma. Encouraging children to sleep minimum of eight hours per day will potentially decrease asthma prevalence.

Mtg Rm 3
1:30

MEDIA EXPOSURE, ANTICIPATED STIGMA, AND SPIRITUAL WELL-BEING IN THE LGBTQ+ POPULATION FOLLOWING THE 2016 PRESIDENTIAL ELECTION

Sarah A. Job, Valerie M. Hoots, Margaret A. Hance, and Dr. Stacey L. Williams. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Exposure to negative media messages related to LGBTQ+ issues have been associated with negative affect, depression, stress, and psychological distress among that population (e.g. Rotosky, Riggle, Horne, & Miller, 2009). Frost and Fingerhut (2016) have suggested that this exposure to negative media messages is a form of distal minority stress, which has been theorized to contribute to anticipated stigma or unfair treatment (Meyer, 2003). Thus, in the present study, we predicted that individuals who were exposed to more negative messages in the media will have more negative feelings about the election, report more anxiety and fear, and anticipate more discrimination due to their LGBT identity. Further, we hypothesized that negative feelings about the election would relate to more anxiety, fear, anticipated discrimination. However, because connection with the LGBTQ+ community and spiritual well-being have been associated with better mental health (Pflum et al., 2015; Greenfield et al., 2009), the current study explored whether community connection and spirituality relate to the other relations tested. Participants (N = 207) were recruited online through various social media platforms and participated in an online survey using Survey Monkey. The survey included the following measures: the Exposure to Negative Campaign Messages (adapted; Frost & Fingerhut, 2016), a self-created Presidential Election 2016 Response Questionnaire, Discrimination Scale (adapted; Kessler, Mickelson, and Williams, 1999), Connectedness to the LGBT Community Scale (Frost & Meyer, 2012), State-Trait Anxiety Form for Adults (Form Y-1; Spielberg, Gorsuch, Lushene, Vagg, & Jacobs, 1977), Fear and Sense of Control Scale (Salcioglu, Urhan, Pirinccioglu, & Aydin, 2016), Spiritual Index of Well-Being Scale (Daaleman & Frey, 2004), Centrality Scale (Quinn, Williams, Quintana, Gaskins, & Pishori, 2014), and questions about frequently used social media sites. Results revealed, contrary to our hypotheses, that more negative messages in the media was not significantly related to negative feelings about the presidential election, $r = .05$, $p = .524$, or state-trait anxiety, $r = .079$, $p = .341$. In support of our hypotheses, negative feelings about the presidential election were significantly related to more anticipated discrimination in everyday life, $r = .631$, $p < .001$, state-trait anxiety, $r = .577$, $p < .001$, and fear, $r = .663$, $p < .001$. Exploratory analyses revealed that those with more negative feelings about the election felt less connected to the LGBTQ+ community, $r = -.224$, $p = .001$, and had a lower spiritual life schema, $r = -.362$, $p < .001$. Additional exploratory findings highlight the possibility that spiritual well-being may moderate the effect of being exposed to negative media messages and should be examined more specifically in the future. In sum, feelings resulting from media exposure may be more influential to mental health than media exposure itself.

Mtg Rm 3 2:00 **CAUSAL ATTRIBUTION AND REHABILITATIVE IDEOLOGY AMONG JUVENILE JUSTICE WORKERS**

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

According to attribution theory, the meaning assigned to a particular behavior depends upon whether the behavior is considered a response to one's environment or a result of personal choice. Attitudes toward rehabilitation are largely influenced by causal attributions. In other words, beliefs regarding why a particular behavior has occurred tend to shape individual views on appropriate sanctions for that behavior. Specifically, individuals who view crime and delinquency as a response to environment tend to be more supportive of rehabilitative ideology, whereas individuals who view these behaviors as a result of personal choice tend to hold more punitive attitudes. Public opinion research also generally indicates stronger support for rehabilitation of juvenile offenders as compared to adults. However, opinion research is rather limited regarding those whose support for rehabilitation is perhaps the most crucial to successful outcomes: workers in the justice system. The current study proposes that attribution theory can be used to accurately predict the rehabilitative ideology of correctional workers in the juvenile system based on their views towards a variety of criminogenic factors using factor analysis of survey responses from juvenile justice employees in a conservative Midwestern state. Results indicate strong support strong support for a relationship between causal attribution and support for rehabilitation among "insiders" in the juvenile justice system. Implications for training and policy will also be discussed.

Mtg Rm 3 2:15 **ASSOCIATION OF SEXUAL ABUSE AND EXPOSURE TO PARENTAL SUBSTANCE ABUSE BEHAVIOR DURING CHILDHOOD WITH DRUNK DRIVING IN US ADULTS**

Elaine Loudermilk[1], Sreenivas P. Veeranki, MBBS, DrPH[2], Megan Quinn, DrPH[1], Shimin Zheng, Ph.D[1], and Oluyemi R. Rotimi, MBBS[1].
[1] Department of Biostatistics and Epidemiology, College of Public Healh, East Tennessee State University, Johnson City, TN;
[2] Department of Preventive Medicine and Community Health, University of Texas Medical Branch, Galveston, TX.

Background: Adverse childhood experiences (ACEs) lead to high risk behaviors in adults. Annually, around 10,000 people die from alcohol-related motor vehicle injuries, and >1.1 million arrested for driving under the influence of alcohol or narcotics. An estimated 700,000 children reported abuse each year; 8.4% reported experiencing sexual abuse. Studies have reported the role of ACEs in alcohol consumption during adulthood. Additionally, evidence exists about the influence of parental substance abuse behaviors on addiction to alcohol and other substances of abuse. However, the association of adult drunk driving with childhood sexual abuse, and /or exposure to parental substance abuse behaviors has not been investigated. Objective: This study aimed to estimate the association of sexual abuse and/or parental substance abuse behaviors during childhood

with drunk driving in US adults. Methods: Data were obtained from 4,374,390 adults who participated in the 2012 Behavioral Risk Factor Surveillance System (BRFSS). Participants' self-reported responses were used to define study outcome- drunk driving (no/yes) and study exposure- childhood sexual abuse (no/yes) and parental substance abuse behavior (no/yes). Covariates included age, sex, race, income, education, and marital status. Simple and multivariable logistic regression models were used to assess the relative odds of drunk driving among US adults who reported sexual abuse and/or exposure to parental substance behaviors during childhood. Interaction models were conducted to test for joint effects of study exposures on the outcome. Results: Approximately 3.6% of adults reported DD, 10.55% reported exposure to parental substance abuse behavior, and 11.1% adults reported childhood sexual abuse. Compared to adults who didn't experience sexual abuse during childhood, those who experienced were significantly associated with increased odds of drunk driving behavior (adjusted Odds Ratio (aOR): 1.67, 95% confidence interval (CI):1.27-2.20). Adults who reported exposure to parental substance abuse behavior were found to be associated with increased odds of drunk driving behavior (aOR:1.30, 95%CI:1.00-1.68) compared to unexposed adults. Conclusion: Adults who were sexually abused during childhood and had exposures to parental substance abuse behaviors were associated with increased relative odds of drunk driving. The study findings help public health professionals identify targeted high risk groups for interventions. Appropriate public health interventions and/or policies should be developed to prevent sexual abuse and exposure to parental substance abuse during childhood. Health education and promotional campaigns are vital to minimize drunk driving cases by targeting communities and individuals with high risk behaviors.

Mtg Rm 3
2:30

CLIENT EXPERIENCES OF MINDFULNESS MEDITATION IN THE COUNSELING SETTING: A QUALITATIVE STUDY

Veronica O'Brien, Dr. Elizabeth Likis-Werle, and Dr. Cassandra Pusateri. Department of Counseling, Clemmer College of Education, East Tennesse State University, Johnson City, TN.

Mindfulness meditation is a growing topic in counseling literature and has shown to be beneficial in reducing symptoms associated with mental illness and assisting counselors in training with their skill development. To date, no research has explored the client's experience with the emerging technique. In the present study, students enrolled in a graduate level counseling program were recruited and asked to engage their client, from the department run clinic, in a mindfulness meditation during their weekly counseling session. All counselors went through training which provided them with necessarily information and tools to perform the intervention with clients. Clients who agreed to participate in the study were led through a breathing mindfulness meditation within their session and interviewed by the primary investigator within a week of the session. The interview was semi-structured, and questions were formulated based on the phenomenology tradition to probe the client about their unique lived experience when mindfulness meditation was incorporated into their session. Once interviews had concluded, the primary investigator transcribed the interviews, and the research team met to identify themes. Overarching themes identified included variations of the individual's

experience, mental, emotional, and physical sensations described, perceptions of mindfulness meditation, preferences of mindfulness meditation, and continued practice. Following the discussion of themes, a discussion of the implications for counselors will be provided along with future research considerations.

Mtg Rm 3
3:00

SPATIAL ANALYSIS OF DOCTOR-VISITS AND HOSPITALIZATION FROM MOSQUITO BORNE ILLNESSES IN NUEVA VIDA, NICARAGUA

Sonica Sayam, Julie Obenauer-Motley, and Megan Quinn. Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN.

Background: Recently mosquito-borne illnesses (MBI) such as Chikungunya (CHIKV) and Zika virus (ZIKV) proved to be of major public health importance in the Western Hemisphere. Nicaragua is considered the poorest country in Central America, with 46.2 percent of the population living in poverty. The community of Nueva Vida in Nicaragua rose as a place for displaced people after Hurricane Mitch and continues to be a place where homeless people come to create makeshift housing. The purpose of this study was to gain insight into the number of community members in Nueva Vida, Nicaragua seeking medical attention for self-reported MBI. Method: This study involved a door-to-door survey of 1,015 households in five Etapas or sections of Nueva Vida. Existing local maps and Google map were used to delineate the territory of each of the five Etapas and the blocks within them. There are five Etapas, indicated by number, and within each Etapa are blocks, indicated by letters. The data pertaining to number of doctor visits and hospitalization from MBI were aggregated to the block level and mapped for spatial analysis using ArcGIS 10.3. Cross tabulation of the number of cases and doctor visits and hospitalization by Etapa and block was done using SAS. Results: The maps illustrate that Etapa 2 has highest number of doctor visits (411) and hospitalization (48), while Etapa 5 has lowest number of doctor visits (62) and hospitalizations (14). The cross tabulation suggests there is an association between self-reported MBI and number of doctor visits and hospitalization, since Etapa 2 and 5 have the highest (526) and lowest (100) number of cases, respectively. Among the rest of the Etapas, Etapa 3 is the second highest both in terms of self-reported MBI cases (445) and number of doctor-visits (326) and hospitalization (39). This association is consistently found in other Etapas as well. Within Etapa 2, block 2T and 2M have highest number of households seeking medical attention, 43 doctor-visits and 14 hospitalizations, respectively. Conclusions: The geospatial map of the data indicates that the burden of disease in this community varies by Etapa and block. These maps are useful to identify the high risk areas for MBI in Nueva Vida, Nicaragua and can be utilized to make decisions on the most efficient distribution of resources for mitigation.

Mtg Rm 3
3:15

THE LEVELS OF SECONDHAND TOBACCO SMOKE EXPOSURE (PM2.5) IN HOSPITALITY BEFORE AND AFTER THE ENACTMENT OF A NATIONAL TOBACCO CONTROL ACT IN GHANA.

Pooja Subedi[1]; Wilfred Agbenyikey, PhD[2]; Daniel Owusu, DrPH[3]; Abdallah Ibrahim, DrPH[4], Bossman Asare, PhD[5], Edward Brenya, PhD[6], Ahmed EO Ouma, PhD[7], Rijo M. John, PhD[8], Hadii M. Mamudu, PhD MPA[9].

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[6] Kwame Nkrumah University of Science and Technology, Kumasi, Ghana;
[7] World Health Organization (WHO) Regional Office for Africa, Brazzaville, Republic of Congo;
[8] India Institute of Technology, Johpur, Rajasthan, India;
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Tobacco smoke contains over 4,000 chemicals, 70 of which are known toxins and carcinogens. Yet, with over one billion smokers in the world, billions of nonsmokers, including children are exposed to secondhand tobacco smoke (SHS), contributing to over 600,000 annual deaths worldwide. The ban on smoking in public places has been identified as an effective policy to protect nonsmokers from SHS exposure, promote smoking cessation, and change social norms about tobacco; yet, only 7 of 47 countries in Sub-Saharan Africa (SSA) have comprehensive smoke-free policies. In 2012, Ghana enacted and implemented a national Tobacco Control Act, the Public Health Act 851 that prohibited smoking in all indoor places, including workplaces, restaurants, and bars and night clubs. The **aim** of this study was to evaluate the impact of the public smoking ban on SHS exposure in hospitality venues. Hundred and Forty-one public recreational places in towns across Ghana including Accra; the capital, were surveyed (n =92 in 2007 and 49 in 2015). Research assistants visited the selected facilities and recorded indoor $PM_{2.5}$ concentrations along with information on general characteristics, infrastructure and smoke-free policy of the facility. The research assistants spent at least 30 minutes in each facility to record $PM_{2.5}$ concentrations using Sidepak monitor. T-test was conducted to compare the mean $PM_{2.5}$ concentrations in indoor air of these facilities before and after the enactment of Tobacco Control Act in Ghana using SAS 9.4. Indoor smoking was observed in 86% of the facilities surveyed pre-legislation and in 56% of the facilities surveyed post-legislation. The average $PM_{2.5}$ concentrations was 571.25 $\mu g/m^3$ (SD 526.04$\mu g/m^3$) in 2007 and 231$\mu g/m^3$ (SD 332.76$\mu g/m^3$) in 2015. The average $PM_{2.5}$ concentrations was significantly lower post-legislation compared to pre-legislation (p 0.0007). Ghana is one of the seven countries in SSA with a national Tobacco Control Act. As a Party to the WHO Framework Convention on Tobacco Control (WHO FCTC),

Ghana is required to implement Article. 8, which talks about regulations to protect people from SHS exposure. This study shows that the introduction of the smoke-free policy in Ghana through the Tobacco Control Act reduced SHS exposure in hospitality venues in Ghana, suggesting the need for extension of smoke-free policies to other venues, including outdoor public places. Thus, this first study of $PM_{2.5}$ level and the impact of smoke-free policy on SHS exposure in Ghana provides lesson for other countries in SSA region and low- and middle-income countries.

Mtg Rm 3
3:30

COMPARATIVE ANALYSIS OF SURVIVAL AND DECAY OF FECAL INDICATORS IN BOVINE FECES AND FRESHWATER MICROCOSM

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

According to the Center for Disease Control and Prevention, livestock feeding operations are a major source of surface and groundwater pollution. A report published by the US EPA estimated that fecal wastes from agricultural feedlots were responsible for the impairment of a staggering 173,629 river miles, 3,183,159 lake acres, and 2,971 estuary square miles. Given the extent of the fecal pollution and its associated human health hazards, it is important to regularly monitor the surface waters for pathogens. The use of fecal indicator bacteria, such as *E. coli* and enterococcus, has greatly improved our ability to predict and mitigate the associated risks that stems from ingesting contaminated food or water. Remediation of impaired surface water is accomplished through a process mandated in the Clean Water Act. The mandated process involves developing and implementing Total Maximum Daily Load (TMDL) plans that are founded on the fate and transport of fecal bacteria. In order to develop effective criteria for water quality, it is important to be able to accurately and precisely determine the concentrations of bacteria within areas of fecal deposits or manure-treated soils that are proximal to impaired sources of water. Based on the concentrations of bacteria within the fecal deposits of manure amended soil, predictions about in-stream concentrations can be made. The aim of this study was to – 1) determine the influence of temperature on the survival and differential decay of two fecal indicators – *E. coli* and enterococci – in cow feces; and 2) compare the decay kinetics for fecal indicators in feces and freshwater microcosm. To do this, freshly voided feces were collected from 3 farms in East Tennessee on 4 different days. The samples were homogenized and stored at three different temperatures - 4^{o}C, 22^{o}C and 35^{o}C. Samples from the manure were collected over a period of 18 days to test for survival. The survival of bacteria was determined using drop plate technique on tryptic soy agar (TSA), m-fecal coliform agar, m-endo agar, eosin methylene blue (EMB) agar and m-enterococcusal agar. Direct counts were performed using acridine orange as the binding dye to get an idea of the total bacterial load in the sample. Colony counts and direct counts were recorded from samples that met the quality control criteria for field, experimental and analytical procedures. Data will be analyzed using Chick's exponential model with temperature correction based on the Arrhenius equation. Bases on the survival time-series, two phases of growth are expected – a short growth phase followed by a long die off. The growth at 22 ^{o}C is expected to be higher than observed growth at 35^{o}C, with the least growth occurring at 4^{o}C. It is expected that the bacteria will survive

longer in freshwater microcosm compared to the fecal matrix. The results of this study will influence regulations regarding better management of animal fecal pollution. To our knowledge, no study has addressed the differential survival of FIB in the fecal matrix and compared it to survival in freshwater microcosm. This highlights the importance of conducting more studies that focus on developing effective fate and transport models for fecal indicator bacteria to make accurate predictions about the extent of fecal pollution in surface waters.

Poster Presentation Abstracts

Medical Residents and Clinical Fellows

Natural, Biomedical and Health Sciences, Group A

1. PEDIATRIC PATIENT PREVENTION EDUCATION: IMPROVING ATTITUDES, KNOWLEDGE, AND BEHAVIOR IN A PATIENT-CENTERED MEDICAL HOME FAMILY MEDICINE RESIDENCY

Dr. DeLayne Allred, Laurie Webb, Kristen Greene, Brittany Flanary, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Patient education is vital for pediatric wellness and prevention of common diseases and illnesses. In this study, researchers focused on how well the physicians and staff at the East Tennessee State University Family Physicians of Bristol are prepared to offer pediatric patient prevention education. A questionnaire about knowledge, attitudes, and self-reported behaviors was administered to resident and staff participants. These same participants then took part in an interactive educational session on pediatric prevention topics. After the conclusion of this activity, a second questionnaire assessing the aforementioned domains was administered. Results from the two surveys were compared to determine if the educational program led to significant changes in knowledge, attitudes, and behavior. For all of the analyses, t-tests were performed. With regards to the knowledge portion, total percentage correct out of 16 questions was calculated. It was found that total percentage correct was significantly higher post-education ($M=85.9$) compared to pre-education ($M=35.6$), $t(1,30)=-7.5$, $p<.001$. Significant changes were also found in the self-reported behavior items. Respondents reported higher levels of comfortable in discussing developmental milestones, diet changes, and childhood obesity. These results stress the importance of educating resident providers in Family Medicine on topics about pediatric patient prevention. Future research should retest participants to determine if knowledge and behavior gains endure over a longer time period.

2. **ENCOURAGING BREASTFEEDING IN CONTINUITY OB PATIENTS AMONG FAMILY MEDICINE RESIDENTS BY DEVELOPING BREASTFEEDING EDUCATION CURRICULUM**

Dr. Martha Cole, Dr. Tyler Elam, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

As family medicine residents with continuity obstetrics patients, we are often in the unique positon to not only care for and support moms through pregnancy and delivery, but thereafter, care for the dyad of mother and infant. The benefits of breastfeeding for mom and baby are well established and supported by evidenced based medicine; however, due to time constraints and lack of resident education, many of these benefits are not communicated to our patients and we do not meet established goals/guidelines set forth by the World Health Organization, Centers for Disease Control, the American Academy of Pediatrics, the American Congress of Obstetricians and Gynecologists, and the American Academy of Family Physicians. This project was designed to: assess current knowledge base of Family Medicine residents, educate and update family medicine residents on physiology, benefits, and recommendations for patient education, and subsequently improve outcomes related to breastfeeding. To achieve the previously mentioned goals of this project, a pre-test, educational lecture/PowerPoint, and post-test were administered to Family Medicine residents. A t test was conducted to determine if test scores changed after the presentation of the breastfeeding education. The mean score for the pre-education condition was 64.6% correct; for the post-education condition, the mean score was 89.7% correct. The t test revealed that this was a statistically significant difference, $t(1,22)=-4.89$, $p<.001$, indicating that the education did increase Family Medicine resident knowledge of the benefits of breastfeeding. Future research should examine if these knowledge gains persist over longer intervals of time.

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3. **LEADERSHIP TRAINING IN A FAMILY MEDICINE RESIDENCY: DEVELOPING A FORMAL CURRICULUM FOR RESIDENT LEADERSHIP SKILLS**

Dr. Tyler Elam and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

The natural progression of medical residency is such that, as one matriculates, the amount of responsibility one must carry increases. Naturally, the more responsibility one encounters, there is a tacit demand for leadership skills that residents may or may not possess, and may or may not have been trained to possess. This demand for leadership training was addressed in the Journal of Graduate Medical Education published by the American College of Graduate Medical Education (ACGME) in the June 2015 edition. To date, no Family Medicine residency programs have addressed the "inherent disparity" of formal leadership training in medical resident education. It is a bit ironic that a Level 5 PROF-1 milestone competency of family medicine residency dictated by the ACGME is "demonstrate leadership," yet there is no published formal leadership training component in the world of Family Medicine residency. Other residency programs

(nursing , pharmacy, and hospital administration) have well established formal leadership training, even fellowships in leadership (Association of Colleges of Nursing) and it seems that physicians in training should also have a formalized component of leadership training in addition to the observational learning component of leadership (also necessary in leadership development). Currently there are no good publications concerning how to best formalize a component of medical resident leadership training, nor has any data been published on outcomes or best practices of the limited residency programs (dermatology and pediatrics). This project details the development of a 6 week formalized leadership curricula covering six high yield leadership topics (Proactivity, Positivity, Prioritization, Personal growth, and People handling) relevant in the medical world to be supplemented by a leadership inventory/questionnaire before and after delivery of aforementioned curricula. This project represents an important contribution to resident physician education, and provides a blueprint on how to design a leadership training program.

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4. EKG EDUCATION, AN ENDURING CURRICULUM

Jonathan Goodnight, MD and Jason Moore, MD. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

This project details the creation of a standardized curriculum to improve the delivery of EKG education to Family Medicine Residents and Medical Students involved with patient care in a Family Medicine Residency Program. EKG interpretation is a cornerstone of primary care. Successful interpretation of EKG's in a timely fashion ensures appropriate and efficient care, which can often be the difference between life and death. Many Medical Schools defer teaching methods for EKG interpretation until the clinical years, and then rely often on a very fragmented self-directed learning model. This model can be an effective method if the learner possesses adequate clinical experience to provide motivation and frame the lessons in a meaningful and clinically relevant way. This project intended to consolidate EKG education into a single “course”, which would include a series of lectures, reference materials, and practice materials. Each Medical Student would be exposed to a Basic EKG course, which provided a review of previously learned methods of EKG interpretation, and presented a clinical context to evaluate each component of these methods. Each Family Medicine Resident was also provided with the same Basic EKG course during their first year, and would also be provided Advanced EKG interpretation at regular intervals during their remaining Residency. All students were provided with reference handouts to summarize and compare methods, as well as access to practice EKG's with clinical cases. This program provides improved access to consistent educational content related to EKG interpretation, which would ideally lead to improved patient care. Feedback received from Residents and Students has been very positive, and was expanded to include Medical Students Rotating at other Residency sites by request.

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5. IMPROVING MALE ABDOMINAL AORTIC ANEURYSM SCREENING RATES IN AN APPALACHIAN RESIDENCY PROGRAM

Dr. Jason Hollis, Dr. Chaitanya Korrapati, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Screening patients in the primary care setting has been and continues to be a major factor in the treatment and monitoring of disease progression. It has also been shown to prevent and decrease incidence of certain diseases as well as to be a cost-savings measure for healthcare overall if carried out according to recommendation. The United States Preventive Services Task Force (USPSTF) recommends abdominal aortic aneurysm (AAA) screening by abdominal duplex ultrasonography for males 65-75 years of age who have smoked at least 100 cigarettes in their lifetime. The objective of this study was to improve the rate of screening for AAA by abdominal duplex ultrasound in male patients 65-75 years of age who are current or former smokers and are seen in the East Tennessee State University Family Physicians of Bristol clinic. The baseline rate of AAA screening was determined by reviewing electronic medical records. Providers in the Bristol clinic received education regarding USPSTF recommendations for AAA screening. Six months later, another review of electronic medical records was conducted to determine the screening rate had significantly improved. Analysis is currently ongoing. It is expected that the results will demonstrate that provider education significantly increased the rate of AAA screening in the Bristol clinic. This project represents an important contribution to the fields of physician education and abdominal aortic aneurysm screening.

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6. CAUSES AND PREVENTION OF HOSPITAL RE-ADMISSIONS SECONDARY TO CHRONIC OBSTRUCTIVE PULMONARY DISEASE: TRENDS AND RECOMMENDATIONS

Enambir Josan, Jennifer M. Treece, MD, Heidi Storer DO, Ahmad Albalbissi MD, Pratyaksha Sankhyan MD, Akhilesh Mahajan MD, Mudher Al Shathir MD, and Girendra Hoskere MD. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Chronic obstructive pulmonary disease (COPD) is a major cause of hospital re-admissions (up to a reported 22.6% over a 30 day period per 2003-2004 Medicare patient data), and accounts for significant health-care expenditures. Moreover, re-admissions cause significant distress to patient and their families, in addition to causing increased risk of complications secondary to recurrent treatment (mechanical ventilation, antibiotics, steroids). Methods and Results: COPD readmission, defined as hospital admission within 30 days of discharge, has been previously studied. The most notable prior publication by Jencks, Williams, & Coleman in 2009 evaluated readmission rates of various chronic illnesses in Medicare patients between 2003-2004. In this review COPD accounted for the second highest cause of all medical readmissions at 22.6%. In 2015 COPD was also included as a targeted diagnosis subject to penalty imposition for readmission under the 'Hospital Re-admissions Reduction Program' within the Affordable Care Act (ACA). This resulted in a significant drop in overall readmission rates from 58.2 to 50.1 per 1000 Medicare recipients from 2009-2013. However, the targeted effect on overall COPD re-admissions is yet to be assessed. In this study data from a community hospital in rural eastern Tennessee will be analyzed and compared to national statistics. Through the use of published national government data from the Healthcare Cost and Utilization Project (HCUP), national trends are currently tracked. Readmission data will therefore be collected from local healthcare facilities in east Tennessee through institutional review board (IRB) approval and data will be mined for causes of hospital re-admissions in less than 30 days from a previous hospital discharge. Particular attention will be paid towards re-admissions following hospitalization for COPD. National trends will then be compared to these local readmission trends with emphasis on the timing of prior government regulation implementations. Conclusion: Interventions effective in reducing readmission secondary to COPD include annual influenza vaccination, disease education, close outpatient follow-up, pulmonary rehab within 4 weeks of discharge, and the use of long acting maintenance inhalers. These management strategies can reduce readmission rates by up to 57%. Additionally, the use of angiotensin converting enzyme inhibitors and/or statins has been noted to mitigate systemic inflammation and reduce all-cause mortality. Finally, it is important for clinicians to continue classic recommendations including proper inhaler technique, medication compliance, lifestyle modifications (smoking cessation, avoidance of triggers), early awareness of exacerbation and timely intervention with rescue inhaler in order to maximize time to re-exacerbation and further decrease readmission rates.

7. EFFECTS OF MINDFULNESS MEDITATION ON STRESS IN HEALTHCARE PROFESSIONALS

Dr. Chaitanya Korrapati, Dr. Gigi Miranda, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Working in medical profession is stressful, and stress can affect performance, indirectly affecting patient care. Mindfulness has shown to decrease stress, which may improve patient care. At the East Tennessee State University Family Physicians of Bristol, there are no resources for learning mindfulness, so our goal was to educate all the medical professionals in our practice to learn mindfulness and evaluate the effect on their stress levels. First, a stress survey (Perceived Stress Scale) was administered to clinic providers. We presented instruction to clinic providers how to engage in mindfulness meditation. The technique of mindfulness meditation was taught by an expert through an audio clip. Six weeks after implementing the mindfulness meditation program, the Perceived Stress Scale was administered to the providers again to determine if their stress level had been reduced. Statistical analysis consisted of a t test. Higher scores on the Perceived Stress Scale indicate higher levels of experienced stress. The mean score in the pre-meditation condition was 16.71, and the mean score for the post-meditation condition was 12.62. The t test indicated that this difference was statistically significant, $t(1,32)=2.14$, $p<05$. The results of this study demonstrate that teaching healthcare providers skills regarding mindfulness meditation can significantly reduce their feelings of stress in the workplace. Future research should focus on examining if reducing stress has a measurable effect on patient outcomes.

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8. MEASURING PATIENT INTEREST IN COMPLEMENTARY AND ALTERNATIVE MEDICINE IN A RURAL/COMMUNITY FAMILY MEDICINE RESIDENCY PROGRAM IN NORTHEAST TENNESSEE

Dr. Gigi Miranda, Dr. Martha Cole, and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Complementary and Alternative Medicine (CAM) has been demonstrated to be an effective addition to traditional medical practice. However, patient awareness of CAM techniques may be low, particularly in rural areas. The aim of this study is to measure adult patient interest in CAM, particularly Osteopathic Manipulative Medicine (OMT), acupuncture, meditation, nutrition, and breathing techniques in a community Family

Medicine practice. An anonymous survey was given to 200 adult patients in an outpatient clinic over the course of 3 months. Survey items were designed to assess if patients were aware of CAM, if they had experience with any of the mentioned modalities, if they were interested in the mentioned modalities, and which CAM services patients would like to see offered in clinic. In regards to having heard of CAM, 57.3% of patients had reported that they were aware of CAM, while 42.7% were not. Of those that had heard of CAM, 42.4% had experience with OMT, 55.1% had experienced acupuncture, 7.6% had experienced breathing techniques group, 14.4% had experienced nutrition groups, and 5.1% had experienced meditation groups. 22.3% of patients were not interested in any form of CAM being offered in clinic, while 77.7 were interested in at least one type of CAM. OMT held the highest rating among interested patients, with 29.1% wanting to see it offered in clinic. These results indicate that, while many patients were not aware of CAM, there was nonetheless a high degree of interest in seeing CAM techniques offered. The implication of this study is that CAM should be implemented in the clinic as soon as possible. Future research should assess the degree to which patients actually utilize these services, once offered.

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9. PRECISION PROSTATE CANCER CHEMOPREVENTION WITH GAMMA-TOCOTRIENOL

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A goal of precision chemoprevention is to prevent or delay cancer progression by using minimally toxic agents guided by knowledge of alterations in oncogenic molecular pathways and signaling cascades. Indolent prostate cancer can benefit from chemopreventive agents by delaying growth. Vitamin E is not a single compound and refers to four tocopherols and four tocotrienols. The use of all-racemic-alpha tocopheryl acetate in preventing cancer was studied in the SELECT clinical trial. This trial found it was not chemopreventive and could promote prostate cancer. We compared the abilities of RRR-alpha-tocopherol (AT), RRR-gamma-tocopherol (GT), and gamma-tocotrienol (GT3) in preventing growth of two prostate cancer cell lines (LNCaP and PC-3) and a control prostate cell line (RWPE-1) by quantifying their effects on two signaling pathways known to be pivotal in prostate carcinogenesis, AKT and MAP Kinase (pERK). LNCaP, PC-3, and RWPE-1 cell lines were treated with increasing concentrations of AT, GT and GT3 in DMEM, and cytotoxicity determined by MTS cell culture experiments. We determined the effect of GT3 on signaling pathways by analyzing B-actin, P-AKT and p-ERK in combination with AKT and/or MEK inhibitors via Western immunoblot and PCR analysis. Initial experiments with LNCaP and PC-3 cells showed GT3 induced the expression of pERK and p-c-JUN, inhibited cell growth and promoted apoptotic cell death. Neither AT nor GT had these effects. AKT was not activated by AT, GT or GT3. Inhibition of AKT activation via MK-2206 did not block GT3 growth inhibition in

LNCaP cells. No growth inhibition was found with RWPE-1 control cells in presence of AT, GT or GT3 yet GT3 induced pERK expression. AT did not interfere with cancer growth inhibition and did not block the anticancer effects of GT3. GT3 induces the activation of pERK but this effect is not sufficient to account for the in vitro chemopreventive effects of this form of vitamin E. The AKT pathway is not modulated by GT3 and does not appear to be relevant to GT3 killing of PC-3 or LNCaP. Of five signaling pathways implicated in prostate carcinogenesis, we explored AKT and pERK. Future research will explore B-catenin, mTOR and PI3K.

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10. MAILING PATIENTS THEIR MEDICATION LIST: DOES IT IMPROVE OFFICE VISIT ATTENDANCE?

Dr. Melissa Robinson and Dr. Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Assessing patients in the office and accurately reconciling their medications is key to improving health outcomes. However, patient engagement with office visits at an East Tennessee residency clinic is sub-optimal. Patients do not always keep their appointments, and when they do they may not know or bring their medications. It is already known that an appointment reminder system can help. This research sought to determine whether mailing the medication list within a week prior to the appointment would change patient attendance behaviors. All patients who were at least 18 years of age scheduled for a clinic appointment during the week of January 23rd, 2017 (experimental week) were sent their medication list via US mail 7 days prior to the appointment. The attendance rate of this week was compared to the attendance rate of the week of February 13th, 2017 (control week), during which patients were not sent their medication lists. During the experimental week, 733 patients were scheduled. Ultimately 233 patients cancelled and 56 patients did not show up for their appointments. The attendance rate was therefore 61.9%. For the control week, 564 patients were scheduled, 207 patients cancelled, and 60 patients no-showed. The attendance rate for this week was 52.7%. The experimental week had an attendance rate 9.2% higher than the control week. Additionally, the cancellation rate for the experimental week was 30.4% versus 36.7% for the control week. The no show rate for the experimental week was 7.6% compared to 10.6% for the control week. The results of this study demonstrate that sending medication lists along with the reminder letter to patients lead to increased attendance rates.

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11. CAUSES AND PREVENTION OF HOSPITAL READMISSIONS SECONDARY TO PNEUMONIA: TRENDS AND RECOMMENDATIONS

Heidi Storer, DO, Jennifer M. Treece, MD, Enambir Josan, MD, Ahmad Albalbissi, MD, Pratyaksha Sankhyan, MD, Akhilesh Mahajan, MD, Mudher Al Shathir, MD, and Girendra Hoskere, MD. Department of Internal Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Introduction: Pneumonia (PNA) is a major cause of hospital readmissions, however recent data suggests overall readmission rates for specific targeted diagnoses have decreased. Given readmissions amount to significant health care expenditure as well as

stress to patients and their families, formal evaluation regarding this decline is warranted, especially on a local level. Methods: This retrospective cohort study aims to analyze frequent unscheduled hospital readmissions, defined as admissions occurring within 30 days of discharge, as well as overall methods currently implemented toward readmission prevention. This will be accomplished by evaluating the effectiveness of recent legislation aimed at reducing readmissions secondary to PNA on both the national and local levels in rural eastern Tennessee via the Hospital Readmission Reduction Program initiated in 2012 under the Affordable Care Act. The effectiveness of readmission mitigation strategies will be assessed within regional healthcare facilities which will provide input regarding future local readmission reduction programs. Finally, the validity of current prediction models for determining patients at high risk for readmission following initial hospitalization for PNA will be evaluated. Results: National readmission rates have decreased for all causes of initial admission diagnosis, but have most significantly declined for the targeted readmission diagnoses including PNA, congestive heart failure (CHF), and myocardial infarction (MI) starting in 2012. Readmission data from local healthcare facilities in eastern Tennessee were obtained and analyzed for comparison to national readmission data. Chronic obstructive pulmonary disease (COPD) was added recently in 2015, and therefore no published data regarding readmission rates for this targeted diagnosis was available. Conclusions: All-cause-readmissions were found to have decreased over the past decade following initial admission due to a targeted admission diagnosis (PNA, CHF, and MI). The United States federal government implemented the Hospital Readmission Reduction Program in 2012 under the Affordable Care Act, which incentivizes hospitals to reduce readmissions for targeted diagnoses via penalization for those facilities with readmission rates higher than the national average. This study found that readmissions following initial admission for targeted diagnoses decreased at a faster rate than those with non-targeted diagnoses. However, further analysis revealed that readmission rates overall have decreased following admission for both the targeted diagnoses as well as non-targeted diagnoses, suggesting the methods aimed at prevention are effective at preventing readmission in both categories. Therefore it is imperative to continue to focus on prevention of readmissions via patient education regarding their disease processes, communication between patients and physicians, maintaining smooth transitions of care between inpatient and outpatient facilities, and increasing efforts of healthcare professionals towards aiding patients in overcoming barriers to compliance.

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12. IMPROVING PHYSICIAN UNDERSTANDING OF ADVANCE DIRECTIVES IN A FAMILY MEDICINE RESIDENCY PROGRAM

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It has been shown that end-of-life conversations and the use of Advance Directives in medical care have led to improved quality of care and reduced in-hospital deaths as well as lower health costs in the last week of life for patients. For these reasons, the use of Advance Directive documents in primary care, and encouragement and assistance in completing them with patients is essential to holistic medical care in the outpatient setting. However, there are many barriers to both patient completion of these documents,

and to physicians' implementation of these documents in practice. This study sought to explore the impact of a simpler Advance Directive pocket card on Advance Directive physician knowledge and perception of completion rates by surveying our physician population at the ETSU Family Physicians of Bristol clinic. Education regarding ease of use and portability of the new Advance Directive pocket cards was presented to providers in the clinic, so that they could share it with patients as they deemed appropriate. Surveys assessing provider knowledge and behavior about the new document were administered both before and after the education. Analysis of the survey results is currently underway. It is expected that more Advance Directives will be completed by the patient population at the clinic (as measured by the physician survey), and that provider knowledge of Advance Directives will show significant increases. Results of this study will provide important information on how to best assist patients regarding this sometimes uncomfortable topic.

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62. **A TEST OF INTERVENTIONS TO ADDRESS IMMUNIZATION RATES IN A FAMILY MEDICINE CLINIC**

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Adult immunizations effectively reduce diseases. Despite this, it is difficult to convince patients to be vaccinated. We developed and implemented two different strategies, each deployed separately to improve our flu vaccination rates in two flu seasons. Data assayed from two seasons (2015-16 and 2016-17) show changes by approach used. Results suggest the strategy involving the most effort was no more effective than the lower effort strategy. These data are discussed in terms of appropriate metrics and future research.

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13. **EFFECTS OF METFORMIN AND GAMMA-TOCOPHEROL ON CYTOTOXICITY AND SYNERGY IN HCT-116 AND CACO-2 COLON CANCER CELLS**

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Introduction**:** Colorectal cancer is the second leading cause of cancer-related deaths in the United States and the third most common cancer in men and women. Type-2 diabetes mellitus increases the risk for several types of cancers involving the liver, pancreas, colon, endometrium, bladder, and breast. Insulin resistance, hyperinsulinemia, oxidative

stress, and proinflammation have been suggested as potential mechanisms. Recent studies including retrospective and *in vivo* studies have suggested that Metformin, a biguanide class of anti-diabetic drugs, possesses anti-cancer properties. Tocopherols (Vitamin E) are lipid soluble antioxidants that exist as eight structurally different isoforms. Recent epidemiological, experimental, and molecular studies suggest that γ-tocopherol may be a more potent cancer-preventive form of vitamin E. Several retrospective studies and *in vivo* studies have shown that Metformin and Gamma-tocopherol (GT3) have anticarcinogenic properties individually on colon cancer cells. Our experiment was aimed at identifying the individual cancer reducing properties of Metformin and GT3 on human colon cancer cell lines HCT-116 and CaCO-2 *in vivo* and to identify if there was any additive or synergistic effect when both these drugs are combined. Methods: HCT-116 and CaCO-2 colon cancer cell lines were cultured in DMEM media (low glucose) containing 10% bovine serum, and plated in 96-well culture plates at 5,000 cells per well. HCT-116 cells were dosed at 24 hours and CaCO-2 cells were dosed at 48 hours with increasing concentrations of Metformin (2.5mM-40mM) and GT3 (20μM-50μM). Cytotoxicity of the drugs was studied using MTS assay 24 hours after dosing. Later, we also studied an MTS assay by combining both the drugs to the cell lines to study synergy. Results**:** Metformin and GT3 induced cytotoxicity in both HCT-116 and CaCO-2 cell lines with increasing concentrations. Synergy was found in HCT-116 cells with Metformin and GT3 at lower doses, but no synergy was appreciated in CaCO-2 cells. In HCT-116 cells, IC-50 for metformin was 36.6mM and IC50 for GT3 was 26.03 μM; synergy was identified at 10 μM of GT3 and 5mM of Metformin. In CaCO-2 cells, IC-50 for Metformin was 33.22mM and IC 50 for GT3 was 29.5 μM. Conclusion: Metformin and Gamma-tocopherol induce cytotoxicity in HCT-116 and CaCO-2 colon cancer cell lines. In addition, they exhibit differential synergy in the two colon cancer cell lines. Further studies will be necessary to identify the potential mechanisms of cytotoxicity and the basis for the differential synergy.

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14. UNUSUALLY AGGRESSIVE LOW GRADE FOLLICULAR LYMPHOMA

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Follicular lymphoma is one of the most common indolent non-Hodgkin's B-cell lymphomas that usually arise from germinal B-cell origin. It usually peaks in the fifth and sixth decade. Neoplastic cells typically express CD 19, CD 20, and CD 23. The chromosomal translocation t(14;18) is a hallmark of follicular lymphoma and is present in almost 90% of cases. This translocation is contributing to overexpression of BCL2 protein which is capable of inhibiting apoptosis in lymphoid cells. There are three histological grades of follicular lymphoma. Grades 1 and 2 follicular lymphomas, while incurable, are usually low grade with prolonged survival and limited extent of disease. We present a sixty-eight-year old lady who presented with severe left hip pain due to impending femoral neck fracture. Imaging showed diffuse and widespread adenopathy. Biopsies of both the mesenteric lymph node and femoral bone lead to the diagnosis of follicular lymphoma grade 1-2. PET/CT revealed diffuse osseous and extensive lymph node involvement on both sides of the diaphragm. A bone marrow biopsy and aspiration

illustrated hypercellular marrow consisting of 40% lymphoma with monoclonal lambda-light chain restriction. The patient was diagnosed with stage IV follicular lymphoma with high FLIPI score consistent with a five-year survival of 50%. Based on the high GELF score, bulky lymphadenopathy causing hydronephrosis, and imaging consistent with bowel involvement, chemotherapy was initiated with Rituximab and Bendamustine. Most patients with grades 1-2 follicular lymphomas have lymphadenopathy that waxes and wanes over time, and they will require chemotherapy only to control symptoms. Observation followed by a wait and watch strategy is the most common approach.

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15. INTERPRETING PROTEINURIA IN PREGNANCY

Dr. Melissa Robinson and Patricia Conner. Department of Family Medicine, Quillen College of Medicine, East Tennessee State University, Johnson City, TN.

Pre-eclampsia is associated with significant maternal/fetal morbidity and is classically defined as hypertension with proteinuria occurring at >20 weeks EGA or <48 hours postpartum. Proteinuria has been used to predict pre-eclampsia since the turn of the 20th century. However, its utility in predicting pre-eclampsia is much debated, and many reports exist of adverse outcomes in the setting of hypertension without proteinuria. Research is now turning toward alternative measures such as urinary podocytes and their transmembrane proteins, and endothelial factors. An updated understanding of the utility of urine protein tests is needed. The objective of this project was to construct an updated understanding of the significance of proteinuria in pregnancy. Literature from 1990 to January 2016 was identified via 1) Cochrane Central Registry of Controlled Trials, 2) Cochrane Database of Systematic Reviews, 3) General bibliographic databases including PubMed and Google Scholar. Studies and reviews were selected if they specifically addressed the measurement of, or significance of, proteinuria in pregnancy. Studies were divided into three categories: 1) Proteinuria in the General Pregnant Population; 2) Proteinuria in Special Populations; 3) Methods to Assess Proteinuria. Results from the literature review indicated that proteinuria is an unreliable predictor of pre-eclampsia. Although under debate, it is still used as a diagnostic criterion for pre-eclampsia when seen together with hypertension after 20 weeks gestation or within 48 hours of delivery. 24-hour urine collection is the only accurate measure although urine dipstick is still commonly used as a screening tool. In healthy pregnant women past the first trimester and without hypertension, proteinuria likely has no significance. In women in the first trimester, it likely indicates Chronic Kidney Disease which is an independent risk factor for poor outcomes. In women with SLE or Diabetes proteinuria may predict pre-eclampsia, and in women with mild pre-eclampsia it can be used as a part of a model to predict severity of pre-eclampsia. New research focuses on serum endothelial factors and urine podocytes and podocyte proteins.

❋ Case Studies, Group A ❋

16. DR. GOOGLE: FORECASTING ZIKA INTEREST USING GOOGLE TRENDS IN TENNESSEE

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Zika virus is an arthropod-borne flavivirus that has emerged as a rapidly spreading public health threat causing neurological disease and congenital anomalies. Transmission is by Aedes genre mosquitos. On July 29, 2016, The Centers for Disease Control and Prevention (CDC) announced the first locally transmitted outbreak in the continental US in Miami, Florida. Google trends have been previously used to predict increased activity or an outbreak prior to epidemiologic surveillance data, as seen during the influenza pandemic in Mexico. We sought to determine the trends of Google search on Zika virus in Tennessee before and after the CDC announced autochthonous US cases. Therefore, we performed a Google trend search using the keywords "Zika virus" from June 1 to August 5 in Tennessee. Google trends publishes data in numbers that represent search interests relative to the highest point on chart for a given region and time. A value of 100 is the peak popularity for a given term, 50 means that the term is half as popular and 0 means the term was less than 1% popular. Data collected in June was compared to the period between July 29 and August 5. Google search for "Zika virus" quadrupled from July 28 to July 29. The most common keyword search included Zika virus - Organism classification, Virus – Infectious agent and Mosquito – Insect. The most common related queries included Zika virus symptoms and Zika symptoms. The five top cities in Tennessee performing searches on Zika virus included: Nashville, Chattanooga, Knoxville, Tri-Cities, and Memphis. There was a trend of increased searches in neighboring states to Florida since July 29. As a result of completing the above procedure, Google search in Tennessee on Zika virus has increased 100% since the CDC announced local US Zika virus cases in Florida. There is a clear interest by the general public on Zika virus, possibly increasing the report of cases in Tennessee. We predict an increase in other social media traffic on Zika virus information. The internal medicine community has a clear opportunity to enhance accurate evidence-based information for patients in Tennessee through face-to-face health-care provider counseling, twitter, or other social media tools.

17. MASSIVE TUMOR WITH MILD SYMPTOMS AND MOLECULAR MARKERS THAT MAKE MORE SENSE - A RARE CASE OF PULMONARY SYNOVIAL SARCOMA

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Sarcomas are tumors of mesenchymal origin with a plethora of pathologic variants that can be challenging to diagnose merely by histo-morphology. We present a rare histologic case with an unusually quiet presentation. A sixty one year old previously healthy non smoker female patient presented with a persistent cough despite discontinuing ACE inhibitors. She felt well with no history of significant chest pain, hemoptysis, dyspnea or weight loss. Chest x ray revealed a large right lung mass and PET-CT demonstrated a large 9.0 x 8.7 cm right upper lobe mass adjacent to the main stem bronchus and main pulmonary artery with SUV of 4.19. Mild mediastinal adenopathy noted. No other hypermetabolic uptake. Bronchoscopic biopsy established a diagnosis of spindle cell neoplasm with neuroendocrine features (TTF 1 negative, CD56 and synaptophysin positive) on initial pathology report. Morphologically, proliferation of monotonous oval to spindle shaped cells seen with fine chromatin and no necrosis. Immunohistochemistry positive for Vimentin. RT-PCR for SS18-SSX2 fusion clinched the diagnosis of synovial sarcoma. Imaging studies suggestive of Stage III (T3/4,N2) disease. She was deemed not a candidate for neoadjuvant radiotherapy. Attempted cardiothoracic resection abandoned due to intra operative findings of tumor adherence to superior venacava, pulmonary artery and phrenic nerve. Patient opted to enroll in a clinical trial. Synovial sarcoma (SS) is a malignant soft tissue sarcoma with a poor prognosis because of late local recurrence and distant metastases. After rhabdomyosarcoma, SS is the most common soft tissue sarcoma in children, adolescents, and young adults. Synovial sarcoma is derived from the embryonic synovialis and does not originate from synovial tissue. Synovial sarcoma is like a carcinosarcoma with true epithelial differentiation and occurs in two major forms, biphasic and monophasic. Biphasic synovial sarcomas contain epithelial cells arranged in glandular structures and spindle cells, whereas monophasic types are entirely composed of spindle cells. Adverse prognostic factors for SS include large tumor size, metastases at diagnosis, high histological grade, trunk-related disease, and suboptimal surgery. Cytogenetic studies of synovial sarcomas reveal a characteristic chromosomal translocation, t(X;18)(p11;q11), in more than 90 percent of both biphasic and monophasic tumors. Cloning of the translocation breakpoints showed that t(X;18) results in the fusion of two novel genes, designated SYT (at 18q11) and SSX (at Xp11). Pulmonary synovial carcinoma can represent a primary tumor or a metastasis. Synovial sarcoma has generally been regarded as a high grade sarcoma and treated with adjuvant radiation therapy and chemotherapy following resection. Ifosfamide based chemotherapy regimens have demonstrated improved response rates. This case demonstrates the importance of molecular profiling and testing in the diagnosis of rare histologies.

18. SUBCLINICAL SEIZURES IN A PATIENT WITH AUTISM SPECTRUM DISORDER AND SPEECH DELAY

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Up to 8% of children are diagnosed with speech delay or disorder by preschool age. Parents and pediatricians must monitor closely for such delays. The American Academy of Pediatrics recommends developmental surveillance at all visits and utilization of formal screening tools at particular well child checks to aid in early recognition of concerns. A 6 year old male with a diagnosis of autism presented to primary care for a new patient, transfer-of-care, evaluation. At initial encounter, the patient used a maximum of 60 words and was receiving speech therapy through school. Family history was positive for seizures in the father and paternal grandfather as well as autism in a brother. Referrals to genetics, private speech therapy, and an autism specialist were offered although the latter was declined by family. Subsequent genetics evaluation resulted in discovery of a small gain on chromosome 1q42.2 and associated partial duplication of the DISC1 gene. The assay could not determine the exact clinical significance of the abnormality, but similarly sized and located abnormalities involving the DISC1 gene are reported in some patients with autism and developmental delay. During a follow up pediatrics appointment, father expressed his wish for further evaluation of causes of autism and requested an electroencephalogram (EEG) evaluation. Family concomitantly reported slow improvement in speech with therapy, the use of up to 200 words, and the ability to count to 10. The primary care physician reiterated that EEG and imaging studies are not indicated for an isolated autism diagnosis. The father was educated on recommended therapies for autism, and Neurology referral was made per parental request. Neurology noted ongoing echolalia and scripting as well as a normal neurologic exam and no imaging was ordered. Autism education was again emphasized. However, EEG was ultimately ordered due to strong and repeated paternal request despite denial of any seizure-like episodes in the patient. EEG unexpectedly showed extremely frequent subclinical seizures arising from the left temporal lobe prompting the initiation of oxcarbazepine maintenance therapy. At this time, the patient continues with speech therapy. Imaging and further follow up are pending. Common etiologies of speech disorders range from hearing abnormalities to underlying cognitive and genetic syndromes. Many children with autism spectrum disorder experience some level of speech impairment. This patient with a diagnosis of autism, possible related chromosomal abnormality, and speech delay, only somewhat responsive to therapy, without clinical concern for seizures or neuroregression found to have focal seizures from the speech area of the brain, likely contributing to the patient's ongoing clinical speech picture, highlights the need for constant vigilance in medical evaluation for co-existing pathologies in the evolving medical understanding of autism spectrum disorder.

19. CAUSES AND PREVENTION OF HOSPITAL READMISSIONS SECONDARY TO MYOCARDIAL INFARCTION: TRENDS AND RECOMMENDATIONS

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Objective: This is a retrospective cohort study in academic medical facilities in rural eastern Tennessee 2007 – 2016 with the purpose of: analyze the causes of frequent unscheduled hospital readmissions defined as hospital admissions that occur within 30 days of hospital discharge and methods to prevent readmissions secondary to myocardial infarction (MI), analyze effectiveness of recent legislation aimed at reducing readmissions secondary to MI on the national level and local level in rural eastern Tennessee via the Hospital Readmission Reduction Program implemented in 2012 under the Affordable Care Act, assess effectiveness of readmission mitigation strategies implemented within local healthcare facilities and provide input for future local readmission reduction programs, evaluate validity of prediction models for determining patients at high risk for readmission following initial hospitalization for MI. Main outcome measures: Primary readmission diagnosis for readmission = 30 days from prior hospital discharge when the previous hospitalization was for MI. Results: National readmission rates have decreased for all causes of initial admission diagnosis but have decreased most for the targeted readmission diagnoses, which include myocardial infarction (MI), congestive heart failure (CHF), and pneumonia (PNA) starting in 2012. Readmission data from local healthcare facilities in eastern Tennessee have yet to be obtained and analyzed for comparison to national readmission data. Conclusions: All-cause-readmissions have decreased over the past decade between 2007 – 2016 following initial admission due to a targeted admission diagnosis (MI, CHF, and PNA). The United States federal government implemented the Hospital Readmission Reduction Program in 2012 under the Affordable Care Act, which incentivizes hospitals to reduce readmissions by penalizing hospitals that have readmission rates that are higher than the national average secondary to targeted diagnoses. Readmission rates have decreased following admission for both the targeted diagnoses as well as nontargeted diagnoses, which suggests that methods to prevent targeted diagnoses also prevent nontargeted diagnoses. Readmissions following initial admission for targeted diagnoses decreased at a faster rate than for nontargeted diagnoses. The main causes of readmissions secondary to all causes of initial admission and primary areas to focus on for prevention of readmissions include educating patients about disease processes, communication between patients and physicians, communication between inpatient and outpatient physicians to facilitate transition of care, and healthcare professionals helping patients address barriers to compliance.

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20. OBESITY COMPLICATION: PICKWICKIAN SYNDROME

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Introduction: Obesity Hypoventilation Syndrome (OHS) is an increasingly common medical problem that in severe forms can lead to multiple organ failure secondary to chronic respiratory dysfunction and hypoperfusion. OHS is characterized by alveolar hypoventilation during sleep and wakefulness. Respiratory failure is associated with hypoxemia and hypercapnia ($PaO_2 < 70$ mm Hg and $PaCO_2 > 45$ mm Hg) in the setting of an increased Body Mass Index (BMI >40kg/m2). Managing these patients can be very challenging because of the limited diagnostic and treatment options presently available for them. Early intervention and aggressive treatment are the keys to reducing the significant morbidity and mortality associated with OHS. Case Description: We present a 68-year-old Caucasian female with a BMI 96 kg/m2 and history of obstructive sleep apnea(OSA), non-compliance with CPAP, essential hypertension and type 2 diabetes. She initially presented to the hospital with nonspecific complaints including shortness of breath and generalized weakness. She was found to be hypotensive, hypothermic and bradycardic. Diagnostic testing revealed hyperkalemia (7.3), renal injury (Creatinine 1.87), elevated liver enzymes and a mixed respiratory and metabolic acidosis. Initially, she required continuous BiPAP and later weaned off to BiPAP only at night as she gradually improved. After several days in the ICU, she was moved to the general medicine floor awaiting placement in a skilled nursing facility; however, after being transferred to the floor, she was again non-compliant with BiPAP and her condition deteriorated to the point she has to be transferred back to ICU for possible intubation. Very limited imaging and diagnostic options were available due to her extreme weight. The degree of organ damage due to hypoperfusion was difficult to assess. She became unable to communicate properly and more lethargic as the days went on. After several days, it was clear that her encephalopathy was not improving despite continuous BiPAP, and her family was tasked with the responsibility for making her medical decisions. Her family was left with the difficult decision of whether to proceed with tracheostomy or opt only for comfort care. She was taken off the BiPAP and passed away shortly thereafter. Discussion: OHS is a common medical condition with many medical, social and financial challenges for the patient as well as the treatment team. The mainstay of treatment is primary prevention of disease progression with aggressive treatment of obesity. Patients with BMI reaching 40 kg/m2 need intense weight control management. This can include surgical treatment which could result in rapid weight loss, improvement in respiratory function and overall quality of life. The prognosis depends on many factors including early diagnosis, education and compliance. It is extremely important for the primary care provider to discuss goals of care with these patients and provide realistic expectations about their weight control. Once the patient has developed respiratory complications of obesity, treatment options become much more limited. A family discussion to determine goals of care should include presenting options for aggressive care (i.e. tracheostomy) versus palliative care. These discussions can help minimize complications during hospitalization.

21. AMOXICILLIN INDUCED SWEET SYNDROME

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Introduction: Sweet syndrome or acute neutrophilic dermatosis is an uncommon dermatologic eruption characterized by acute onset of painful papules, plaques and nodules on the skin. Drugs, vaccines, malignancies and infections can trigger this condition. Here, we present a patient who appeared to be in sepsis of unknown origin with an eventual diagnosis of sweet syndrome. Methods: A 70-year-old female with a past medical history of asthma, hypertension, fatty liver disease and congenital absence of left kidney presented to the emergency department (ED) for a one-month history of fatigue and malaise. One month ago, she was diagnosed with an upper respiratory tract infection and was discharged with amoxicillin. Two weeks later, the patient developed swelling of her fingers with nodules appearing along her bilateral palms and fevers as high as 101F. On physical exam, she had peeling skin along her right and left index fingers, palpable, non-tender, non-blanching nodules scattered over palmar and dorsal surfaces with an isolated 0.5 cm nodule along right extensor elbow. Laboratory studies revealed leukocytosis (22.8 K/uL) with 80% neutrophils, hemoglobin/hematocrit of 15.4 g/dL/46.6%, platelet count 683K/uL, erythrocyte sedimentation rate 48 and C-reactive protein 133.4. Computer tomography of her abdomen and pelvis was negative. Serum and urine protein electrophoresis were negative, peripheral smear was unremarkable. She denied recent travel out of the United States and was up to date with regular cancer screening. Biopsy of her nodules confirmed neutrophil rich inflammatory infiltrate present in the superficial and mid dermis consistent with sweet syndrome. The patient was started on systemic steroids (1mg/kg/day) with marked improvement of her fatigue, malaise, and rash on her hands. She was discharged with a seven-week taper of systemic steroids with close follow up. Conclusion: Sweet syndrome is diagnosed with a combination of physical signs and pathological features. Patients typically present with fever, neutrophilia, tender erythematous skin lesions and a diffuse infiltration of neutrophils located in the upper dermis. Diagnosis is further classified as major and minor criteria. Patient must meet both major criteria and two of minor criteria to confirm diagnosis. Major criteria are abrupt onset of painful erythematous lesions or nodules and histologic evidence of dense neutrophilic infiltrate without evidence of leukocytoclastic vasculitis. Minor criteria consist of (1) fever over 38C (2) association with underlying hematological or visceral malignancy, inflammatory disease, pregnancy or preceding upper respiratory infection, gastrointestinal infection (3) excellent response to systemic glucocorticoids (4) three out of four lab values of elevated ESR, positive CRP, WBC >8000 and 70% neutrophils. Given the onset of symptoms occurring after two weeks of patient ingesting amoxicillin, we propose that the source of Sweet syndrome is likely medication induced. Her malignancy workup remained negative per imaging and serological testing. Cohen et al has reported sweet syndrome occurrence in a patient who took amoxicillin. Treatment for our patient consisted of discontinuing the offending agent, amoxicillin and administering high dose intravenous steroids with plans for a long taper.

22. INDIVIDUALIZED CANCER TREATMENT BASED ON PHARMACOGENOMICS ANALYSIS

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5-Fluorouracil (5-FU) is one of most frequently used chemotherapeutic medications for the treatment of many types of cancer in curative and palliative setting. It is important to recognize chemotherapy side effects and toxicities because some of these symptoms may indicate a clinical syndrome needing evaluation for a principal cause. We discuss a patient who developed severe mucositis requiring hospitalization after first use of Fluorouracil. Dihydropyrimidine dehydrogenase (DPD) deficiency was suspected and was proven to be a cause of severe drug-related toxicity. Our patient is fifty six year old gentleman with stage III nasopharyngeal squamous cell carcinoma who developed two masses on right side of the neck and large posterior right nasopharyngeal mass. Patient was treated with concurrent chemotherapy with high dose of cisplatin along with radiation. Once completion of concurrent chemotherapy and radiation he was started on combination of 5-Fluorouracil and cisplatin. Three days after completion of ninety six hour continuous 5-flurouracil infusion patient developed severe mucositis. Clinical exam was consistent with swollen tongue and mouth and inability to clear oral secretions. Patient was tested for DPYD gene mutation. Testing showed heterozygous for the c.1679T>G(*13) variant in the DPYD gene consistent with predicted intermediate DPD activity (30-70% enzyme activity). About 80% of administered 5-fluorouracil is normally inactivated by DPD. A decrease in DPD enzymatic activity may lead to increased concentrations of 5-FU and elevated risk for severe toxicities. Standard dose of 5-FU was decreased by 50% with second cycle of chemotherapy. Patient tolerated the second cycle of chemotherapy well. Variants in the DPD gene can lead to reduced 5-FU catabolism resulting in severe toxicities. Some of the toxicities can cause death. It is important to screen for this deficiency and closely observe patients during chemotherapy treatment.

Medical Residents and Clinical Fellows

❋ Case Studies, Group B ❋

23. A NEW MOLECULAR VARIANT OF HERMANSKY-PUDLAK SYNDROME TYPE 6

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Hermansky-Pudlak syndrome (HPS) is a rare autosomal recessive multisystem condition characterized by blood platelet storage pool defect that manifests with prolonged bleeding, visual impairment, and abnormally light coloring of the skin, hair, and eyes (oculocutaneous albinism). Nine different types of HPS have been identified, which can be distinguished by their signs and symptoms and underlying genetic cause. Here we describe a new HPS-6 variant with a mutation on chromosome 10 that has not been reported in the literature. 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 Willebrand's 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 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 function analysis I & II were elevated suggestive of platelet dysfunction. Platelet aggregometry showed decreased aggregation to epinephrine which could represent a primary storage granule release disorder. Platelet surface glycoprotein analysis demonstrated no detectable deficiencies. Platelet electron microscopy (PTEm) demonstrated almost complete absence of dense granules. PTEm demonstrated no evidence of alpha granule deficiency, abnormal membranous inclusions or other abnormalities and normal platelet ultra-structure. NextGen Sequencing for HPS identified a mutation on chromosome 10-p.V128A. This mutation in HPS-6 has not been reported in the literature. HPS, regardless of subtype, have oculocutaneous albinism, and a bleeding disorder caused by platelet dysfunction that ranges from mild to severe. HPS gene express their products in several organs in the body which assemble into hetero-oligomeric complexes called BLOCs (biogenesis of lysosome-related organelle complexes), they play very important role in trafficking to lysosome like organelles, such as melanosomes, platelet dense granules, and lamellar bodies resulting in spectrum of clinical manifestations. Since these patients have a qualitative platelet defect as part of

the clinical syndrome, these patients should avoid antiplatelet and anticoagulant medications. Platelet transfusions or Desmopressin may also be used to prevent bleeding complications prior to procedures. The natural history of pulmonary fibrosis in HPS has been reported as variable but universally progressive, with mortality commonly occurring in the fourth to fifth decades of life. Our case is unique given the rarity of diagnosis associated with a new mutation that has not been identified. Further cytogenetic and functional studies to firmly establish that this hitherto undescribed new mutation as being definitely causal is being worked out through the NIH.

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24. A RARE CASE OF NEISSERIA MUCOSA ENDOCARDITIS IN IMMUNOCOMPETENT PERSON

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An 83yr old Caucasian male presented to ER with recent onset of shortness of breath on exertion on evaluation Negative Troponin, no signs of ischemia on EKG, Negative for D dimer, chest x ray negative for infiltrates, blood cultures were drawn. Was symptomatically treatment with Albuterol and Ipratropium nebulization, felt better, was discharged home. Eventually Blood cultures in 2 bottles grew Gram negative cocci, oxidase positive, catalase positive, Nuclear MALDI TOF identified it as Neisseria Mucosa sensitive to Ceftriaxone. Patient was called, upon admission patient was having right knee pain with fever of 101.7, with WBC count of 11.7 was given IV Ceftriaxone, Arthrocentesis was done which showed 1+ Neutrophils with no growth. TEE showed ICD associated with oscillating mass consistent with Endocarditis, with EF of 40% and grade 2 diastolic failure. Cardiology recommended replacement of ICD. Repeat blood cultures after the antibiotic were negative for Neisseria growth. Neisseria Mucosa is a flora of buccal mucosa, it one of the non-Meningococcal, non-Gonococcal organism. Bio chemical properties of the Neisseria species is it grows as mucoid colonies could be pigmented or non- pigmented, oxidase and catalase positive but it is very difficult to differentiate the organism from other species as they have very close properties. Matrix assisted laser desorption/ionization Time of flight technique is used to differentiate the species this mainly differentiates the organisms based on potential differences. This organism when isolated form the nares or buccal mucosa does not indicate any infection. In Infection organism should be Isolated from the sterile site like blood, synovial fluid, urine with clinical signs and symptoms. There are very few case reports recorded on Neisseria Mucosa bacteremia causing endocarditis of which present case we want to endorse that Neisseria Mucosa can cause bacteremia even in immunocompetent who are elderly individuals without any other predisposing risk factors.

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25. ***withdrawn***

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26. CAUSES AND PREVENTION OF HOSPITAL READMISSIONS: NATIONAL AND LOCAL TRENDS AND RECOMMENDATIONS VIA RETROSPECTIVE COHORT STUDY

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Purpose of this study is to analyze the causes of frequent unscheduled hospital readmissions defined as hospital admissions that occur within 30 days of hospital discharge and analyze the effectiveness of the methods to prevent readmissions secondary to all causes on the national level and local level in rural eastern Tennessee. The Hospital Readmission Reduction Program implemented in 2012 under the Affordable Care Act penalizes hospitals with readmission rates that are higher than the national average as an incentive to reduce readmission rates. This study also assesses effectiveness of readmission mitigation strategies implemented within local healthcare facilities and provide input for future local readmission reduction programs.
The participants include adults greater than18 years old discharged from medical facilities in eastern Tennessee 2014 to 2016, with readmission less than or equal to 30 days from prior hospital discharge for all admission diagnoses. The United States federal government implemented the Hospital Readmission Reduction Program in 2012 under the Affordable Care Act, which incentivizes hospitals to reduce readmissions by penalizing hospitals that have readmission rates that are higher than the national average secondary to targeted diagnoses, which include congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), myocardial infarction (MI, heart attack), and pneumonia. Readmission rates have decreased following admission for both the targeted diagnoses as well as nontargeted diagnoses, which suggests that methods to prevent targeted diagnoses also prevent nontargeted diagnoses. Readmissions following initial admission for targeted diagnoses decreased at a faster rate than for nontargeted diagnoses. National data for readmissions following initial admission for COPD has not been published since the implementation of penalties in 2015 for readmission following COPD admission. Readmission data collected from the TriCities area in eastern Tennessee will be compared to national data. Per literature review, the areas to focus on for prevention of readmissions include educating patients about disease processes, communication between patients and physicians, communication between inpatient and outpatient physicians to facilitate transition of care, and healthcare professionals helping patients address barriers to compliance. In conclusion, the causes of frequent hospital readmissions are multifactorial requiring multifaceted approaches to prevent them. All-cause-readmissions have decreased over the past decade between 2007 – 2016 following initial admission due to a targeted admission diagnosis (CHF, MI, and PNA). The implementation of penalties to hospitals for readmissions and promoting communication between patients and physicians and between physicians has effectively reduced hospital readmissions on the national level, which will be compared to the local level.

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27. PARANEOPLASTIC CUSHING SYNDROME: A SIGNAL OF OCCULT MALIGNANCY

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Cushing Syndrome(CS) is a clinical entity which describes a collection of nonspecific signs/symptoms including obesity, HTN, hypokalemia, hyperpigmentation and the altered fat distribution associated with a Cushingoid appearance, which result from prolonged hypercortisolism. While often caused by iatrogenic administration of exogenous steroids or Cushing Disease(ACTH-secreting pituitary tumor), this syndrome is also rarely caused by the secretion of ACTH from an ectopic source, such as a malignancy. Though rare – with ectopic ACTH secretion(EAS) accounting for only 7-15% of endogenous CS cases – when diagnosed, CS can lead to earlier discovery of occult malignancy and increased potential for successful treatment. Clinicians must therefore have a high degree of suspicion when faced with such presentations and for this reason the following case was presented. Case: 57 yo man with CKD, CAD, HTN, DM and an extensive smoking hx was admitted with respiratory failure secondary to CAP. He complained of progressive dyspnea, weight gain, abdominal distention, and extremity weakness x1 month. Pertinent negatives included no fever, chills, or night sweats. Physical exam was positive for reduced breath sounds over his right lower lung fields and abdominal obesity, but no typical Cushingoid appearance. He had marked HTN which was refractory to the administration of multiple antihypertensives. Lab analysis showed profound hypokalemia with metabolic alkalosis, hypoxemia, hypercapnia and leukocytosis. CXR showed a moderate right pleural effusion and right basilar lung infiltrate. Elevated serum cortisol and ACTH levels helped to diagnose CS. Abdominal CT showed no adrenal masses while lab tests ruled out pheochromocytoma. A negative dexamethasone suppression test led to suspicion for EAS. CT Chest showed a R lung mass with bronchial obstruction, mediastinal LAD and bilateral noncalcified nodules concerning for metastatic disease. While pleural fluid analysis indicated a transudative effusion and microbiological studies were negative, cytology showed atypical cells suspicious for malignancy. Biopsy of the RML mass allowed for a unifying diagnosis of small cell carcinoma as the presumed cause of the paraneoplastic CS(PCS). Chemotherapy was promptly started. Discussion:Though rare, and at times difficult to recognize due to its nonspecific symptoms/variable severity, PCS may be the first evident sign of malignancy. While the source of EAS may be benign, it can also be seen in cases of small-cell lung cancer, gastrinoma, medullary thyroid CA and other such aggressive malignancies. A 20 year study of the disease suggested the diagnostic work-up included dexamethasone suppression and CRH stimulation tests, inferior petrosal sinus sampling (IPPS), as well as imaging modalities including CT, MRI, octreotide scans and venous sampling. In cases of EAS, an overwhelming majority didn't respond to attempted CRH stimulation or dexamethasone suppression. IPPS was found most likely to identify the disease. Treatments for control of hypercortisolism ranged from anticortisol medications (ketoconazole, metyrapone, mitotane, etomidate) to surgical bilateral adrenalectomy. The highest rate of cure, up to 65%, came with surgical removal of the ectopic ACTH-secreting neoplasm though recurrence was a possible complication. While cure in nonsurgical patients was quite rare, survival was common except in cases of PCS caused by aggressive diseases which carry a poor prognosis.

28. TRAUMATIC ADRENAL HEMORRHAGE MASKING AS A PSEUDOTUMOR

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Several case reports have been filed regarding the latent presentation of hemorrhagic pheochromocytomas in the trauma setting; however, fewer patients have been observed to exhibit these symptoms in the absence of a tumor. In this report we discuss a patient who sustained blunt abdominal trauma leading to the development of an adrenal hemorrhage and sequela of symptoms. Discovery of source was delayed secondary to multiple comorbidities in the critical care setting and work up for sources such as infection and agitation. Hypertensive urgency was confirmed to be of adrenal etiology with measurement of persistently elevated plasma and urine metanephrines during hospital course. The patient was successfully managed nonoperatively with the use of an esomolol drip, clonidine, and eventually tapered dose of metoprolol. Symptoms improved over time and repeat CT imaging weeks later showed resolution of the hematoma.

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29. TRAUMATIC SMALL BOWEL PERFORATION WITHIN PREEXISTING VENTRAL HERNIA: A CASE REPORT AND LITERATURE REVIEW

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We present a case of a sixty six year old female involved in a blunt trauma with a delayed presentation of small bowel perforation within a chronic ventral hernia. A literature search showed traumatic small bowel perforation within any hernia to be a rare finding, and a perforation within a ventral hernia was not described in our literature search. A patient with chronic abdominal pain and chronic hernia requires high suspicion for a delayed presentation of bowel injury if the patient's clinical picture declines.

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30. PNEUMATOSIS COLI SECONDARY TO EOSINOPHILIC COLITIS: A RARE ENTITY

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We present a case of 51-year-old female with history of treatment naive hepatitis-C and alcohol dependence presented to our hospital with sharp right upper quadrant pain, worse with eating and associated with nausea and bilious vomiting. She also reported 5-6 episodes of loose, non-bloody stools for couple of days. Physical exam including vitals was unremarkable except for mild tenderness in the right upper quadrant. Ultrasound Abdomen showed no evidence of gall stones or cholecystitis. Subsequently, CT Abdomen showed right colon wall thickening with pneumatosis and ileocolic mesenteric venous gas. The initial differential included ischemic or infectious colitis but further workup with CBC, CMP, lipase, amylase, lactate and stool studies including Clostridium difficile were all normal. Water-assisted colonoscopy revealed mild erythema and erosions in ascending colon which were biopsied. Since there were no signs of bowel ischemia, decision was made to manage patient medically with high-flow oxygen therapy and antibiotics. Meanwhile, the biopsy from the ascending colon showed increased intramucosal and submucosal eosinophils concerning for eosinophilic colitis. She was treated with oral metronidazole and empiric elimination diet which lead to complete resolution of symptoms. Pneumatosis Cystoides Intestinalis (PCI) is a rare condition with overall incidence of 0.03% and is characterized by the presence of gaseous collections within the submucosa and/or subserosa of the intestinal wall. It may involve the small intestine (20-51.6%), colon (36-78%) or both (2-22%). PCI can be primary or idiopathic (15%) and secondary (85%). Secondary PCI has been reported in association with disorders of digestive system (peptic ulcer, Crohn's disease, appendicitis, necrotizing enterocolitis, bacterascites) or respiratory (COPD, cystic fibrosis), autoimmune, inflammatory, infections (Clostridium difficile, HIV), trauma or use of immuno-suppressants. Our patient did not have any of the above disorders. This is probably the first report of pneumatosis coli in association with Eosinophilic colitis. PCI may be caused by mechanical, pulmonary, bacterial or biochemical processes. Mucosal injury and increased intraluminal pressure, or both can lead to the intrusion of intraluminal gas into the bowel wall. In our case, the mucosal injury might have been caused by eosinophilic colitis. PCI may be asymptomatic or present with abdominal pain and diarrhea or with complications such as intestinal obstruction and perforation. CT is the diagnostic modality of choice. Findings of cystic gas is associated with good prognosis, and linear gas with poor prognosis. In the absence of clinical and laboratory findings of bowel ischemia or other complications, the patients can be managed conservatively with high flow oxygen/hyperbaric therapy, antibiotics and special elemental diets. Surgery may be elected in cases where medical therapies failed. The important step in managing PCI is to decide surgical versus conservative management as an unnecessary laparotomy/ surgery can lead to a fatal outcome.

31. INCIDENTAL FINDING OF APPENDICEAL MUCOCELE ON COLONOSCOPY

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Appendiceal mucocele is a rare condition characterized by intraluminal accumulation of mucoid substance by neoplastic or non-neoplastic processes leading to progressive dilation of the appendix. We present a case of 74-year-old female with no significant medical co-morbidities who underwent surveillance colonoscopy for her personal history of colon polyps 5 years ago. On Colonoscopy, she was found to have mucus secretions from appendiceal orifice. She underwent a CT-scan that confirmed a 1-cm mass extending into the cecum at the base of the appendix with no evidence of lymphadenopathy or extension to peritoneum. The recommendation was made for an appendectomy including partial cecectomy. The patient underwent surgery and her post-operative course was uneventful. The specimen biopsy showed villous adenoma with prominent mucinous/serrated pattern, which circumferentially involved the appendix for approximately 60-70% of its length. There was no evidence of atypia or malignancy. The patient is currently doing well without any complications. Appendiceal mucocele is usually is seen in the fifth decade of life and is relatively more common in women. About 25-50% of the patients with mucocele are asymptomatic and are diagnosed incidentally during physical exam or abdominal imaging or colonoscopy or abdominal surgery. Few patients present with acute abdominal conditions like appendiceal intussusception, pseudomyxoma peritonei or appendiceal perforation. The mucocele can be malignant or benign. Benign variants histologically demonstrate epithelial villous adenomatous changes with epithelial atypia whilst the malignant variants are characterized by glandular stromal invasion with or without peritoneal implantation of epithelial cells. Historically they were classified as: 1) Simple retention cysts, 2) Mucosal hyperplasia, 3) Mucinous cystadenoma and 4) mucinous cystadenocarcinoma. However, the recent classification and pathological reporting is as follows: 1) Benign appendiceal adenomas, 2) Low-grade appendiceal neoplasm for low grade cytologic atypia with no infiltration, 3) High-grade appendiceal neoplasm for high grade cytologic atypia with no infiltration, 4) Mucinous adenocarcinoma for infiltrative lesions. Both benign and malignant lesions can cause Pseudomyxoma peritonei in 10-15% cases. Abdominal US and CT scan are the diagnostic modalities of choice. A cystic mass with variable intraluminal echotexture and concentric/echogenic layers (Onion skin) are the diagnostic findings on US. Curvilinear mural calcifications with dumb-bell shape are suggestive of mucocele on CT. The definitive treatment of appendiceal mucocele is surgical resection. The extent of surgery depends on the dimensions and histology of the neoplasm, as well as the clinical presentation. About 30% of the patients with appendiceal mucocele can have other tumors of the gastrointestinal tract, ovary, breast, and kidney with the most common association reported being adenocarcinoma of the colon. In conclusion, whether found incidentally or as acute abdomen, a definitive histopathological diagnosis of appendiceal mucocele is essential in further management of the condition. Cystadenoma which is the most common variant would require surgical treatment and follow up with surveillance colonoscopy.

32. A RARE CASE OF SYSTEMIC DIFFUSE B-CELL LYMPHOMA PRESENTING AS PANCREATITIS

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We present a case of 38-year old female who presented to our hospital with sudden onset epigastric pain, radiating to the back and associated with nausea and vomiting. Physical exam showed tenderness in epigastric region. Laboratory findings revealed Microcytic anemia, elevated lipase >600 U/L (Ref 11-82 U/L), bilirubin 8.8 mg/dl, alkaline phosphatase 246 IU/L (Ref 34-104 IU/L). The patient was admitted with diagnosis of pancreatitis and started on intravenous fluids. Chest X-ray at admission showed a mediastinal mass. Further evaluation with CT (computed tomography) abdomen and chest showed enlarged pancreatic head with peripancreatic lymphadenopathy and mild intrahepatic biliary ductal dilatation and a large anterior mediastinal mass. CT-guided core biopsy of the mediastinal mass showed Diffuse Large B-cell lymphoma (DLBCL). PET (positron emission tomography) scan was done which showed tumor grade activity in large anterior mediastinal lymph node mass in multiple lymph nodes in the base of the neck, pancreatic head, multiple peripancreatic lymph nodes and multiple lymph nodes along the gastro-hepatic ligament. A diagnosis of Systemic DLBCL with Lugano Stage 4 classification and High Risk International prognostic index was made. The patient was started on chemotherapy with nitrogen mustard followed by 6 cycles of R-EPOCH. Also, Magnetic resonance cholangiopancreatography with biliary stent was placed which relieved the abdominal pain. The patient is currently following up with oncology and is in remission. DLBCL is the most common histologic subtype of non-Hodgkin lymphoma (NHL) accounting for approximately 25-30 percent of NHL cases. NHL occurs in extra-nodal sites in about 40-50% of the cases and the most common site of involvement is the gastrointestinal tract, especially stomach and small bowel. Pancreatic involvement is rare and is only seen in 0.2-2.2% of all cases at the time of presentation. Literature review showed about 10 reported cases of primary pancreatic lymphoma presenting as acute pancreatitis. However, there are only two reported cases of secondary pancreatic involvement of DLBCL presenting as pancreatitis. The most common presenting symptom is abdominal pain, followed by abdominal mass, weight loss, jaundice, acute pancreatitis, small bowel obstruction and diarrhea. The classic systemic symptoms of NHL like fever, chills, night sweats, are uncommon. CT is usually the diagnostic modality of choice and PET scan helps with staging of the disease. Ultrasound- or CT-guided fine needle biopsy of the pancreatic mass can also help distinguish pancreatic lymphoma from pancreatic adenocarcinoma but in our case, it was unnecessary as we could do mediastinal mass biopsy. Anthracycline-based chemotherapy is the standard treatment for NHL, and includes six to eight cycles of R-CHOP for patients of all ages. Secondary involvement of the pancreas by B-cell lymphoma is a rare occurrence. Pathologic diagnosis is important in distinguishing pancreatic lymphoma from adenocarcinoma because pancreatic lymphoma responds very well to chemotherapy unlike adenocarcinoma.

33. THYROID STORM: A VERY RARE THOUGH POSSIBLY DEADLY COMPLICATION OF A VERY COMMON DISORDER

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We present a 71-year-old male who came to the medical center brought by his wife for evaluation after she had witnessed multiple falls. He was found to have altered mental status, agitation, hyperpyrexia, nausea, vomiting and tachycardia. He had a history of hyperthyroidism, hypertension and malignant mesothelioma. His medications were Methimazole 5mg twice a day and Metoprolol tartrate 25mg twice a day. Laboratory findings showed a low TSH (<0.015 mcIU/mL), high Free T4 (4.87 ng/dL), leukopenia (4.6 x10(3)/mcL), hypercalcemia (10.5 mg/dL) and hyperglycemia (131 mg/dL). All other laboratories were normal. Notable physical examination finders were the alerted mentation, temperature of 103.2F, agitation, pulse of 103, nystagmus bilaterally, moist skin and an enlarged thyroid. Imaging was performed including CT of the head and chest x-ray which were unremarkable. Thyroid US showed diffuse thyromegaly compatible with multinodular goiter. Based on the findings he was suspected to be amid a thyroid storm. We used the scoring system developed in 1993 by Burch and Wartofsky to evaluate to likelihood of thyroid storm, which resulted in a score of 60, highly suggestive of thyroid storm. He was admitted to the intensive care unit, continued beta blockade at his home dose Metoprolol, increased his dose of thionamide to 20mg every six hours, started saturated solution of potassium iodide 5 drops orally every six hours and hydrocortisone 100mg intravenously every eight hours. The hyperpyrexia was treated with acetaminophen as needed. The patient clinically improved over the hospital course hence the iodine therapy and steroids were discontinued. The dose of Methimazole was titrated to 15mg daily to maintain euthyroidism. We present a case of thyroid storm related to multiple falls to emphasize the importance of proper diagnosis and timely management of such patients. Thyroid storm is a very rare though possibly deadly complication of a very common disorder. The incidence is about 1-2% among patients with overt hyperthyroidism and mortality is reported recently as high as 10-20% which is significantly improved from previous reports possibly due to early recognition. It is often precipitated by an acute event such as surgery, trauma, infection, an acute iodine load, or parturition. It remains a diagnostic challenge at times as there are no specific laboratory abnormalities. Successful diagnosis and management is only achieved by a detailed history, laboratory evaluation and use of the scoring system. A high clinical suspicion is advised in any patient presenting with hyperpyrexia, altered mentation, cardiac dysfunction and evidence of hyperthyroidism, as any delay in therapy may increase the mortality to 75%.

34. RELAPSE OF GRANULOMATOSIS WITH POLYANGIITIS (GPA) PRESENTING WITH VESICOVAGINAL FISTULA

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Introduction: ANCA-vasculitides are a heterogeneous group of rare syndromes characterized by necrotizing inflammation of small and medium-sized blood vessels and the presence of ANCAs. GPA can present in any number of ways, most commonly with constitutional symptoms, ears/nose/throat, pulmonary, renal, cutaneous and/or ophthalmic manifestations. Uncommonly the central nervous system, gastrointestinal/ hepatic, cardiac, and lower genitourinary findings may be present. Relapses occur in >50% GPA cases. They often present with manifestations that can vary from their initial presentation. We present a patient with vesicovaginal fistula as part of the presentation of GPA relapse. Case presentation: 33-year-old woman was diagnosed with GPA at age 13 with mild bilateral hearing loss, saddle nose deformity, but without significant kidney disease at that time. Patient was treated with methotrexate and prednisone and had remained in remission until 7/2015. On 7/2015, she initially presented with pneumonia, hemoptysis, exudative pleural effusion, pulmonary cavitary lesions. Blood and pleural effusion culture were negative. Patient also developed pulmonary emboli. Due to unsuccessful bronchoscopic biopsy she underwent VATS biopsy that showed lung parenchyma with areas of necrotizing granulomas and capillaritis consistent with GPA. Renal biopsy showed hyaline arteriolosclerosis; however, no evidence of vasculitis, vascular necrosis, glomerular tuft necrosis, or crescent formation. Labs revealed CRP 135.2 mg/L, ESR 74 mm/hr, negative FANA and MPO, ANCA IgG 1:80, ACE 26 U/L. PR3-Ab was negative in 8/2015 but positive in 10/2015, PR3-Ab 772 AU/mL. She had been on antibiotics for several months due to recurrent UTI. Initial CT showed normal bladder and ureter. Patient subsequently developed hematuria with hemolytic anemia. Repeat CT showed a large amount of air lucency in the vagina. Follow up CT showed very little urine in the urinary bladder itself. There is a collection of urine which is inferior to the bladder probably in the vagina with a connection between the two. There is leakage of urine down into the perineum. Patient was treated with IV cyclophosphamide and maintenance steroids and responded well. Currently she is on methotrexate, rituxan and prednisone. Patient is scheduled for vesicovaginal reconstruction and urostomy bag. Discussion: GPA relapses can present with extra-renal/pulmonary manifestations. GPA is confirmed with compatible clinical presentation, serological tests (eg, PR3-ANCA-positive) and often tissue biopsy. Other labs (eg, ANA, anti-GBM, cryoglobulins, hepatitis, HIV, LFTs and blood cultures) should also be performed to assess the potential involvement of other organs and exclude other processes. Mortality depends on initial severity: 25% in patients with renal failure or severe lung hemorrhage; 6% for generalized non-life threatening ANCA-associated small vessel vasculitides but rising to 30-40% at 5 years. Mortality from GPA is four times higher than the background population. Early deaths are due to active vasculitis and infection. Subsequent deaths are due to cardiovascular events, infection, and cancer. Management of GPA centers on improving the long-term outcome by controlling disease activity and preventing damage, relapse and drug toxicity. Therefore it is imperative that we do not overlook physical and laboratory findings given high recurrence rate.

35. "THERE'S MORE TO IT THAN MEETS THE EYE" AN UNUSUAL CASE OF METASTATIC OCULAR SEBACEOUS CARCINOMA

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Ocular sebaceous carcinoma is an extremely rare tumor, with an estimated incidence of approximately 1per 1,000,000 per year. It is often initially misdiagnosed as a chalazion or blepharo-conjunctivitis. We present one such case presenting with parotid enlargement. An eighty-five-year old Caucasian female with Type 1 diabetes, hypertension and coronary artery disease presented with a nine month history of recurrent left-sided blurry vision diagnosed and treated unsuccessfully with various eyedrops/topical antibiotics for blepharo-conjunctivitis. She was referred for ophthalmologic evaluation revealing atender left pre-auricular swelling,left conjunctival/lacrimal erythema but preserved visual acuity. A left eye conjunctival shave biopsy demonstrated poorly differentiated sebaceous carcinoma. CT scan of orbits demonstrated left inferior periorbital soft tissue prominence and 12 mm left superficial anterior parotid lymph node. Lymph node aspirate revealed sebaceous carcinoma confirmed by immunohistochemical staining. Given her age and comorbidities, the patient declined any intervention and opted for best supportive care. Sebaceous carcinoma typically presents as a firm, gradually enlarging subcutaneous nodule. Approximately 80 percent of cases occur in the skin of the head or neck, and about forty percent involve the eyelids. Ocular sebaceous carcinomas arise from the sebaceous glands of the eyelid, caruncle or Meibomian (tarsal), and Zeiss (eyelash) glands.Extra-ocular sebaceous carcinomas can develop in extracutaneous sitessuch as the parotid gland, nasal cavity, breast, large bowel, ovary, and prostate. Sebaceous carcinomas may represent as a marker of Muir-Torre syndrome, an autosomal dominant disorder considered a subgroup of hereditary nonpolyposis colorectal cancersyndrome (Lynch syndrome). However, these tend to occur in multiplicity, are recurrent and show an early onset (before age 60). It is clinically relevant to note that it precedes visceral malignancies in sixty percent of patients.Regional lymph nodes are the most common site of metastasis and tumors located on the upper eyelid tend to metastasize to preauricular and parotid nodes. Distant metastasis may involve the parotid gland, liver, lung, and bone. Data on the management of locoregional or distant metastasis of sebaceous carcinoma are limited to small case series and case reports. Patients with regional nodal involvement are treated with lymph node dissection and/or radiation therapy with Moh's surgery evaluation for the primary ocular site. Some isolated reports of successful use of 5-fluorouracil, cisplatin, capecitabine, and palliative radiation for the management metastatic sebaceous carcinoma have been reported. Our case highlights the need for clinicians to be aware of this rare condition.This knowledge would facilitate an index of suspicion while treating persistent ocular lesions enhancing early diagnosis and treatment.

36. GLIOSARCOMA A RARE AND MORE AGGRESSIVE VARIANT OF GLIOBLASTOMA

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Gliosarcomas are bimorphic extremely rare high-grade malignant neoplasms of the central nervous system characterized pathologically by glioblastoma admixed with mesenchymal/sarcomatous components. They represent 1-2% of all glioblastomas, commonly affecting the temporal lobe with a propensity for extra-cranial metastasis. We present apatient diagnosed with frontal lobe gliosarcoma who later developed osseous metastases. A fifty-eight year old male was hospitalized with a three week history of frontal headaches associated with progressive memory loss, dysarthria and falls. On exam, the patient was somnolent (Glasgow Coma Scale 12). MRI Brain demonstrated a large cystic right frontal lobe mass compressing both lateral ventricles with surrounding vasogenic edema, subfalcine herniation and a 1.5 cm midline shift. He underwent stereotactic right frontal craniotomy for gross total excision of a hemorrhagic right frontal brain tumor. Pathology demonstrated a necrotic, predominantly spindle cell neoplasm with high grade nuclear atypia and high mitotic activity (Ki-67 positivitity; 20-30% in astrocytic area and 50-70% in spindle area). Immunohistochemistry (IHC)positive for GFAP confirmed glial elements. A diagnosis of gliosarcoma was made based on histo-morphology and IHC . Plans for adjuvant concurrent radiation and chemotherapy (with Temozolomide) could not be initiated due to the patients long and difficult postoperative course complicated by worsening back pain and possible T12 vertebral metastatic disease.Primary gliosarcoma is now recognized by the World Health Organization (WHO) classification as a pathological variant of glioblastoma multiforme. Gliosarcomas are similar to glioblastomas commonly affecting the temporal lobe with an average age of onset in the fourth to sixth decade of life, with males being affected twice as often as females. Tumor location and age prognosticate gliosarcoma with a median survival of 4 months (vs 14 months for glioblastomas). Interestingly,gliosarcomas have a much higher rate of extra-cranial metastases (glioblastomas rarely metastasize) and overall carry a worse prognosis than glioblastoma. Additionally, they do not carry the hallmark characteristic of EGFR overexpression. Furthermore the loss of heterozygosity (LOH) 10q, the absence of IDH1/ IDH2 mutations andTERT promoter mutations are unique to gliosarcoma. Due to limited clinical experience, there is poor delineation of treatment guidelines.Currently, the consensus for gliosarcoma treatment is in accordance with existing guidelines for glioblastoma involving multidisciplinary effort targeting maximal surgical resection followed by chemoradiation (with temozolomide). Radiation therapy at a minimum dose of 54 Gy leads to an increased rate of overall survival in gliosarcomawhereas temozolomide, an alkylator, may be less effective with this histology. Our case highlights the aggressive tumor biology and dismal prognosis of Gliosarcoma.

Medical Students, Group A

37. EVALUATING THE EFFECTIVENESS OF THIEL EMBALMED CADAVERS FOR THE IDENTIFICATION OF A POSITIVE LACHMAN TEST AMONG FIRST YEAR ALLOPATHIC MEDICAL STUDENTS

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Education on appropriate physical diagnostic skills begins in the first year of training for medical students. This education provides a foundation from which medical students begin to develop differential diagnosis skills to be used in the clinical setting. Without proper technique and clinical exposure, it is difficult to accurately diagnose and treat an abnormality that should be detected during a thorough physical examination due to the limitation of exposure to pathologic conditions. One method of teaching diagnostic skills in medical schools across the country is through the use of Standardized Patients (SPs), real-life actors and actresses assigned to mimic specific physical examination findings. At Quillen College of Medicine, first-year medical students work with SPs in an Introduction to Physical Examination Skills (IPES) course. While SPs are human models that provide a great service in medical education, it is not feasible for students to accurately identify positive versus negative physical examination findings for specific tests unless the SPs have a specific clinical diagnosis. This research focuses on improving medical education through the use of cadavers that have undergone a novel embalming technique known as the Thiel method. The Thiel method allows for better joint range-of-motion, tissue preservation, and vascular stability compared to traditional formaldehyde-embalmed cadavers. The population in this study consisted of first year medical students in the Quillen College of Medicine Class of 2020 with the assigned goal of diagnosing anterior cruciate ligament (ACL) tears using a diagnostic test known as the Lachman examination. All participants have completed education in the Lachman examination and performed the test on SPs in their IPES course two weeks prior to the cadaver study. Before interaction with the Thiel cadavers, all participants completed a seven question survey on their self-perceived ability to diagnose an ACL tear performing the Lachman examination. Following the completion of the survey, participants were randomly assigned in groups of four to begin the knee examination on four Thiel-embalmed cadavers and indicate if the cadaver had a positive Lachman test. Participants were also randomly assigned to an experimental and control group at the beginning of the study. Students assigned to the study group participated in a post-survey to evaluate whether they thought the Thiel-embalmed cadavers improved their Lachman examination diagnostic skills. The results were as follows: 1) 75% of participants in the experimental group preferred utilizing both SPs and Thiel-embalmed cadavers in the IPES course; 2) 93.75% of experimental group participants indicated on the post-survey compared to 68.75% on the pre-survey that they feel confident performing the Lachman examination

on a real patient; 3) 100% of experimental group participants indicated that the Thiel cadavers enhanced their Lachman examination technique. We conclude that Thiel-embalmed cadavers are a valuable resource for the IPES course based on the fact that they enhance student confidence and Lachman examination diagnostic capabilities.

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38. PROBABLE MINOCYCLINE INDUCED PANCREATITIS: A CASE REPORT

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Introduction: This is a case of a patient with acute pancreatitis following the initiation of minocycline therapy. Case Description: A 52-year-old male with a past medical history of hyperlipidemia and diabetes mellitus type II underwent a right fibular open reduction and internal fixation. The patient was discharged on minocycline to prophylax for skin and soft tissue infections. One week later, the patient woke up with significant abdominal discomfort that was described as severe, sharp, worsened by movement, and radiating to both flanks. He drove to the hospital and reported continue pain upon arrival to the ER. The patient denied history of alcohol consumption. The patient was noted to have history of uncomplicated cholecystectomy without intraoperative cholangiogram. Laboratory values collected on the day of admission showed a lipase of 994 and WBC of 17.1. Potassium, triglycerides, calcium, hemoglobin, and hematocrit were within normal limits. Physical exam revealed central abdominal tenderness with guarding, rigidity, hypoactive bowel sounds, and abdominal distention in the epigastric region. Pancreatitis criteria were met with elevated lipase and epigastric pain. A CT scan showing pancreatic inflammation and adjacent reactive lymphadenopathy supported this diagnosis. The patient met SIRS criteria on admission. The patient was promptly managed with IV fluids and made NPO. Minocycline was discontinued upon admission. Diluadid, morphine, and Zofran were administered for pain and nausea. Diet was eventually progressed to clear liquid diet and fluids were tapered off as the patient's condition improved. The patient was soon discharged following clinical improvement and a downtrend in WBC. Discussion: The objective of this case report is to increase awareness of minocycline as a possible cause of pancreatitis. Several case reports have implicated the tetracycline class of antibiotics as a rare cause of acute pancreatitis. Common culprits of drug-induced acute pancreatitis reported in the literature are tetracycline, tigercycline, and doxycycline. Minocycline is a broad-spectrum tetracycline antimicrobial structurally related to tigercycline as well as other antimicrobials in the tetracycline class. Minocycline is commonly used for treatment of acne vulgaris, MRSA, and Lyme disease, amongst others indications. Minocycline usage has been associated with numerous adverse events including hypersensitivity syndrome reaction, serum sickness like reaction, hepatotoxicity, and drug-induced lupus. Conclusion: The findings in this case, along with other similar reports, indicate that clinicians should be aware of the possible adverse effects of minocycline on the pancreas. As a consequence, we recommend that clinicians maintain a low threshold for ordering lipase and amylase in patients with abdominal pain after recent initiation of minocycline.

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39. FUNGAL-BACTERIAL INTERACTIONS: HOW DOES CANDIDA INFLUENCE THE DISEASE-CAUSING POTENTIAL OF TWO SEXUALLY TRANSMITTED BACTERIA?

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Humans harbor many commensal and pathogenic organisms, but the interactions among these organisms and the implications of these interactions on disease and treatment have not been thoroughly studied. This project examined interactions between a fungal member of the normal vaginal flora, Candida albicans, and two sexually transmitted pathogens, Neisseria gonorrheae and Chlamydia trachomatis. Previous work by our lab has confirmed an older study that C. albicans can inhibit N. gonorrheae growth, however it is not known if other Candida spp. can impair N. gonorrheae. Growth of 3 strains of N. gonorrheae were examined in the presence of C. albicans, C. dubliniensis, C. tropicalis, C. krusei, C. parapsilosis, and C. glabrata. Agar plates were inoculated with each Candida sp. Following overnight incubation, the agar was removed and flipped to expose the opposite side. N. gonorrheae strains were inoculated onto the opposite side of the agar, perpendicular to the Candida streak and incubated for 2 days at 37°C in a candle jar. We observed that only C. albicans, C. dubliniensis, and C. tropicalis produce a soluble substance capable of penetrating the agar and inhibiting N. gonorrheae growth. A replicate experiment using a C. albicans ECE1 knockout mutant indicated that candidalysin, a newly recognized toxin produced by C. albicans, is not the inhibitor of N. gonorrheae, suggesting that a novel soluble compound is responsible. To identify this inhibitor, fractions of C. albicans culture supernatants were tested for inhibitory activity against N. gonorrheae. One inhibitory fraction was subjected to NMR; however, the inhibitor was too dilute to identify, suggesting that it is highly potent. While we have demonstrated that Candida inhibits Neisseria growth, previous research has also shown that bacterial binding to Candida can aid in dissemination of or provide a reservoir for bacterial infection. Therefore, we investigated whether C. trachomatis can bind to C. albicans and if so, how this interaction occurs. C. albicans yeast or hyphae were cultured and incubated with C. trachomatis elementary bodies (EB) for 1.5-120hr before formaldehyde fixation and visualization by immunofluorescence assays using anti-Chlamydia antibodies. The data indicate that EB bind to both yeast and hyphal forms of C. albicans for a minimum of 120hr. This interaction was not blocked by pre-incubation of EB with Candida mannan or beta-glucan, suggesting that EB interact with a cell wall protein or other structure. Overall, the current study suggests that Candida members of the normal flora may have various interactions with pathogens, including inhibition of bacterial growth and sequestration of bacteria via binding. Future studies are needed to determine the impact of these interactions on disease progression and whether Candida-produced inhibitors have antibiotic potential.

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40. ***withdrawn***

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41. ***withdrawn***

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42. HEYDE'S SYNDROME: FROM RECOGNITION AND UNDERSTANDING OF PATHOPHYSIOLOGY TO TREATMENT

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Introduction: In the late 1950's, Heyde observed that a relationship existed among two fairly common diagnoses, aortic stenosis and gastrointestinal bleeding from angiodysplasia, which shared no apparent association at the time. Decades later, Heyde's Syndrome continues to be known to describe a clinical triad of aortic stenosis, acquired coagulopathy, and anemia caused by bleeding of intestinal AV malformations. An improved understanding of the hypothesized pathophysiology behind this syndrome has allowed clinicians to see improvement, and even resolution, of anemia when the inciting aortic stenosis is corrected with aortic valve replacement. As such, a high index of suspicion is needed when encountering such a triad and for this reason the following case is being presented. Case: Patient is a 70 year old gentleman who presented to the hospital for his fourth admission for gastrointestinal tract bleeding. Though he'd had dark stools at baseline, likely due to iron supplementation, he stated that his stool had been darker and stickier with a tarry quality over the past 2 weeks, followed by episodes of bright red bleeding per rectum 1 day prior to presenting in the emergency department. Notably, his history was significant for increased NSAID use over the past month to treat symptoms of headache. He also complained of lightheadedness and dizziness, but denied any abdominal pain. Physical exam was significant only for blood seen on rectal exam and a loud 4/6 systolic flow murmur most prominent over the right second intercostal space and radiating to his carotids. Laboratory analysis showed significant iron deficiency anemia and the patient was transfused 2 units of packed red blood cells. An EGD was performed to show a 4-5 mm nonbleeding AVM of the inferior duodenal wall which was subject to cautery, epinephrine and placement of 2 endoclips. Echocardiogram revealed reduced left ventricular systolic function and severe aortic stenosis with moderate aortic insufficiency. As the patient met criteria for aortic valve replacement, plans were made to perform the procedure on stabilization of the patient's active problems. Discussion: When treating an aging population, diagnoses such as aortic stenosis can be observed to be increasingly prevalent. While its effect on the cardiovascular system is often evident, such clinical relationships as Heyde's Syndrome allow clinicians to see the potential that this common structural and functional abnormality has to affect both the hematological and gastrointestinal systems. Stenosis of the aortic valve results in increased rate of blood flow. Heyde's Syndrome has been hypothesized to be similar to an acquired von Willebrand disease (Type 2A) which is thought to be a product of the effect of the high sheer stress caused by flow through the stenotic valve which leads to the loss of structural integrity and depletion of the von Willebrand multimers. The result is an increased risk of bleeding systemically, but especially at sites of intestinal angiodysplasia. This hypothesis is best supported by the reduction in bleeding episodes and resolution of anemia noted in patients who had undergone successful replacement of the dysfunctional valve. The fact that this finding may, one day, allow for an expansion of the indications for valve replacement and the

potential reduction of significant morbidity and mortality among patients makes this topic one worthy of further research.

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43. FINDING THE WORDS FOR STROKE

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Introduction: A stroke is defined as an event in which part of the brain stops receiving blood or receives a slowed blood supply. Strokes can result in a wide range of effects and can have devastating consequences. Yearly, almost 800,000 people suffer from stroke, resulting in 130,000 deaths, making stroke the fifth leading cause of death in the United States. The effects of the stroke vary in a predictable fashion based on the area of the brain affected. Since these symptoms can be so wide-ranging, it is important to keep stroke on the differential diagnosis for patients presenting with any new neurological symptom. We present a patient with unusual presentation for stroke that was not evident on initial neuroimaging. Case Description: A 59 year old male presented to the Emergency Department after he called EMS stating that he was locked out of his house. He was seen 3 days before by his daughter and was asymptomatic. The patient last remembers the previous day when he went out to get something to eat. He presented with new-onset word-finding difficulty and amnesia. He denied any prodrome to this event, and has a history of alcohol use. On physical exam, he was noted to have anomic aphasia. The patient had bilaterally intact: cranial nerves, upper and lower extremity motor, sensation, proprioception, and cerebellar testing. The head CT and chest x-ray showed no acute abnormality and other labs were unremarkable. The EKG showed sinus rhythm with a right bundle branch block. Head MRI showed a relatively acute infarction involving the posterior left MCA territory, with a thrombus in the left middle cerebral artery. As it was outside of tPA therapy time frame, treatment was initiated with a loading dose of aspirin and a statin. A Transthoracic echocardiogram (TTE) was performed which demonstrated no shunt. Neurology was consulted and noticed scattered areas of restricted diffusion on MRI suggestive of embolic etiology of the stroke. A Transesophageal echocardiogram (TEE) was negative for thrombus in the let atrium, but overnight telemetry showed a brief episode of atrial fibrillation. As a result the patient was counseled on starting anticoagulation when safe due to likelihood of suffering from previously undiagnosed PAF and risk of further embolic stroke. Discussion: This patient did not present with quickly recognized stroke symptoms such as weakness or loss of sensation. This case highlights the importance of keeping stroke on the differential for any new and unexplained neurological symptoms. Also, one needs to have a high index of suspicion, especially in MCA strokes to the strong possibility of atrial fibrillation being a notable cause for embolic phenomenon. Anticoagulation is an important component of therapy for patients with history or risk of embolic stroke due to atrial fibrillation, that could have been missed in this patient.

Medical Students, Group B

44. COMPARISON OF RADIAL ARTERY PUNCTURE SIMULATION MODALITIES: LOW FIDELITY SIMULATION MODEL VS NOVEL THIEL-EMBALMED CADAVERIC MODEL

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The use of simulated training has become widely accepted as a means for training healthcare professionals. As a result, academic medicine institutions and research efforts have increased their focus on the development of high-quality hands-on skills sessions and simulated cadaver workshops. A novel approach to cadaver preservation, the Thiel method, provides a unique advantage in simulated training because of its ability to create lifelike flexibility and long-term preservation of muscle tissue, viscera, and vasculature. The purpose of this study is to compare the perceived value of simulated mannequins versus Thiel cadavers for medical student education of radial artery puncture technique. The Thiel cadaver's brachial artery and distal portion of the radial artery were exposed via dissection, cannulated and perfused utilizing a pulsatile pump. For each simulation session, students performed a radial artery puncture on the simulated mannequin model and then performed the puncture on the Thiel cadaver. In order to evaluate the students' perception of simulation quality, pre- and post-surveys were administered. After 4 simulation sessions, 33 students' survey results were tabulated. Results indicated that overall, students felt more confident in their ability to perform a radial artery puncture in an actual patient after practicing on a Thiel cadaver. In addition, there was consensus that the cadavers provided a more realistic simulation than the mannequin model. As a result, we consider our novel Thiel cadaver arterial puncture simulation to be a superior educational experience in comparison to previously utilized mannequin simulations. In conclusion, the artificially perfused Thiel cadaver increases the authenticity of radial artery simulation and improves students' confidence.

45. DEADLY VIRAL INFECTION IN DISGUISE

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Introduction: This is a case of a 13 day old preterm male found to have asymptomatic disseminated herpes simplex virus (HSV) after testing was ordered in response to the positive result of the patient's symptomatic dichorionic diamniotic twin. Case Description: A preterm male infant of a dichorionic, diamniotic twin pregnancy was born via c-section after spontaneous rupture of membranes at 32.6 weeks' gestation to a 30 year old G4P2012 with a history of opiate addiction. Prenatal labs significant for O+ antibody negative, rubella immune, and negative for VDRL, hepatitis B virus, gonorrhea, chlamydia, urine drug screen, glucose, and quad screen. Apgars were 8 and 9 at 1 and 5 minutes, and the patient was then transferred to NICU. Exam: Awake and active with stable vital signs. Red reflex intact bilaterally, palate patent with normal facies, and fontanelles were soft, open, and flat. Heart was regular in rate and rhythm with no murmurs. Lungs were clear to auscultation with no retractions. Abdomen was soft and non-tender, no organomegaly, and three vessel cord was noted. Genitals were normal for male with descended testicles palpated. Anus was patent, no sacral dimple. Extremities had full range of motion. Infant had good muscle tone with appropriate reflexes intact. Skin was pink and warm with mild acrocyanosis, but no bruises or lesions. Hospital Course: Blood cultures were obtained at birth due to uncertainty of the duration of ruptured membranes and showed no growth after five days of incubation. He developed oral thrush and candida diaper dermatitis for which PO and topical nystatin were used. The other twin had positive HSV testing after developing vesicular lesions, which prompted blood HSV DNA PCR testing in our patient, though no skin lesions or symptoms were observed at this time. PCR results tested positive for HSV in plasma and nasopharynx. He was treated with IV acyclovir at 34mg q8hr for 21 days. CSF analysis was unremarkable. Results of repeat HSV DNA PCR was negative. Screening for CNS involvement via MRI revealed normal findings. He was discharged on with oral acyclovir to be taken for 1 year. Discussion: This case demonstrates an occurrence in which a neonate presented with disseminated HSV and remained asymptomatic throughout their hospital course. While 40% of neonates may never exhibit vesicular lesions as in our case, majority of infants will be symptomatic with disease frequently involving multiple organ systems such as CNS, liver, and lungs, with death resulting from both hepatic and pulmonary involvement, as well as severe coagulopathy. Our case highlights that infants with disseminated HSV may be asymptomatic initially, but it is only a matter of time before symptoms will develop and is therefore important to treat any asymptomatic neonate with suspicion or laboratory evidence of disseminated HSV due to the high associated morbidity and mortality.

46. ***withdrawn***

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47. PREPARING MEDICAL STUDENTS TO WORK IN COMMUNITIES: THE FIRST FIVE YEARS OF ETSU'S COMMUNITY MEDICINE CURRICULUM

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The Quillen College of Medicine has, for the past five years, maintained a community medicine clerkship based in Sevierville, Tennessee. The program is the result of a partnership with Sevierville and is designed to expose medical students to the multiple components of a health care system necessary to deliver care to a community. Students spend approximately 50% of their time in clinical settings with physicians and other health care professionals, and the remaining 50% in community experiences designed to create understanding of common health needs of the community, the impact of culture on health, health education, methods to reach underserved populations, and the nonclinical roles of physicians in the community. Each group of students participate in a community project during the clerkship as well as a rural outreach health fair focused on delivering preventive services to rural underserved areas. This project details the creation of the program, its objectives, and its successes. Additionally, it features analysis of survey results and interviews with past students, faculty members, and community staff members. Survey and interview questions were derived from institutional and curricular objectives. Interviews were conducted in person and by phone, and surveys were conducted online. Positive community impact was identified and suggestions for further development were derived from these data sources. Medical schools are moving towards increased curricular incorporation of population health and community focus, but current literature on such programs is lacking. This project highlights East Tennessee State University's leadership in this area and represents an important contribution to the field of medical education.

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48. KNOWLEDGE AND ATTITUDES TOWARD USE OF EXTERNAL EDUCATIONAL RESOURCES BY PRE-CLERKSHIP MEDICAL STUDENTS

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Introduction: Medical education currently is characterized by numerous changes, including new instructional modalities and a growing number of external (especially online) educational resources to supplement institutional educational programs. Literature is lacking about the use of external resources by pre-clerkship medical students. The impact is not clear but deserves clarification. The primary research question for this project was: does pre-clerkship student use of external educational resources differ significantly from faculty use/knowledge of these same materials? Materials & Methods: Brief surveys were developed for medical students and pre-clerkship faculty to determine use of external educational resources in first and second year courses. Survey questions

focused on topics such as: (a) perceptions of the importance of faculty knowledge of which external educational resources students employed; (b) perceptions of faculty awareness of the resources students employed; (c) which resources students were most likely to first use; (d) specific publications or question banks students used; and (e) student motivation for using resources. Student reports of actual use were compared to faculty responses to determine the degree of congruence between what resources are used and if faculty are aware/use the same resources. Results: Results showed some areas of close agreement and others of marked disagreement. For example, there was agreement on the importance of faculty being aware of which resources students use (rated important by 86% of students and 94% of faculty). Concerning perceptions of faculty awareness, students and faculty had opposite perceptions: 63% of students believed faculty were unfamiliar with the external resources used while 63% of faculty believed they were very or somewhat familiar. In addition, faculty believed students were more likely to use them as a first resource than students indicated (19% vs. 4 %). In terms of motivation, faculty and student responses showed rough equivalence. Conclusion: Students used external educational resources frequently, valued them, and used them for a variety of reasons. Attitudes and experiences with such external resources show some differences between faculty and students.

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49. IMPROVING TYPE 2 DIABETES KNOWLEDGE IN HAWKINS COUNTY, TN THROUGH A COMMUNITY-BASED LECTURE SERIES

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It is estimated that the prevalence of type 2 diabetes mellitus (T2DM) in Hawkins County, Tennessee is 13%. This is a 2% greater prevalence than Tennessee which ranks 5th in the United States. There is abundant evidence that effective lifestyle interventions can improve health outcomes and prevent the progression of T2DM in at-risk individuals. Our aim in this study was to assess how patients in Hawkins County, TN perceived their knowledge about T2DM to be and determine if a community-based lecture series could improve their knowledge base. Participants for the study were recruited using advertisement pamphlets at local physician offices and pharmacies. The study consisted of three separate informational sessions with an emphasis on different aspects of T2DM including general knowledge, diabetes medication, exercise, and nutrition. A survey was administered to each participant to assess their comfort with T2DM topics before and after a series of educational workshops. The survey consisted of questions targeting topics related to T2DM and participants could document their perceived knowledge base using a Likert-type scale. Eight participants that were present at all three educational sessions were included in the study. The Likert-type items from the survey were converted to a 5-point scale (1 = nothing, 2 = not very much, 3 = undecided, 4 = decent amount, and 5 = very much) for statistical analysis. Each participant was assigned a number and served as their own control. A dependent-samples t-test was used to compare T2DM knowledge before and after the scheduled education sessions. There was a significant difference in general diabetes knowledge before ($M = 3$, $SD = 1.069$) and after ($M = 4.75$, $SD = 0.4629$) the education sessions $t(7) = 4.249$, $p = 0.0038$. There was

a significant difference in exercise knowledge before (M = 2.25, SD = 1.488) and after (M = 4.875, SD = 0.3536) the education sessions t(7) = 4.406, p = 0.0031. There was a significant difference in diabetic medication knowledge before (M = 2.625, SD = 1.061) and after (M = 3.875, SD = 0.8345) the education sessions t(7) = 3.989, p = 0.0053. There was a significant difference in nutrition knowledge before (M = 2.25, SD = 0.7071) and after (M = 4.75, SD = 0.4629) the education sessions t(7) = 6.614, p = 0.0003. The results of our studies suggest that the series of educational sessions were effective at improving the knowledge base of participants in fundamental aspects of T2DM. Participants showed statistically significant increases across the subjects of general diabetes knowledge, diabetic medication knowledge, exercises knowledge, and nutrition knowledge. This method of community-based education on T2DM will serve as a template for future sessions for patients in Hawkins County, TN and other at-risk communities in the region.

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50. IMPROVING EVIDENCE BASED PRACTICES OF LONG ACTING REVERSIBLE CONTRACEPTIVES IN A RURAL COMMUNITY OF NORTHEAST TENNESSEE

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INTRODUCTION: Intrauterine devices (IUDs) and implants have been shown to decrease the rate of unintended pregnancies. These methods also known as Long Acting Reversible Contraceptives (LARCs) are considered the birth control of choice for women of childbearing age, including adolescents, from multiple professional medical associations. However, even with strong recommendations, LARCs are widely underused in the United States, especially in rural areas. This research is based in the Rural Health Services Consortium (RHSC) clinic in Rogersville, Tennessee. This research looks at knowledge and use of LARCs in this clinic before and after receiving training in IUD and implant insertion and removal. METHODS: The physicians, nurse practitioners and physician assistants affiliated with the Rural Health Services Consortium were invited to attend both an IUD and an Implant training. Those who agreed to participate in the study were asked to complete a survey, which addressed current knowledge of LARCs, contraceptive counseling practice and LARC referral practice. Surveys were de-identified and linked to each individual provider through a person specific randomized code. Providers were then trained and certified in the insertion and removal of both IUDs and Implants. Following training the providers provided a survey assessing any change in knowledge and intended practice. At three and six months the same providers will be given an additional surveys with their individualized codes. These surveys assessed the providers' knowledge of LARCs and current practice regarding contraceptive counseling and LARC referral. All survey data was compiled and analyzed for statistical significance using paired T tests. Data was analyzed to identify significant changes in knowledge or practice following training. RESULTS: A t-test revealed a statistically significant increase in provider comfort level with discussing the risks and benefits associated with both IUDs (pretest M=1.92, posttest M=2.92, t = -3.09, p<.01) and implants (pretest M = 1.83, posttest M = 2.83, t = -2.76, p< .05). Regarding practice behavior, a t-test found a statistically significant increase in provider recommendation/discussion of Mirena/Skyla (pretest M= 2.09, posttest M= 3.08, t = -2.14, p<.05) and implants (pretest M = 2.25,

posttest M = 3.27, t= -2.11, p<.05). CONCLUSION: The purpose of this study was to examine if changes occurred in the knowledge and prescribing of Long Acting Reversible Contraceptives (LARCs) like IUDs and implants, in a rural area following comprehensive trainings. Participants of this study were provided with trainings on indications, contraindications, insertion procedures and removal procedures of both IUDs and Implants. Participants filled out 3 surveys and the data collected in these surveys were then analyzed for statistically significant changes. Thee results indicate that the training sessions positively changed provider attitudes and behaviors regarding IUDs and implants. A 3 month follow up posttest will assist in determining if the positive effects of the training are enduring.

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51. *withdrawn*

52. THE EFFECTS OF FURANOXAPALAMINE ON COLON CANCER CELLS AS A NOVEL TREATMENT OPTION

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Colon cancer is the 3rd most common type of cancer in the United States with an estimated 134,000 new cases and 49,000 deaths in 2016. Recent studies have found efficacy in compounds isolated from indigenous plants in eliciting cytotoxic effects on cancerous cells. The primary objective of this study was the isolation and examination of a furanoeremophilane isolated from the plant Senecio pampae, and its cytotoxic effects on colon cancer cell lines. The compound was isolated using a combination technique of column chromatography and thin layer chromatography. Caco2 and HCT-116 colon cancer cell lines were grown to ~70% confluency and dosed with either DMSO used as a vehicle or 5, 10, 20, 40, or 80 μM solutions of furanoxapalamine dissolved in DMSO. After 24 hours, the cells were analyzed using MTT assay and spectrophotometry to test for mitochondrial function and cell viability. In order to confirm our data and determine whether furanoxapalamine caused apoptosis or necrosis, the cells were also analyzed using annexin V and propidium iodide via fluorescence microscopy. Furanoxapalamine was then compared to 5-FU, the most common treatment for colon cancer. The results show a significant decrease in cell viability in Caco2 and HCT-116 colon cancer cells treated with furanoxapalamine compared to control. In addition, preliminary results suggest the compound shows more effective cytotoxicity than the current standard of 5-FU. This is shown by an EC50, using furanoxapalamine in Caco2 and HCT-116 colon cancer cell lines, of 10.0 μM and 48.7 μM respectively. When treated with the standard treatment of 5-FU, the EC50 values were 86.6 μM and 144.4 μM respectively for Caco2 and HCT-116 colon cancer cell lines, which is in agreement with data published in previous studies. This research indicates the potential viability and need for further study of furanoxapalamine as chemotherapeutic treatment for colorectal cancer.

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53. INVESTIGATING THE STABILITY OF COMPOUNDED TRILOSTANE IN COD LIVER OIL

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Trilostane (Vetoryl®) is a synthetic steroid used in the treatment of Cushing's syndrome in dogs. For small dogs, the dose found in commercially available dosage forms of trilostane is too high. Compounding the trilostane in an appropriate diluent provides an option for more precise dosing for smaller dogs, and can be easier to administer versus a tablet or capsule. Trilostane suspends well in cod liver oil, which provides a taste that is

palatable to dogs. In this project, the stability of compounded trilostane suspension in cod liver oil, stored in amber glass and amber plastic bottles at room temperature, was investigated for 30 days. Compounded stability investigations require the utilization of stability indicating analytical methods to monitor drug potency over time. A high performance liquid chromatography (HPLC) with ultraviolet (UV) detection was developed and validated for the quantification of trilostane in cod liver oil. This assay employs the use of a Waters XBridge C18 column (3.5 micron, 4.6 x 150mm) for chromatographic separation of trilostane from the cod liver oil components. The method was linear in the range of 0.5 – 2 mg/ml, with percent error and relative standard deviation of < 5%. The stability indicating nature of the method was assessed using forced degradation of the trilostane through treatment with strong acid (HCl), strong base (NaOH), oxidative agent (H2O2), and heat. The method was applied to the stability investigation of 6 batches of compounded trilostane stored in amber plastic (n =- 3) and amber glass (n = 3) bottles at room temperature. Samples were removed and analyzed for trilostane concentration, versus a matrix matched reference standard, at day 0, 1, 2, 5, 7, 10, 14, 21, and 30. Preliminary results indicate that trilostane is stable in a cod liver oil suspension for an extended storage at room temperature.

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54. ANALYSIS OF RAT SOMATOTROPH CELL LINES TO STUDY TISSUE-SPECIFIC TRANSCRIPTION OF THE GROWTH HORMONE GENE

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Understanding the regulation of the Growth Hormone (GH) gene has been the foundation for identifying mutations in the transcription factor Pit-1 that ablate GH expression in human short-stature patients and for the basic mechanisms of transcriptional control of gene expression (Parks et al., JCEM, 1999). Novel GH transcriptional regulators that work in synergy with Pit-1, such as the zinc-finger protein Zn16 (Wojtkiewicz et al., Endocrine, 2002), will rely on analysis of function using available rodent cell lines expressing GH (Voss et al., Mol. Endo., 2001). An important cell line is the rat MtT/S somatotroph cell line, which has been used in several studies of the control of GH expression. These cells belong to a series of GH lines derived to provide a panel of pituitary developmental models: MtT/S cells solely express GH in large amounts; MtT/Se cells display estrogen control of GH levels; MtT/SM cells represent a prior stage containing both GH and PRL; and MtT/E cells are an early precursor line with no GH (Inoue et al., Endocrinology, 1990). These four cell lines were obtained from the Riken Cell Bank in Japan, and cultured according to previous protocols. MtT/S cells were treated with GH secretagogues such as GH Releasing Hormone to provide for baseline vs stimulated GH production. Further, alternative culture using poly-Lysine-coated flasks that increase cellular attachment of these loosely-attached cells were performed to determine the effect on GH transcription. After examination for characteristic morphologies, cells were collected and total RNA extracted, then reverse transcribed. Quantitative real-time PCR was performed to determine levels of RPL19 as a

normalization value, and for GH, Pit-1 and Zn16 mRNAs. As expected, the levels of GH mRNA varied with the characterized GH secretory values for each line. The levels of Pit-1 and Zn16 are currently being examined to determine the relative contribution of each transcription factor to these GH values. By examining this continuum of somatotroph-expressing cell lines under a variety of conditions, we hope to precisely describe the nature of Zn16 function during pituitary development. It was recently discovered that Zn16 functions as a "trunk-driver" tumor suppressor gene that is mutated and loses function in human colorectal cancer (Takeda et al., Nat. Genetics, 2015). This additional information buttresses the role of the MtT cell lines as an important means to understand the role of Zn16 in controlling the cell cycle as well as gene expression during discrete pituitary developmental stages.

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55. CONSISTENCY OF DRUG INFORMATION RESOURCES IN IDENTIFYING DRUG-DRUG INTERACTIONS WITH ORAL ANTINEOPLASTIC AGENTS

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Targeted oral antineoplastic agents (OAs) have become a staple and rapidly growing field in the realm of cancer treatment. As with any chemotherapeutic/narrow spectrum agent, clinicians have to be aware of potential drug interactions that could interfere with therapy. Drug information databases are a common resource utilized to check for interactions between agents 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. With this kind of therapy adherence and patient side effect reporting becomes a concern. We wanted to determine the reliability of these databases for picking up potential interactions with patients on OAs. We accessed hospital records to find patients with various malignancies on OAs between the calendar year of 2013-2014, of which we found 876 that were screened for potential use of OAs. The goal was to find patients on OAs specifically and determine the number of drug interactions flagged by either drugs.com and/or Lexicomp®. In addition, the significance of the interaction as well as disagreements between databases were analyzed. A major interaction by Lexicomp® is defined as either a 'D' or an 'X' level interaction and on drugs.com is labeled 'major.' Of the 876 screened we found 16 patients (one patient had tried 3 different agents, and another patient had tried two) on OAs. Lexicomp® flagged overall 42 interactions amongst all subjects, of which 17 were major interactions. Drugs.com flagged overall 44 interactions amongst all subjects, of which 11 were major interactions, being the more conservative of the two. Between the 2 databases there were 10 out of 18 major interactions that both were in agreement upon. These discrepancies are of concern in that clinicians hope that resources they utilize are incongruent with one another and allow them to practice in the safest manner in terms of avoided potential serious drug interactions whether it be harm to a patient or decreased effectiveness of the OA. Now that all patients have been screened, future research would be to determine the clinical significance of these interactions and whether or not they had an effect on patient outcomes.

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56. A STABILITY INDICATING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY METHOD FOR INVESTIGATING VITAMIN K IN ORAL LIQUID FORMULATIONS

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According to guidelines from the American College of Chest Physicians, orally administered phytonadione (vitamin K) may be used in patients with INR values > 10 who do not require immediate reversal of warfarin effects. Vitamin K is available commercially as a tablet and an injectable emulsion, but an oral liquid dosage form may be more appropriate for some patients. For extemporaneously compounded medications, there is no assigned expiration date and stability studies must be conducted to determine an appropriate beyond-use date (BUD). Such as stability study requires an accurate and reliable method of quantifying the compound under investigation. In this project, we developed a stability indicating high performance liquid chromatographic (HPLC) method with ultraviolet (UV) detection for the determination of vitamin K. This method requires the use of a Waters XBridge C18 column (3.5 micron, 4.6 x 150mm) for chromatographic separation, and has been validated in the calibration range of 0.1 – 1 mg/ml. Additionally, forced degradation experiments using strong acid (HCl), strong base (NaOH), and oxidizer (H2O2) were used to verify the stability indicating capacity of the assay. Using phytonadione 10mg/mL injectable emulsion, we propose studying the stability of two oral liquid formulations, one compounded in a 1:1 mixture of Ora-Sweet® and Ora-Plus®, also known as Ora-Blend® and the other diluted in SWFI. The commercial vehicle has the advantage of providing an efficient means of compounding the suspension in a slightly more palatable vehicle than the SWFI, but the excipients may affect the stability of the drug.

Pharmacy Students, Group B

57. RESIDENCY, FELLOWSHIP, AND GRADUATE SCHOOL VALUE BELIEFS AMONG STUDENT PHARMACISTS

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Objective: To compare pharmacy students' value beliefs across residency training, fellowship training, and graduate education with research and non-research emphases using expectancy-value theory as a framework. Method: First through fourth professional year (P1-P4) students (N=263) completed the 26-item Postgraduate Training

Value Instrument (PTVI) for four postgraduate training paths. Items were responded to using a 5-point Likert scale. Intrinsic, attainment, utility, financial value and perceived cost scores were calculated for each training path. Using SAS 9.0, ANOVA procedures were employed to test differences between mean value construct scores across training paths. Results: An 84% response rate was obtained. Value construct scores ranged from 2.02 for financial value of fellowship training to 3.36 for intrinsic value of residency training. Positive value scores (ie, scores that theoretically support task choice) were noted for two (residency intrinsic value and residency utility value) of the 20 evaluated value constructs. Students reported statistically significantly higher intrinsic, attainment, utility, and financial value scores for residency training as compared to other paths ($p<0.0001$). Perceived cost did not differ across path ($p=0.48$). Implications: This is the first study to theoretically quantify students' value beliefs across commonly pursued postgraduate training paths. Our results indicate an overall lack of intrinsic, attainment, utility, and financial value for most paths and high perceived cost across all paths. The PTVI could be used to target interventions across the curriculum that seek to promote the value of various postgraduate training paths. Research is warranted to explore how value beliefs change longitudinally as students progress through the professional program.

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58. PROMOTION OF NEUROGENESIS WITHIN THE HIPPOCAMPUS BY EXPOSURE TO MUSICAL PIECES BY MOZART

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For years, it has been widely accepted that exposure to classical music strengthens the human mind in various ways. One area that has generated significant interest in both the media and the scientific community is the role that music plays in the development of learning and intelligence, particularly in children. An increasingly popular and controversial set of research referred to as the Mozart Effect suggests that early childhood exposure to pieces by Wolfgang Amadeus Mozart has a potentially beneficial effect on mental development. Preclinical studies have been performed in an effort to determine the validity of this effect and have indicated that prenatal exposure to Mozart's music increases neurogenesis in the dentate gyrus of the hippocampus. In the present study, the effects of prolonged exposure to the music of Mozart on the brains of newborn mice were investigated. Briefly, Swiss-Webster mice were divided into 2 cohorts: the treatment arm (those exposed to Mozart's music) and the control arm (those exposed to no music). The mice in the treatment arm, housed in a separate area from those in the control arm, were exposed to various pieces by Mozart at volume of 65-75 dB. Immediately following the birth of the mice, a playlist composed of entirely Mozart's music was played repeatedly between the hours of 7pm and 7am, which both corresponds to both the dark cycle in our vivarium and encompasses the murine active period. The mice in the control arm remained in standard housing under the same light/dark cycle. After 3 weeks (21 days of age), all mice were injected with 50mg/kg 5-ethyinyl-2'-deoxyridine (EdU), a thymidine analog that can be used to label newly generated cells. Twenty-four hours after EdU injection, the mice were sacrificed via transcardial perfusion with 4% paraformaldehyde and the brains collected. The neural tissue was then frozen and sectioned on a cryostat at 20 microns. These sections were then stained using the Click-iT EdU imaging kit and

double-labeled for the neuronal marker, NeuN, using immunohistochemistry. Numbers of EdU+/NeuN+ double-labeled cells and total numbers of NeuN+ cells were counted in the dentate gyrus of the hippocampus. Ratios of double-labeled cells to total NeuN+ cells were calculated and compared between the two groups. Preliminary data indicates that exposure to Mozart's music during the perinatal period increases neurogenesis in the dentate gyrus of the hippocampus. Therefore, it can be concluded that exposure to the music of Mozart may indeed have a positive impact on early brain development.

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59. 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 methylenedioxypyrovalerone (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. 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. Drug concentrations were measured using a previously validated high pressure liquid chromatography-tandem mass spectrometry (HPLC-MS/MS) method. 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 3 drugs were shown to cross the placenta and enter the fetal brain. In fact, when comparing maximum concentrations (Cmax) between the matrices, the Cmax of methylone in fetal brain was almost as high as the Cmax in maternal brain. For mephedrone, the Cmax in maternal brain and fetal brain were equivalent, while the highest Cmax was achieved in the placenta. Finally, for MDPV, the highest Cmax was seen in the fetal brain. Also of note, the area under the curve (AUC) values for all 3 drugs were higher in fetal matrices, with the highest AUC for mephedrone and MDPV

achieved in placenta and the highest AUC for methylone achieved in the fetal brain. Given the concentrations of each compound found in fetal brain after prenatal exposure and the demonstrated pharmacokinetic differences among them, 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.

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60. A HPLC ANALYSIS TECHNIQUE OF COENZYME Q10

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According to the CDC, Coronary Artery Disease (CAD) is the leading cause of death in the US. CAD progression exhibits atherosclerosis, a buildup of cholesterol plaques in arteries. The precursor to plaque formation is the oxidation of low density lipoproteins (LDL) by free radicals in the vascular endothelium which then accumulates in the lumen, narrowing the arteries and restricting blood flow. The body produces antioxidants to remove free radicals from the body. An important antioxidant for heart health is Coenzyme Q10 (CoQ10), which operates at the subcellular level in the electron transport chain of mitochondria to remove free radicals. As the body ages, CoQ10 naturally declines, and oxidative stress accumulates. When cholesterol levels increase, patients are commonly prescribed a medication known as a Statin, which works well at lowering the levels of LDL cholesterol. However, their mechanism of action further depletes CoQ10 and supplementation becomes beneficial. The active ingredient content changes between brands, formulations, and drug delivery systems (DDS). Over-the-counter (OTC) products are not required to conform to the quality standards required for legend drugs. Four different OTC CoQ10 products were analyzed to determine their content; three commercially available and one created in-house for a university-wide project with human subjects. The purpose of this study was to verify the hypothesis by developing a simple, concise method to evaluate the contents of CoQ10 using reverse-phase high performance liquid chromatography (HPLC). The design implemented a 1:1 ratio preparation of 1-propanol and methanol as the mobile phase and the ultraviolet (UV) wavelength of 275 nm for spectrophotometric measurements. Standard stock solutions were created with research-grade CoQ10, diluted with 1-propanol via the aliquot method to produce 6 standard solutions of different concentrations. These 6 solutions were analyzed and a standard concentration linear curve was produced. The coefficients of determination (r2) obtained from the five standard runs ranged from 0.9998 to 1.0000. Using this innovative method, it was applied to the four products for analysis, which were listed to contain 100 mg. The samples were diluted with 1-propanol in 100 mL volumetric flasks (VF). The soft-gels were punctured by needle then pressed into a VF. The hard-shell capsules were opened and the contents were poured into a VF. The contents dissolved into solution over 30 minutes with inversion of each VF every 10 minutes, then each sample was prepared for analysis. Products A, G, and S contained > 100 mg, and Product B contained ~90% of 100 mg. Of the 4 products analyzed, 3 exceeded the labeled dosages. This data supports the hypothesis of varying amounts of active ingredient contained within different brands and DDS. Further evaluation of the hypothesis will be done using this analysis method and applying it to additional OTC CoQ10 supplements in different DDS.

61. METHYLPHENIDATE AND THE SUSCEPTIBILITY OF THE NIGROSTRIATAL DOPAMINE PATHWAY TO OXIDATIVE STRESS

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Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that is diagnosed in 5-7% of children and 2.5-5% of adults. The drug of choice for treatment of ADHD is the psychostimulant methylphenidate (MPH), commonly known under the trade name Ritalin. Since symptoms of ADHD continue into adulthood in up to 50% of children that are diagnosed, treatment with MPH is accordingly used as long-term therapy. Although MPH therapy frequently extends over the course of many years, scientific literature focuses almost exclusively on the short-term neurological consequences of the drug. Additionally, while diagnosis rates of ADHD have increased over time, so has the use of MPH as pharmacotherapy. With larger populations being treated with MPH over prolonged periods of therapy, it is of great significance to examine the consequences of long-term exposure to this drug. MPH's primary mechanism is the modulation of dopamine and norepinephrine levels in the synaptic cleft by binding to and blocking their transporters, preventing their reuptake into the presynaptic axon, and elevating levels available to bind to receptors on the postsynaptic cell. Previous research by our principal investigator, Dr. Brooks Pond, has shown that long-term exposure to MPH causes dopaminergic neurons within the nigrostriatal pathway to become more sensitive to 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), a neurotoxin that induces symptoms of Parkinson's disease. We hypothesize that increased levels of oxidative stress, generated by the oxidation of elevated levels of dopamine in the synaptic cleft, increases susceptibility of dopaminergic neurons within the nigrostriatal pathway to the neurotoxic effects of MPTP. In our study, adolescent male Swiss-Webster mice were divided into 3 cohorts: saline (control), 1 mg/kg MPH (therapeutic dose), and 10 mg/kg MPH (abusive dose). The mice were given injections twice daily, Monday through Friday (with weekends off to mimic a school week dosing regimen), over the course of 12 weeks. Following this regimen, the mice were given a 2 day washout period and then half of the animals in each cohort were injected with an acute regimen of MPTP (4 doses of 20 mg/kg). Mice were sacrificed, and brains were collected and dissected the following day. The two brain regions that encompass the nigrostriatal pathway (substantia nigra and striatum) and occipital cortex (negative control) were collected and flash frozen until analysis. Oxidative stress was measured within each sample using a glutathione assay (to measure for glutathione, which should be depleted with DA-induced oxidative stress) and an Amplex red assay (to measure hydrogen peroxide, which should be increased). Unfortunately, no significant differences in GSH or hydrogen peroxide were seen in the tissue samples due to variability in the data and small values given the small tissue weights.

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62. *withdrawn*

Doctoral Candidates and Post-Doctoral Fellows

63. ENHANCED GLUCOLYTIC METABOLISM CONTRIBUTES TO CARDIAC DYSFUNCTION IN POLYMICROBIAL SEPSIS

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Lactic acidosis in sepsis has long been interpreted as a marker of tissue hypoxia and anaerobic glycolysis. There is a well-documented correlation between lactate levels and mortality in sepsis that appears to be independent of other factors. In addition, aerobic glycolysis is now recognized to be critical for the function of many pro-inflammatory immune cells. It is also well known that sepsis induces cardiac dysfunction. This study investigated the role of sepsis enhanced glycolysis in septic cardiomyopathy. Male C57B6/J mice were treated with a hexokinase inhibitor (2-deoxy-D-glucose, 2-DG) at 0.25, 0.5, 1.0 and 2.0 g/kg (n=7-8) before cecal ligation and puncture (CLP) induced sepsis. Untreated septic mice served as control. Sham surgical operated mice treated with or without 2-DG served as sham controls. Cardiac function was assessed 6 hours after CLP sepsis by echocardiography. Serum was harvested for measurement of inflammatory cytokines and lactate. The effect of 2-DG administration on survival outcome in CLP sepsis was also monitored. The data shows that administration of 2-DG either at 0.25 g/kg or 2.0 g/kg markedly attenuated sepsis-induced cardiac dysfunction as evidenced by improved ejection fraction (EF%) and fractional shortening (FS%) in 2-DG treated septic mice ($p<0.05$) when compared with untreated CLP septic mice. We also observed a markedly improved survival outcome. 2-DG administration also significantly attenuated CLP sepsis-induced liver and kidney injury and markedly reduced serum TNFa and IL-1 β production as well as serum lactate levels. Interestingly, 2-DG treatment markedly enhanced the expression of Sirt1 and Sirt3 in the septic myocardium and suppressed the expression of apoptotic inducers Bak and Bax. We conclude that glycolytic metabolism plays an important role in mediating sepsis induced septic cardiomyopathy. The mechanisms may involve regulation of the pro-inflammatory response and apoptotic signaling.

64. INHIBITION OF TUMOR NECROSIS FACTOR ALPHA RESULTS IN ALLEVIATION OF PREPULSE INHIBITION DEFICITS IN A RODENT MODEL OF SCHIZOPHRENIA

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Past work in our laboratory has shown that neonatal treatment to rats with quinpirole, a dopamine D2 agonist, results in increases of dopamine D2 receptor sensitivity throughout the animal's lifetime, which is hallmark of schizophrenia. For example, all antipsychotic drugs used to treat schizophrenia block the dopamine D2 receptor. In this study, we will analyze the use of an anti-inflammatory experimental compound on behavioral deficits known to exist in the neonatal quinpirole model. A behavioral endophenotype in schizophrenia includes deficits in auditory sensorimotor gating as measured through prepulse inhibition (PPI) in adulthood. PPI is a neurobehavioral test in which a weaker stimulus (prepulse) inhibits the startle response to a stronger stimulus (pulse). A common method used to test sensorimotor gating in rodents is the use of auditory stimuli. The reduction of the amplitude of startle when the prepulse is presented directly before startle stimulus (100 ms interstimulus interval) reflects the ability of the nervous system to adapt and predict the presence of a strong sensory stimulus when a preceding weaker signal is given to warn the organism. PPI is one of the most translatable behavioral tests to be used from rodents to humans. Recent studies indicate that inflammation may be an important pathophysiological process related to both schizophrenia psychopathology and metabolic disturbances seen in patients with schizophrenia. The inflammation response is complex and involves a number of factors, but tumor necrosis factor alpha (TNFa) is a cytokine in involved in systemic inflammation and is produced in neurons. The primarily role of TNFa is in the regulation of immune cells in the acute phase reaction. In this study, we analyzed whether a newly developed compound which targets inhibition of TNFa would result in an improvement of PPI on rats neonatally treated with quinpirole. Results revealed that presentation of the TNFa inhibitor in the diet for 30 days in adolescence alleviated PPI deficits in neonatal quinpirole treated rats to control levels when tested as adults. This demonstrates a possible new pharmacological target for treatment of behavioral deficits that exist in schizophrenia.

65. CHARACTERIZATION OF FATTY ACID AMIDE HYDROLASE IN PHYSCOMITRELLA PATENS

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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. Fatty acid amide hydrolase (FAAH) is one of the metabolic enzymes that breaks the amide bond in NAEs to release free fatty acid and ethanolamine. We identified FAAH in Physcomitrella patens and expressed heterologously in E. coli using Gateway cloning system. Radiolabeled NAE 16:0 and 20:4 were used as substrates to test amide hydrolase activity in vitro. In order to understand the role of PpFAAH in vivo, knock out (KO) and overexpressors (OE) were generated by homologous recombination. PpFAAH KO construct was generated by inserting 5'- and 3'-flanking regions into pMP1159 plasmid. Full length PpFAAH with stop codon was cloned into pTHUBlGATE vector in order to make OE construct. KO and OE constructs were then transformed into protoplasts of P. patens by using PEG-mediated transformation to generate mutant lines. To identify potential interacting proteins of PpFAAH, it was cloned into pDEST15 plasmid with N-terminus GST tag. Interaction between GST-tagged PpFAAH and proteins from 14-day old protonema will be visualized by SDS-PAGE and then subjected to LC-MS/MS analysis for identification. 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 P. patens.

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66. COMPARISON OF SPATIAL INTERPOLATION METHODS IN ESTIMATING SUBSIDENCE RATES IN THE LOWER MISSISSIPPI RIVER INDUSTRIAL CORRIDOR

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Subsidence measurements in the Lower Mississippi River Industrial Corridor are difficult to estimate since traditional methods of measuring vertical displacement are obsolete and inaccurate in the state of Louisiana. United States Geological Survey benchmarks in the state of Louisiana are in a continual state of movement that further exacerbates measurement errors; however, researchers through the National Oceanic and Atmospheric Administration developed a method using first-order leveling data in conjunction with tidal gauge data and GPS observations to compute the vertical velocities of over 2,700 National Geodetic Survey benchmarks in the states of Louisiana, Texas,

Mississippi, and Alabama. Estimation of subsidence rates throughout the Lower Mississippi River Industrial Corridor required the use of spatial interpolation methods. For this study, inverse distance weighting, universal kriging, and ordinary kriging methods were applied to the corrected dataset and cross-validation methods were utilized to determine the accuracy of each method. The mean error and the root mean square error is calculated for each interpolation method, then used to detect bias and compare the predicted value with the actual observation value. Early cross-validation estimates are comparable for each method statistically and visually; however, initial results indicate that the inverse distance weighted method is the most accurate likely, because the observed measurements are located in close proximity to each other, placing more weight on the observed points that are closer to the predicted location and resulting in optimal accuracy scores.

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67. EVALUATING A COMMUNICATION SIMULATION SCENARIO

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Multiple professional organizations have developed standards, templates, and guidelines for simulation scenario design; however, incorporating these standards, guidelines and using templates does not guarantee a successful simulation activity. Currently there are no tools that utilize the perspective of study participants when evaluating simulation scenario design. The specific objectives of the study were to; a) identify a pre-written simulation scenario that included elements as recommended by professional organizations; b) identify participant perception of simulation through the use of a pre-simulation needs assessment survey; c) implement the chosen scenario in a undergraduate first semester clinical course; d) evaluate the scenario design through the use of a post-simulation survey; and e) collect and analyze data that can subsequently be used to guide the development of an evaluation tool. Both surveys were aimed at addressing specific practice questions regarding elements of realism in simulation, elements to improve the performance and enhance the knowledge of the undergraduate nursing student as well as addressing the benefits of using a standardized patient actor. A descriptive mixed-method study design was chosen utilizing three participant populations; a) undergraduate nursing students enrolled in their first semester clinical course; b) undergraduate nursing faculty teaching in the first semester clinical course; and c) standardized patient actors. The study took place on the campus of East Tennessee State University, Johnson City TN over a two-day period. Students were divided into small groups according to their pre-assigned clinical section. Upon arrival to the simulation activity students randomly divided themselves into groups of two. The simulation activity followed the pattern of a pre-brief, activity, and then a debriefing session. At the completion of the debriefing session participants were provided a survey link specific to their participant population. Educators and researchers should be encouraged to move beyond evaluations that measure participant self-confidence and satisfaction with the simulation exercise. The development of a method to determine why certain elements worked with some learners and not with others, why some learners met key criteria earlier in the exercise than others, or why cues were recognized by some and not by others would assist in bridging the perceived research gaps and would provide a level of validity to the scenario design.

Upon completion of this DNP scholarly project the hope is to have addressed some of the perceived gaps in the research by; a) identifying elements of simulation the undergraduate nursing student believes to be important in their education; b) providing nursing faculty with information obtained from the undergraduate nursing student, undergraduate nursing faculty, and standardized patient actors that can be used to design simulation scenarios or enhance or improve existing simulation scenario design; and c) establishing a database to be used by future researchers to develop a formal simulation scenario design evaluation tool.

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68. THE EFFECTS OF GENDER AND TYPE OF BOARD GAME ON 4-YEAR-OLD CHILDREN'S ENGAGEMENT IN PLAY

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This study investigates 4-year-old children's engagement while playing two different board games, Robot Turtles and Candy Land. The purpose of this study is to determine how engaged children are during the play time, questions guiding the study were: does gender have an effect on the amount of time that they are engaged in the game? And does the type of game that they are playing make a difference in the amount of time that they are engaged in the games. There a lot of research about children's engagement in the classroom and free play, but the studies that measures children's engagement in board games are very few. This study examines which game is more engaging and whether gender shows any differences. The data was collected as a part of another study which examined the effects of playing Robot Turtle on children's sequencing skills. As a part of this study the children were video taped while playing these board games. The current study will use those videos to examine the research questions. Two videos will be transcribed and coded in order to measure children's engagement during the game play. A checklist was developed by the researcher, based on the videos and the literature, in order to measure the children's engagement during the play. The videos were chosen based on the gender of the children who were playing the game and the games that were playing, there are two boys and two girls in each video and each video represents a different game. The preliminary results show that the gender has an effect in the amount of time that children are engaged in the game. Girls are more engaged than boys. Also Robot Turtle seems to be more engaging than Candy Land.

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69. ATAXIA-TELANGIECTASIA MUTATED KINASE DEFICIENCY IMPAIRS CARDIAC AUTOPHAGIC RESPONSE FOLLOWING MYOCARDIAL INFARCTION VIA THE INVOLVMENT OF AKT/GSK-3 β PATHWAY

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Background: Autophagy, a conserved physiological process, 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. Autophagy is suggested to play a significant role in cardiac remodeling, particularly following myocardial infarction (MI). Ataxia-telangiectasia mutated kinase (ATM) is a cell cycle checkpoint protein activated in response to DNA damage. Mutations in ATM cause a multisystemic disease known as Ataxia-telangiectasia (AT). Previously we have shown that ATM plays a critical role in myocyte apoptosis and cardiac remodeling following b-adrenergic receptor stimulation and MI. Here, we tested the hypothesis that deficiency of ATM impairs autophagic response in the heart 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. Heart function was measured using M-mode echocardiography. The mice were sacrificed 4 hours following MI. For cellular analysis of autophagy, cardiac fibroblasts were isolated from adult male rats. Confluent cultures of fibroblasts were treated with KU-55933 (KU; specific ATM inhibitor) for 4 hours. Proteins involved in autophagy induction and clearance were analyzed in heart and cell lysates using western blots. Proteostat Aggresome detection kit was used to quantify aggresomes, aggregates of misfolded proteins, in the heart tissue. Results: M-mode echocardiography revealed a significant decrease in cardiac output in ATM deficient hearts 4 h post-MI. Western blot analysis uncovered that the ratio of LC3II/LC3I, marker of autophagy induction and autophagosome formation, was significantly lower in hKO-sham versus WT-sham group. MI decreased LC3II/LC3I ratio in both groups with no significant difference between the two genotypes. Expression of p62, a marker of autophagic clearance, was significantly higher in hKO-MI group versus hKO-sham and WT-MI groups. Expression of mature cathepsin D, a lysosomal endopeptidase involved in autophagic clearance, was lower in hKO-MI group versus hKO-sham. The number of aggresomes was significantly lower in hKO-sham and WT-MI groups versus WT-sham group. However, the number of aggresomes was significantly higher in hKO-MI versus hKO-sham group. Activation of Akt was lower, while activation of GSK3 β was higher in hKO-MI versus hKO-sham group. In cardiac fibroblasts, LC3II/LC3I ratio was significantly lower in KU-treated cells when compared to control. Although inhibition of ATM had no effect on p62 and cathepsin D expression in cardiac fibroblasts, activation of Akt was lower while activation of GSK3 β was higher in KU-treated cells when compared to control. Conclusion: These data suggest that - 1) ATM deficiency worsens heart function post-MI; 2) ATM deficiency impairs autophagic response in the heart post-MI and in cardiac fibroblasts; and 3) impairment in autophagic response occurs via the involvement of Akt/GSK3 β signaling. Thus, ATM deficiency impairs autophagic activity in the heart post-MI via the involvement of Akt/GSK3 β pathway.

70. ENDOTHELIAL SPECIFIC DEFICIENCY OF HSPA12B ENHANCES LACTATE PRODUCTION AND IMPAIRS BACTERIAL CLEARANCE IN PLOYMICROBIAL SEPSIS

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High levels of serum lactate have been considered biological marker for tissue hypoxia and a predictor of adverse outcomes in sepsis/septic shock. There is a well-documented correlation between lactate levels and mortality in sepsis. We have previously shown that increased expression of endothelial heat shock protein A12B (HSPA12B) attenuates LPS-induced cardiac dysfunction while deficiency of HSPA12B in endothelial cells resulted in worsen survival outcome. This study investigated whether endothelial HSPA12B plays an important role in mediating a crosstalk between endothelial cells and immune function during polymicrobial sepsis. Endothelial specific HSAP12B deficient ($HSPA12B^{-/-}$, n=5) and wild type (WT, n=5) mice were subjected to cecal ligation and puncture (CLP)-induced sepsis. Sham surgery served as sham control (n=6). Cardiac function was examined by echocardiography before and 6 hour after CLP. Thirty six hours after CLP, serum samples were harvested for examining the levels of lactate and pro-inflammatory cytokines (TNFα and IL-6) by ELISA kits. Bacterial clones in the lung and liver tissues were also examined. CLP sepsis significantly reduced ejection fraction (EF%) and fractional shortening (%FS) in WT mice and further decreased EF% by 19.9% and FS% by 22.5% in $HSPA12B^{-/-}$ septic mice compared with WT septic mice. $HSPA12B^{-/-}$ septic mice showed significant execration of mortality than WT septic mice. Sepsis significantly increased serum levels of lactate in WT mice. However, lactate levels (0.24±0.02mM) in $HSPA12B^{-/-}$ septic mice were markedly greater compared with WT septic mice (0.31±0.01mM). CLP sepsis significantly increased serum TNFα levels by 1000% in WT mice and by 450% in $HSPA12B^{-/-}$ mice, indicating that deficiency of endothelial HSPA12B may alter immune response function during sepsis. Interestingly, bacterial clearance in $HSPA12B^{-/-}$ septic mice was markedly impaired as evidenced by increased bacterial clones in the lung (10^5 cfu/ml) and liver ($2x10^5$ cfu/ml) tissues compared with WT septic mice (lung $2x10^3$ cfu/ml and liver $2x10^4$ cfu/ml). We conclude that endothelial specific deficiency of HSPA12B markedly alters immune function for bacterial clearance and pro-inflammation cytokine production. Endothelial HSPA12B could be an important mediator for the crosstalk between endothelial cells and immune function during sepsis.

71. ASSESSING CRITICAL CARE NURSES' COMPLEMENTARY THERAPY KNOWLEDGE

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Critical care patients, admitted to a hospital with acute or chronic conditions suffer from unwanted side effects. Pain, anxiety, nausea, shortness of breath, and fear are some of the side effects that critical care nurses try to control for patients. Use of complementary therapies (CT) such as music therapy, aromatherapy, nature-based sound therapy, and spiritual care, alongside use of traditional medicine, have all been found to be effective in reduction of side effects for critical care patients. The purpose of this study was to assess critical care nurses' CT knowledge, provide educational resources, and reassess for an increase in knowledge and interest in future education. The aim of this project was to increase nurses' knowledge of music therapy, aromatherapy, relaxation and nature-based sound therapy, and spiritual care. Objectives included: (a) assess current CT knowledge, (b) provide an educational session about CTs, (c) provide educational materials to enhance the educational session, and (d) encourage participants to seek out more information about CTs and their use in the clinical setting. The study was completed at an acute care facility in Northeast Tennessee. A one-group, pre-survey/post-survey design with a convenience sample of 31 critical care nurses was used. An assessment tool that was used in past research was adapted and used to assess the nurses' demographic information, CT knowledge, and interest in CT education. The majority of the participants were females (83.9%). Eighty-seven percent of the nurses provided direct bedside patient care, while 12.9% were in a combined leadership and bedside patient care role. Five critical care units (CCU) were involved in the project: surgical/trauma CCU (45.2%); cardiovascular CCU (16.1%); medical CCU (3.2%); neuro CCU (12.9%); intermediate medical unit (9.7%) and the leadership nurses from each of these units (12.9%). Collectively, the average number of months of critical care experience was 76 months, with a minimum of 6 months and maximum of 384 months. A comparison between the pre-survey and post-survey showed a significant difference in knowledge of music therapy ($P = 0.014$), aromatherapy ($P = 0.000$) and spiritual care ($P = 0.027$). Additionally, findings showed a significant difference between the pre-survey and post-survey assessments that pertain to interest in more knowledge/training, level of knowledge, and barriers to use of CT. The post-survey showed the vast majority of nurses were interested in more knowledge and training in aromatherapy (100%), nature-based sound therapy (100%), spiritual care (100%), and music therapy (96.8%). Providing critical care nurses with an educational session and educational resources positively impacted the nurses' understanding of CTs and the desire to learn more about the topic. Possible implications for the study findings include consideration of implementation of CT education for new nurses in a hospital setting and CT education on a yearly basis as a continuing education offering for critical care nurses.

72. AN ANALYSIS OF GENDER ATTITUDES AND FORCED SEX AMONG COLLEGE STUDENTS IN SOUTH CENTRAL APPALACHIA

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Adverse childhood experiences (ACEs) include sexual, physical, and emotional abuse, and have been associated with increased mental and physical health problems. Additionally, traditional masculine ideologies and rape myths held by collegiate heterosexual males have been shown to support violence against women. Various risk factors outlined by the Centers for Disease Control and Prevention (CDC) are associated with the perpetration of sexual violence and include alcohol use, adherence to traditional gender roles, prior sexual victimization and hyper-masculinity. In 2014, a modified ACE questionnaire was administered to college students at a regional university in South Central Appalachia. The College- ACE data (C-ACE) were collected via an online close-ended questionnaire. The C-ACE cross-sectional study allowed for exploration of the prevalence of gender attitudes among 899 heterosexual college men and women with a mean age of 20 years old. Multivariate logistic regression models were built for recent and past sexual behaviors, attitudes toward gender roles, and attitudes toward women in society based on the responses. The prevalence of female students that consider women who carry condoms on them as “easy”, and that found swearing and obscenities more repulsive when stated by women compared to men was higher than anticipated at 31.28% and 42.63%. Male student agreement was 52.13% and 55.32%, respectively. Nearly a quarter of the men felt fathers should have more authority than the mothers when raising children, and 39.72% felt the intellectual leadership of a community should be in the hands of men. The univariate regression model examining forced sex showed a significant association with drinking before sex and being physically or emotionally hurt. A student was 3.8 times ($p<0.001$) more likely to experience forced sex when the partner drank before sex and 3.4 times ($p<0.001$) more likely when the individual was drinking before sex. In the adjusted model, the likelihood of forced sex was two times ($p=0.002$) more likely of experiencing emotional hurt on purpose from a dating partner when controlling for other factors (OR 2.288, CI 1.348 - 3.883). The attitude that men should decide the type of sex to have was positively associated with the attitudes that women carrying condoms are "easy" (OR 3.247, CI 2.274 – 4.637), that men should lead the community (OR 1.614, CI 1.065 – 2.446), and that fathers should have greater authority in raising children (OR 2.745, CI 1.753 – 4.299) while controlling for other factors. The prevalence of unequal gender attitudes held by both men and women should be considered when developing sexual assault interventions. Attitudes surrounding women with condoms are key to updating education on safe sex practices. The role of gender

attitudes and gender inequality are a critical component when attempting to understand sexual violence in current college environments.

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73. FORGIVENESS AND SUICIDAL BEHAVIOR IN VETERANS: THE MEDIATING ROLE OF SHAME AND GUILT

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Suicide is the tenth leading cause of death in the U.S., and military veterans are at a 21% greater risk compared to the general population, perhaps due to negative emotions associated with military service requirements. For instance, many veterans experience guilt, defined as remorse for one's actions (e.g., for a failed rescue mission), as well as shame, or the belief that the self is inherently defected, typically in response to a violation of one's personal values (e.g., harming non-combatants). However, not all veterans who experience feelings of shame/guilt are at risk for suicide, perhaps due to individual-level protective factors. One such factor is forgiveness, defined as an absence of ill will toward a specific offense or offender, and which can include self-forgiveness, other-forgiveness and forgiveness by God. Forgiveness may alleviate these negative emotions (e.g. guilt, shame), thus decreasing suicide risk. To date, no published studies have examined linkages between these variables in a comprehensive model, which we do within a simple mediation framework, in the current study. At the bivariate level, we hypothesized that all forgiveness dimensions would be inversely related to guilt, shame, and suicide risk, and that guilt, shame, and suicide risk would be positively associated. At the multivariate level, we hypothesized that higher levels of forgiveness (e.g., self-forgiveness, other-forgiveness, feeling forgiven by God) would be associated with lower levels of suicide risk via lower levels of guilt and shame. Our sample of U.S. veterans (N = 403; Mage = 50.36 years), who were primarily male (n=276) and white (n = 350), completed the Fetzer Multidimensional Measure of Religiousness/Spirituality, Differential Emotions Scale-IV, and Suicidal Behaviors Questionnaire-Revised. Bivariate correlations and multivariate analyses were conducted, covarying age, sex, ethnicity, combat exposure, lifetime religiousness, and non-focal forgiveness dimensions. At the bivariate level, supporting hypotheses, all forgiveness dimensions were inversely associated with guilt, shame, and suicide risk, which were positively related to one another. At the multivariate level, both guilt and shame mediated the relation between self-forgiveness and suicide risk, such that greater self-forgiveness was related to less guilt and shame and, in turn, to less suicide risk. Shame also mediated the relation between other-forgiveness and suicide risk, in an indirect-only fashion. Finally, although directly and inversely related to suicide risk, feeling forgiven by God was not significantly mediated by the shame/guilt-suicide linkage. Consistent with past literature, our results suggest nuanced relations between individual dimensions of forgiveness and suicide risk, with self-forgiveness as the most robust and consistent predictor. Our results may have clinical implications. Therapeutically fostering forgiveness through stand-alone interventions (e.g. forgiveness therapy) or veteran-focused interventions (e.g. moral injury groups) may allow veterans to transcend past offenses by promoting compassionate views of oneself and others, thereby improving psychological functioning and reducing suicide risk.

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74. COMMUNITY LEVEL PHYSIOLOGIC PROFILES AS A SOURCE TRACKING MECHANISM FOR SURFACE WATER POLLUTION

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Finding cost-effective strategies to determine sources of contamination is essential to prioritize management strategies and appropriately allocate resources to reduce water pollution. Microbial activity is a valuable indicator of environmental change because of quick regeneration times and subtle responses to environmental change, and community level physiologic profiles (CLPPs) are low cost methods to fingerprint sources of pollution, acting as an early indicator of surface water degradation. CLPPs have been used in a wide variety of environmental matrices, such as activated sludge, soils, sediments, surface water, and groundwater. This study incorporates two studies within the department of Environmental Health to demonstrate the potential of using microbial community function to differentiate between types of sources in two 303(d) listed streams, Cash Hollow Creek and Sinking Creek in Northeast Tennessee. Data was collected from October 11th, 2016 to October 25th, 2016 on a weekly basis at 3 sites on Cash Hollow Creek , and samples were collected monthly from November 2016 to January 2017 at up to 8 sites as part of a longitudinal study of microbial diversity in Sinking Creek. Results indicate a diverse utilization of carbohydrates, carboxylic acids, phenolic compounds, amino acids, and polymers between all the sites, and significant differences in the utilization of carbon sources in a variety of individual carbon substrates. Principal component analysis was used to explore the variation within the sampling sites, sample matrices, and revealed separation based on streams and sites, suggesting influence of different types of pollution sources. This demonstrates the potential for CLPPs to be powerful tools to assess the effects of physical, microbial, and chemical pollution on microbial function, and these can be used to reduce the public and environmental health burden of stream impairment through appropriate monitoring strategies.

75. INTRA AND EXTRA FAMILIAL SEXUAL OFFENSES IN RURAL AND URBAN TENNESSEE

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Sexual offenses can be categorized as intra- or extra-familial, reflecting the relationship between perpetrator and victim. Despite colloquial beliefs that incestual sexual offenses may be more prevalent in insulated, rural communities, empirical study of geographical trends for these offenses is limited. In the United States, Menard and Ruback (2003) found that urban areas had a higher average number of sexual assaults against children, but that rural communities had higher per capita rates. They did not, however, examine intra versus extra-familial offenses. There are a small number of studies that discuss instances of incest in rural areas, such as Collinridge (1993) in Wales, who found an increased rate of incest for rural areas in comparison with urban ones. Similarly, Goldman and Goldman (1988) suggest that, in rural Australia, intra-familial child sexual abuse rates are higher for girls raised on farms or from small communities with population less than 5,000. However, these findings are in contrast with the fact that victims of sexual assault within the family are less likely to report, and that the close-knit nature of rural communities and stigma associated with incest may actually deter reporting. The main goals of the current study are to report rates of sexual offenses in the state of Tennessee for rural versus urban counties, and to examine the difference in rates of intra and extra-familiar sexual offenses in rural and urban counties in the state of Tennessee. Data for the current study were extracted from the Tennessee Bureau of Investigation's (TBI) crime statistics database. Communities are coded as rural or urban based on 2013 Rural Urban Continuum Codes (RUCC). The RUCC codes counties into nine categories per population density and urbanization; however, for this study, Tennessee's counties were placed into three collapsed groups based on the RUCC codes: (1) metropolitan counties (RUCC codes 1-3; n=42), (2) nonmetropolitan counties with an urban population density (RUCC codes 4-7; n=37), and (3) rural counties or those with a population less than 2,500 (RUCC codes 8-9; n=16). Chi-square statistics will be used to differentiate rates of sexual offenses and intra- and extra-familial sexual offenses in rural and urban counties in Tennessee. Implications for prevention, victim services, and intervention will be discussed.

76. LAW ENFORCEMENT RESPONSE TO CRIME IN TENNESSEE: INCIDENT CLEARANCE RATES IN RURAL VERSUS NONRURAL COUNTIES

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Incident clearance rates are calculated by dividing the total number of crime occurrences by those solved by police in a given area. While these percentages are commonly used as a measure of law enforcement effectiveness, they are largely influenced by geographic size, economy, and cultural factors. For instance, rural police tend to have fewer financial resources and may not have sufficient personnel and technology to investigate certain criminal offenses. Rural communities also tend to be more close-knit, have stronger social ties, and residents often know one another, which can influence reporting rates and police strategies. Improving our understanding of clearance rates across rural and urban counties is necessary to increase the effectiveness of location-specific law enforcement practices. Data for the present study were obtained from the Tennessee Incident Based Reporting System for reported incidents of crimes against persons and subsequent clearance rates in 2015. Whether an incident was cleared by arrest, cleared by exceptional reasons, or not cleared was noted. Exceptional clearances refer to situations where an offender died prior to being arrested, a prosecutor declined a case, extradition was denied, a victim refused to cooperate, or a juvenile was responsible for the incident. Using the 2013 Rural Urban Continuum Codes (RUCC), counties were categorized based on geographic size and proximity to metropolitan areas, Tennessee's 95 counties were grouped into metropolitan counties (RUCC codes 1-3; n = 42), nonmetropolitan counties with an urban population (RUCC codes 4-7; n = 37), and completely rural counties or those with a population of less than 2,500 (RUCC codes 8-9; n = 16). Preliminary ANOVA analyses with post hoc comparisons using the Bonferroni test suggest that rural counties (M=73.0%, SD=18.1) had higher incidence clearance rates [$F(2,92) = 4.19$, $p = .018$], compared to both metropolitan counties (M=61.1%, SD=14.3, p =.024) and nonmetropolitan counties with urban populations greater than 2,500 (M=61.2%, SD=14.2, p =.029). Similarly, rural counties (M=71.9%, SD=18.3) had significantly higher rates of clearance by arrest [$F(2,92) = 9.29$, $p = .000$] than metropolitan counties (M=51.5%, SD=14.9, p =.000) and nonmetropolitan counties with urban populations greater than 2,500 (M=55.7%, SD=16.6, p =.004). In contrast, a nonparametric Kruskal-Wallis one-way ANOVA test yielded insignificant differences across the three groups with regard to exceptional clearance rates [$F(2,74) = 5.79$, $p = .055$]. Thus, initial findings reveal that overall clearance and clearance by arrest rates in rural areas differ from more urban locations. Additional analyses regarding county-level differences in incidence clearance rates across various types of offenses will be explored. Possible factors that may contribute to discrepancies across counties and future directions will be discussed.

77. PREVENTING TOBACCO ABUSE IN ADOLESCENTS: A PROGRAM FOR HIGH SCHOOL YOUTH

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Tobacco substance abuse in adolescent populations is a persistent public health concern despite recent massive-scale efforts to reduce the incidence of tobacco abuse in young people. This tobacco abuse is directly related to millions of cardiovascular disease, chronic lung disease, stroke, and cancer diagnoses every year in the adult population. While some areas have shown reduced rates of cigarette use, adolescents continue to abuse tobacco frequently and the use of electronic cigarettes has seen a significant increase in recent years. Rural regions, such as mountainous Appalachia, have an even higher incidence of tobacco abuse in adolescent populations. Because the vast majority of individuals begin using tobacco by the age of eighteen, prevention for high-school-aged adolescents has the most potential to reduce rates of tobacco substance abuse in adults. Therefore, the purpose of this study was to evaluate the need for an evidence-based tobacco abuse education program in a high school located in rural eastern Tennessee and assess the outcomes of the education after its introduction into the current curriculum. This study was a quasi-experimental quantitative design and featured two populations and multiple phases of research. A population of faculty and staff members completed needs assessments in order to determine their perceptions of tobacco abuse in the school and surrounding county as well as the need for additional educational intervention in the school. An interactive educational intervention was then developed and introduced into the freshmen curriculum with measures of learning and gauged perceptions of adolescent tobacco abuse. Finally, faculty and staff received an overview of the intervention and their insight into the potential success of the program was assessed. Results of this study demonstrated mixed opinions as to the success that additional education would yield for adolescents; however, the need for education and regional awareness was overwhelmingly indicated. Students demonstrated learning and over two-thirds of the student population would support legislation increasing the minimum legal age to purchase tobacco. These findings suggest that additional education, although cultural norms may harbor resistance, is needed in adolescent groups and would be supported by staff. Additionally, the majority of high school freshmen students would be willing to support increasing the legal age to purchase tobacco thereby limiting their own freedoms for the prospect of improving the nation's overall health. The use of this interventional education in other educational systems is possible for the future in order to encourage tobacco abuse prevention. Increase in education and awareness of adolescents has the potential to prevent future tobacco abuse and the millions of deaths each year associated with the abuse of tobacco products.

78. THE CHANGES OF STRENGTH AND CONDITIONING AFTER AGGRESSIVE IMPROVEMENT OF LIFESTYLE AMONG METHAMPHETAMINE USERS

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Introduction: Methamphetamine is a stimulant drug, which increases the amount of the natural chemical dopamine in the brain. Methamphetamine users have increased the risk for infection such as HIV and hepatitis B and C, psychiatric disorders such as anxiety and Parkinson's disease, and may have many other negative consequences such as sleeping problems, stroke, and kidney failure. Compared with the most common treatments for drug addiction-replacement therapy, the most effective treatments for methamphetamine addiction are behavioral therapies. The exercise was considered as an effective and efficient way in previous research for low drug-drug interactions, improving hormone regulation and increasing human fitness. However, the effect of the combination of exercise and enforced adoption of a healthy daily rhythms life in the duration of detoxification was seldom reported. The purpose of this study was to investigate the changes of strength and conditioning after aggressive improvement of lifestyle among drug users in China. Methods: There are 47 participants, who were methamphetamine users and undergoing detoxification, recruited in this study. In the first period, the participants were enforced to stay in the hospital to be inaccessible to any drug, and then they were admitted to the rehabilitation center in Datong, Shanxi. They were enforced to take unified lifestyles including exercise. Each participant was measured three times in terms of their strength and conditioning including 25 meters (m) running, ball thrown (m) and sit-strength (cm) to evaluate the synthetic effect of exercise and enforced adoption of a healthy daily rhythms life. Descriptive statistics, including mean and standard deviation, were reported. The repeated measurement approach was used to detect whether three items considered in this study increase or not over time. The Mauchly's test was used to evaluate the equality of variance between all pairs of these three-time points. The Huynh-Feldt correction was then applied if the assumption of equality of variance was not met. Paired t-test was used for further investigation if the significance was found. All analyses were performed with SPSS (version 23, IBM SPSS, Chicago, IL U.S.A), and a p-value<0.05 was used to indicate statistically significant. Results: The results indicated that the participants finished running for 25 m significantly shorter compared to the entry time ($p<0.0001$). Meanwhile, the distances of throwing at both intervention time and discharge time are significantly further than at the entry time ($p<0.001$). The mean of sit-strength at discharge time (mean=12.68 cm) is significantly greater than the entry time (mean=5.10). Conclusions: These findings suggested that drug users' strength and conditioning were significantly improved after the combined intervention of adopting healthy and regular daily life along with exercise. Compared with sole exercise intervention, lifestyle combined with exercise should be considered as a better alternative approach to shorten detoxification time and improve the quality of life.

79. COMMON BELIEFS AS TO CAUSE OF AUTISM AND CURRENT LEVEL OF EDUCATION PROVIDED BY HEALTH CARE PROFESSIONALS IN NORTHEAST TENNESSEE

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Autism spectrum disorders encompass a wide spectrum of developmental disorders. Over the last several years, there has been heightened awareness especially in the media and new diagnostic criteria which may have led to the increased pediatric prevalence of this disorder. With these new developments, there is concern as to whom is providing education to patients and whether they are receiving adequate education concerning autism spectrum disorders. The goals of this project were to explore the common beliefs of the female population in Northeast Tennessee as to the causes of autism and to analyze how much education patients receive on autism. This will ultimately allow for the creation of better educational material for patients. An eighteen question survey was given out to all adult female patients in the obstetrics and gynecology office. A total of 125 surveys were handed out and 122 were returned. The questions were analyzed to determine the current beliefs patients have concerning causes of autism and how much education if any concerning autism they receive and from whom. The results were then analyzed to determine the percentages of patient responses. Analysis showed that 51.6% of the patients who responded had been educated at some point on autism. However, only 4.9% of patients reported that their ob/gyn had provided education and only 7.4% reported that their pediatrician had provided that education. The media had been a source of education for 20.5% of patients. Of note, the only correlation between the questions that was significant was the following. The number of children a patient had was significantly correlated with ranking childhood vaccines as a cause of autism, $r = -0.26$, $p < 0.05$. This indicates that as number of children increased, the rank of childhood vaccination as a cause of autism also increased. Patients ranked unknown causes and genetics most frequently as the number one cause of autism. Physicians in general are lacking in providing education to patients concerning autism. Pediatricians are providing more education to patients compared to ob/gyn physicians and primary care providers. There is approximately half of the patient population served by providers in Northeast Tennessee that are not being provided any education on autism. More efforts need to be made to educate patients concerning autism.

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

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Sympathetic nerves have major roles in renal physiology and the pathophysiology of sepsis. Recent work has shown that rapid sprouting of sympathetic nerves occurs in the spleen of septic mice. This study was done to investigate effects of acute sepsis on renal morphology in mice and to test the hypothesis that sprouting of sympathetic nerves also occurs in septic kidney. Sepsis was induced in male C57BL/6 or *ChAT-eGFP* mice at 4-6 months of age by cecal ligation and puncture (CLP). Sham control mice underwent similar surgery without CLP. Both sham and CLP mice received a subcutaneous injection of resuscitation fluid (1 mL lactated Ringers) immediately after surgery. Mice were euthanized with isoflurane at 16 h post-surgery and the kidneys were removed for histological or biochemical evaluation. Serum was collected to measure levels of cystatin C, an indicator of renal function. Paraffin sections were stained with PAS or H&E. Digital images of PAS stained renal corpuscles were collected and used to measure area of the glomerulus and Bowman's capsule. ChAT-eGFP mice were used to evaluate sympathetic nerve density and screen for presence of eGFP+ non-neuronal cholinergic cells in kidney. Frozen, 100 μm longitudinal sections of kidneys were immunolabeled for the sympathetic nerve marker, tyrosine hydroxylase (TH), and for eGFP. Images of stained sections were collected by confocal microscopy and marker densities quantified using ImageJ. Bowman's space was significantly smaller in septic mice (Sham: 633 ± 92 and CLP: 304 ± 33 μm²; n=3 per group, $P<0.05$), and many cortical tubular cells had a bubbly appearance. Both of these results suggest acute renal pathology, however, cystatin C levels were not elevated (Sham: 376 ± 22 and CLP: 325 ± 11 ng/ml, n=6 per group, $P>0.05$). Acute sepsis did not affect sympathetic nerve density determined by confocal analysis or the abundance of TH determined by Western blotting. However, preliminary evidence indicates that renal levels of the sympathetic neurotransmitter, norepinephrine, are reduced in the kidney at 16 h post-CLP (Sham: 353 ± 25 and CLP: 129 ± 20.4 ng/g; n=6 per group, $p<0.0001$). While the kidney lacks cholinergic innervation, we were surprised to find that many tubular cells stained for eGFP, suggesting they might have a cholinergic phenotype. Acute sepsis did not affect either the density of GFP+ cells in confocal analysis or the abundance of GFP in Western blots. We conclude that septic mice, show only minor renal pathology in the early stages of disease. Furthermore, we found no evidence for noradrenergic nerve sprouting in the kidneys, whereas in a previous study, noradrenergic nerve density in the spleen more than doubled using the same model. This difference suggests that sprouting of sympathetic nerves is not a

general phenomenon in sepsis and may be limited to myeloid tissue. Further studies are needed to understand the mechanism and consequences of reduced norepinephrine in the kidney and to determine the role of cholinergic tubular cells in renal physiology and pathophysiology.

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81. NUTRITION STUDENTS' PERCEPTIONS OF THE ROLE OF SPEECH-LANGUAGE PATHOLOGISTS IN TREATING PEOPLE LIVING WITH HIV/AIDS

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Introduction. Human immunodeficiency virus (HIV) is a life-threatening virus, that if not treated can develop into acquired immunodeficiency syndrome (AIDS). Disorders in communication, hearing, and swallowing are universally associated with HIV/AIDS. The speech-language pathologist (SLP) has a vital role in the lives of PLWHA by providing assessment and intervention related to speech, language, cognition, and feeding disorders. Registered dietitians (RD) are also key members of the interdisciplinary team approach, as they assess and treat nutritional issues in PLWHA. Collaboration between these two professions could maximize the treatment provided to PLWHA. Method. This project explores nutrition students' perceptions of SLP and Nutritionists' role in healthcare needs of people living with HIV/AIDS (PLWHA) through survey research. A survey was developed based on an in-depth review of the current literature on HIV/AIDS and survey research. The survey was divided into four sections: demographic information, knowledge of HIV/AIDS, perceptions of treating PLWHA, and perceptions of interprofessional education (IPE). The survey consisted of twenty-seven questions, and the response format included yes, no, unsure, open-ended, and scaled questions. Forty-nine students that were enrolled in undergraduate and graduate Nutrition courses at East Tennessee State University in Spring 2016, were requested to participate in the study. Thirty-seven responses were obtained, yielding a response rate of 75%. Results indicated that participants had limited exposure to PLWHA, lack of experiential opportunities to engage or work with PLWHA, and received little education on PLWHA through their curriculum. However, the students were interested in receiving education regarding their role in treating PLWHA. In addition, the participants were determined to have a general to concrete awareness of the symptoms of HIV/AIDS that pertain to the areas of swallowing (e.g., aspiration risk, swallowing disorders, oral infections), food textures, and weight loss. The majority of the participants valued quality of life (QoL) as being important in PLWHA, which has significant implications for assessment and treatment of these individuals. Lastly, a high percentage (75%) of the nutrition students believed that the SLP had a role in treating PLWHA. Discussion. PLWHA experience an array of symptoms that necessitate a team approach with interprofessional collaboration. A team approach is crucial in planning assessment and intervention for PLWHA. The relationship amongst the team members contributes to serving PLWHA more holistically and efficiently. Based on the results of the current study and research findings regarding IPE a need was identified to improve healthcare options for PLWHA. The results indicate

that Nutrition students lack experience and education related to PLWHA and had decreased awareness of the symptoms PLWHA may endure. They showed an understanding of the importance of QoL and evidenced willingness to learn more about HIV/AIDS and the role of the RD and SLP in treating PLWHA. It is suggested that IPE addresses the topic of service provision to PLWHA. Various professionals' roles could be addressed by having joint classes. Sharing of expertise and perspectives to develop a plan of care for PLWHA to improve their QoL and health outcomes while combining resources will benefit both future professionals and PLWHA.

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82. THE EFFECT OF ALCOHOL CONSUMPTION ON ADIPOKINE SECRETION

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Introduction: The goal of this project was to establish the effect of alcohol consumption on adipose tissue-derived secreted factors; adiponectin and C1q TNF Related Proteins 1-3 (CTRP1-3). Alcoholic Fatty Liver Disease (AFLD) is caused by excessive alcohol consumption and is a leading cause of liver related mortalities, with currently no treatments available. Both adiponectin and CTRP3 have been shown to reduce excessive hepatic lipid accumulation, and CTRP1 and CTRP2 have both been linked to beneficial effects on lipid metabolism. Further, adiponectin has been shown to decrease with alcohol consumption. Therefore, we propose that excessive alcohol consumption will reduce circulating levels of not only adiponectin but other adipokines, specifically CTRP1-3. The deregulation of adipokine secretion can contribute to the development of hepatic insulin resistance, inflammation, and steatosis. Methods: To test the effects of alcohol consumption on adipokines, 12-week old female mice were fed a Lieber-Decarli alcohol diet (5% ETOH by volume) for either 10-days ending with a binge (chronic plus binge model) or for 6-weeks with no binge added (chronic model). Serum was collected from the mice and CTRP1, CTRP2, CTRP3, and adiponectin levels were examined by immunoblot analysis. Results: In response to the chronic plus binge model adiponectin and CTRP1 levels decreased and no change in CTRP2 or CTRP3 levels were observed. After 6-weeks of ETOH feeding there were still no differences in circulating CTRP2 or CTRP3 levels, however, adiponectin and CTRP1 levels were both increased. These results indicate that long-term alcohol consumption effects adipokine secretion in a specific manner. Further research will be needed to explore the physiological relevance of these findings, specifically, to determine if these changes are beneficial compensations to combat the negative effects of excessive alcohol consumption. Lastly, even though CTRP2 and CTRP3 levels were unaffected by chronic alcohol consumption, elevated CTRP2 and CTRP3 may still be beneficial in combating the progression of AFLD.

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83. EFFECT OF ETHANOL DIET ON THE CIRCULATING LEVELS OF MYONECTIN AND IRISIN

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Introduction: In this study, we aimed to characterize the link between ethanol consumption and the circulating levels of novel muscle-produced secreted factors, or myokines. Myonectin (also known as C1q/TNF-related protein 15) and irisin, the secretory product derived from Fibronectin type III domain-containing protein 5 (FNDC5) are newly discovered myokines with wide-ranging effects upon metabolism, inflammation, and tissue survival-signaling. Myokines can control a number of inflammatory and metabolic responses including reducing levels of free fatty acids and lead to the uptake of fatty acids in various tissues such as adipocytes and hepatocytes. Alcoholic fatty liver disease (AFLD) is a major co-morbidity associated with excess alcohol consumption and the leading cause of cirrhosis and liver-related deaths in the world. AFLD occurs when excess alcohol consumption leads to disruptions in hepatic lipid metabolism resulting in the excess accumulation of lipids in in the liver. Due to the potential role in the activation of hepatic lipid oxidation induced by myonectin and irisin we hypothesized that chronic alcohol consumption will result in reduced circulating myonectin and irisin levels, which would be a potential mechanism for the excessive lipid accumulation. Methods: To test this hypothesis, serum was collected from female mice after 6-weeks of ethanol feeding (Lieber-Decarli alcohol diet, 5% ETOH by volume) or calorically matched control diet. Western blot analysis was used to detect the presence of myonectin and irsin. Results: Our data demonstrated that neither serum levels of myonectin or irisin were reduced in the ethanol-fed mice. Although, our data demonstrate that lower myokine levels are not associated with ALFD, it remains to be determined whether increasing the levels of these myokines could stimulate lipid metabolism and prevent AFLD.

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84. IDENTIFICATION OF POTENTIAL REGULATORS OF AN INHIBITORY STRUCTURE WHICH REGULATES RSMA EXPRESSION IN PSEUDOMONAS AERUGINOSA

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Pseudomonas aeruginosa, a leading cause of respiratory failure in cystic fibrosis (CF) patients, is an important nosocomial pathogen. The posttranscriptional regulator, RsmA, in Pseudomonas plays a role in the expression of virulence factors, including virulence factors used in colonizing hosts. RsmA acts by recognizing an mRNA sequence and binding, thus inhibiting ribosomal attachment and preventing the translation of the message. This is a form of direct negative regulation. A proposed stem-loop structure in intergenic region upstream of rsmA completely disrupts rsmA production when formed in the mRNA, while without this structure; rsmA is produced at high levels. It is hypothesized that there could be a riboswitch or trans-binding sRNA (small RNA) that disrupts this structure and permits rsmA to be produced, allowing for the regulation of

genes involved in virulence, including biofilm production. Biofilm production commonly causes life-threatening complications in the lung of CF patients and is frequently composed of alginate. Alginate is an exopolysaccharide responsible for protection against the innate immune system. Additionally, P. aeruginosa has intrinsic antibiotic resistance. Overproduction of alginate leads to the mucoid strains associated with the chronic infection. Therefore a transposon mutagenesis was performed on P. aeruginosa reference strain PAO1 containing a transcriptional lacUV5rsmA-lacZ fusion. Mutants were screened via β -galactosidase assay and transposon insertions identified via arbitrary PCR. A possible regulator of this stem-loop structure, PA2771, an uncharacterized protein with diguanylate cyclase activity, was one significant transposon mutant identified via sequencing data. Because of its potential role in biofilm production, PA2771 was examined in a biofilm assay and found to be decreased compared to the PA01lacUV5rsmAlacz fusion and in a swimming assay, in which the PA2771 transposon mutant was decreased as well. Because rsmA plays a large role in the regulation of multiple virulence factors of P. aeruginosa, understanding this stem-loop structure and identifying possible disruptors of it is important. Elucidating this mechanism of rsmA inactivation could lead to potential new drug targets to help combat a Pseudomonas infection.

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85. EFFECTS OF LACTOBACILLUS RHAMNOSUS MRS6AN ON INTESTINAL LIPID ABSORPTION AND ACCUMULATION IN ENTEROCYTES

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Probiotic microorganisms have been shown to influence the digestion and absorption of various nutrients including lipids. Accumulation of triglyceride (TG) in enterocytes of the small intestine follows two specific absorption pathways: the monoacylglycerol acyltransferase pathway (MGAT) and an alternative glycerol acyltransferase pathway (GPAT). Triglycerides are the main constituents of body fat in humans and other animals derived from the esterification of glycerol and free fatty acids. In this study, we investigated the effects of Lactobacillus rhamnosus MRS6AN, an isolate from "amabere amaruranu" a Kenyan traditional cultured milk, on triglyceride accumulation and expression of GPAT3 in Caco2 cell enterocyte model. In the present study, we examined the effects of L. rhamnosus MRS6AN on lipid absorption mediated by glycerol-3-phosphate acyltransferase. Caco-2 cells were treated overnight with various bacterial cell extracts (cytoplasmic fraction, CF; filtered spent broth, FSB; heat inactivated bacteria, HIB) or with live bacteria (LB). Treated Caco-2 cells were further divided into 3 treatment protocols: Protocol 1 cells were directly overlaid with a lipid mixture without washing, Protocol 2 cells were washed in PBS then overlaid with the lipid mixture, while Protocol 3 cells were washed with PBS, overlaid with lipid mixture and fresh treatments. The cells were subjected to incorporated lipid content assays through triglyceride accumulation analysis assay and Oil-Red staining to determine the total lipid (TL) content. Total lipid and TG content were measured using absorbance OD505nm. Expression of proteins involved in lipid absorption was determined using immunoblotting. Compared to the controls, TL content in cells treated with LB or its FSB was reduced by 0.143 and 0.097, respectively, in Protocol 1 cells; 0.151 and 0.136,

respectively, in Protocol 2 cells; and 0.147 and 0.087 in Protocol 3 cells. HIB had no effect on TL content in Protocol 1 and 3 cells, but a slight reduction in Protocol 2 cells by 0.065. CF reduced TL in Protocol 2 and 3 cells by 0.08 and 0.093 respectively. Compared to the controls, TG accumulation in cells treated with LB or its CF was reduced by 0.05 and 0.02 respectively, in Protocol 1 cells; 0.10 and 0.05, respectively, in Protocol 2 cells; and 0.10 and 0.12 in Protocol 3 cells. HIB had no effect on lipid accumulation in Protocol 1 and 3 cells, FSB reduced TG in Protocol 3 cells by 0.08. Microsomal transfer protein (MTP) expression in cells treated with LB was reduced by 5.87 fold change and 4.92 fold change, respectively, in Protocol 2 and 3 cells. Data from this study suggest that L. rhamnosus MRS6AN strain may reduce lipid uptake and subsequent TAG accumulation in enterocytes.

Master's Candidates

❋ Biomedical and Health Sciences, Group B ❋

86. IDENTIFICATION OF "FHUA" LIKE RECEPTORS IN RHIZOBIUM LEGUMINOSARUM ATCC 14479 FOR "VICIBACTIN" TRANSPORT AND INVESTIGATION OF HEME BOUND IRON UPTAKE SYSTEM

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Iron is a very important element required for bacterial growth, gene regulation, TCA cycle, Electron transport, enzyme/toxin/RNA/DNA synthesis and many more. Rhizobium is in symbiotic relationship with the legume plants. This particular strain of Rhizobium as ATCC 14479 infects the red clover, Trifolium pretense and is required for atmospheric nitrogen fixation thus providing plants with the essential nutrients for plant growth and development, increasing the soil fertility on a long run. The free Iron available in the earth's crust is three times less than the amount of iron a bacteria has inside its body. In such case, bacteria produce a compound known as siderophore which are low molecular weight compounds for chelating iron (highest affinity yet known). Free Iron forms ferric complexes when there is oxygen and at physiological pH, and hence siderophores help to extract that iron and transport the free soluble iron inside the bacteria. A multicomponent protein complex is involved in this mechanism of iron transport. In E.coli, fhuA transports siderophore bound iron inside the cell in an energy dependent system, which is transduced by tonB/exbB/exbD complex. Relative rhizobial species have been reported to have fhuA as outer membrane receptor for iron transport but in some cases were found to be pseudo genes. The siderophore produced by Rhizobium leguminosarum ATCC 14479 is known as vicibactin. As "fhuA" is the known outer membrane receptor for transport of "hydroxamate type" siderophores in other bacteria like E.coli (for transport of siderophore ferrichrome), investigation in involvement of "fhuA" in this strain of Rhizobium was necessary as vicibactin is also a hydroxamate type siderophore. The FhuA gene is present in this strain also but the gene was no match with E.coli but the

structural analysis and protein comparison was surprisingly similar with E.coli fhuA. Next, level of expression was checked via SDS-PAGE and qRT-PCR. Both of them showed a good change in expression, also showed under-expression in case of high iron, suggesting that the protein is dependent of Iron. The gene has been successfully cloned in various vectors for different further assays. The expression level is also checked in E.coli BL21 (DE3). The site directed gene mutagenesis of the FhuA gene, via splicing by overlap extension (SOEing) is being carried out and performing various iron uptake assays will help us figure out the actual role of that deleted protein in siderophore mediated iron transport. On the other hand, bacteria are reported to uptake iron from other different sources as well. As rhizobales are surrounded by hemoglobin in the plant roots, which is leg-hemoglobin, they can show ability of transporting the iron from human hemoglobin as well. A whole new multicomponent protein complex HmuPSTUV has been found to be present and is being sequenced. We are carrying out a transposon mutagenesis and screening the mutants for hemoglobin bound iron uptake. Restriction/digestion and rescue cloning will be done after the interesting mutants are found. Also SDS PAGE showed regulation of various genes for hemoglobin bound Iron transport. We can conclude that the hemoglobin is taken as the iron source at the end.

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87. THE INFLUENCE OF LADS IN PSEUDOMONAS AERUGINOSA CHRONIC VIRULENCE

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Pseudomonas aeruginosa is an opportunistic pathogen that is capable of infecting all tissues of the human body and is a major concern for individuals who have cystic fibrosis, chronic obstructive pulmonary disorder, diabetes, have recently undergone surgery, or ventilator associated pneumonia (VAP). *P. aeruginosa* escapes the host immune response by expressing a myriad of virulence factors. Upon infection *P. aeruginosa* diversifies due to mutations in genes, such as *mucA* and *lasR*, in the cystic fibrosis lung due to the heavy inflammation from the immune response. Chronic isolates have been shown to express certain virulence factors like copious exopolysaccharide production, and antimicrobial resistance. The sensor kinase LadS has been shown to contribute to chronic virulence. We propose that LadS contributes to the expression of the small RNAs RsmY and RsmZ which influence chronic virulence in *P. aeruginosa*. We hypothesized that a Δ*ladS* mutant would have decreased *rsmY* and *rsmZ* expression. We constructed a Δ*ladS* construct in a suicide vector pEX18tc. From here we performed allelic exchange using the helper strain pRK2013 to create Δ*ladS* mutants in both our acute infection strain PAO1 and our chronic infection strain *mucA22*. Lastly, we investigated the expression of RsmY and RsmZ by using a transcriptional fusion for these small RNAs. In the Δ*ladS* mutants we observed increases in the expression of RsmY and RsmZ. In conclusion, LadS is not important in the expression of chronic virulence factors in both acute and chronic infecting strains. Further analysis is required to fully understand how this hierarchal system operates in *P. aeruginosa* and contributes to chronic virulence.

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88. DOES MICROGRAVITY INCREASE THE CHANCES OF FEMALE ASTRONAUTS DEVELOPING UTERINE CANCER?

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One of the main questions put forth by NASA and the European Space Agency (ESA) is whether or not an organism, especially mankind, can complete an entire life cycle in space. With this in mind it is essential to study the effect of spaceflight on reproductive tissues. There are two factors involved with spaceflight that are dramatically different from conditions on Earth. The spaceflight environment is one of very low gravity (microgravity) and of relatively high levels of radiation compared to that on Earth. Spaceflight has been shown to have effects on many different tissues of the body. It is unknown whether those effects are due to the microgravity of spaceflight, the elevated levels of radiation, or a combination of the two. It is well known that radiation can alter/damage DNA and lead to the formation of cancer. Therefore it is reasonable to assume that extended duration spaceflight would result in extended levels of radiation that could lead to various forms of cancer. Our study is designed to look for the correlation between microgravity and radiation exposure and incidence of uterine cancer. Using simulated microgravity techniques and whole body radiation we propose to determine if females subjected to the spaceflight environment have increased incidences of uterine cancer. And if so, which variable, or variables are responsible for this increase. Our hypothesis is that radiation will induce the formation of uterine cancer, and that microgravity conditions will exacerbate the cancerous condition. To test our hypothesis 6-month-old C57 BL/6 female mice were randomized into 4 groups (6/group) as follows: age-matched controls, low-dose-rate (LDR) γ-irradiation, unloading with tail suspension (simulated microgravity), and LDR + tail suspension. Using 57C0 plates (0.04Gy at 0.01cGy/h) radiation was delivered to the whole body of mature 6-month-old adult C57 BL/6 mice (n=4-6/group) to simulate the LDR component of spaceflight. Anti-orthostatic tail suspension was used to model the unloading, fluid shift, and physiological stress aspects of the microgravity component. Mice were hindlimb suspended and/or irradiated for 21 days. This experiment was repeated 3 times with 1 changing variable. In the first run of the experiment the animals were allowed to live for 9 months post irradiation. In the second run of the experiment the animals were allowed to live for 4 months post irradiation. For the third run animals lived for 1 month post irradiation. To date we have been working with the uterine tissue from the 9 month survival group. Our first set of data will be Western Blot analysis of the uterine tissue to determine the presence of AKT which is a protein that is upregulated in cancer cells. This will be followed with immunohistochemical staining to determine which of the uterine cells are cancerous. The presence of and severity of the uterine cancers will be compared across all treatment groups. These experiments will provide valuable insight into what duration of spaceflight would be considered safe with regard to the female reproductive system.

89. POSTNATAL CELL SHAPE DEVELOPMENT OF THE CORNEAL ENDOTHELIUM IN MICE

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The cornea endothelium consists of a monolayer of epithelial cells, derived from the neural crest, which forms the inner boundary of the cornea. Recent studies have shown that adult endothelial cells possess a uniform polygonal shape at their apical surface and a complex multipolar shape at their basolateral surface (Harrison et al., 2016). Our experiments focus on establishing a timetable to study morphological changes of corneal endothelial cells in postnatal mice to understand how the complex shape of endothelial cells arise. Transgenic mice were gotten from breeding heterozygous P0-Cre mice strain with heterozygousR26-tdtomato reporter mice strain. Animals were sacrificed at different timepoints between postnatal day 1 and 18 and examined using fluorescence confocal microscopy to assess these changes. To observe shape changes at the apical and basolateral surfaces, cells were stained with antibodies specific for ZO-1 protein and NCAM, respectively. Morphometric analysis using Image J was done on images gotten at the different time points. Our results show that a significant cell shape change between postnatal day 8.5(P8.5) and 16.5(P16.5) during which period the eyelids are known to open and this shape continues to grow complex until maturity where transparency is fully ensured. Vivid shape changes were observed at P12.5 and P16.5 with significant difference in shape development from the periphery to the center. Morphometric analysis also shows increases in cell area with an increase in age.

90. THE NARRATIVE SKILLS OF CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT AND TYPICAL LANGUAGE

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Purpose. The purpose of this research project was to compare the narrative content organization (macrostructure) of young children with specific language impairment (SLI) and those with typical language development (TL). While it is well-known that young children with SLI display poorer use of grammar (microstructure) than their TL language similar peers (Leaonard, 2014; Rice et al., 1998) less is known about their use of macrostructure. Thus, the research question was: What are the narrative skills of children with SLI as compared to their language similar peers with development TL? Based on research with older children (Gillam et al., 2016), it was hypothesized that children with SLI will have poorer narrative macrostructure of narratives than those with TL. Method. The experiment compared 6 children with SLI (mean age: 5 years, 2 months) and 8 language similar children with TL (mean age: 4 years, 8 months). Language equivalency was determined based on administration of the Clinical Evaluation of Language Fundamentals-Preschool-2 and the Rice/Wexler Test of Early Grammatical Impairment. As well, all the participants passed a hearing screening and performed in the average range on the Preschool Test of Nonverbal Intelligence. Researchers read two books, Gossie and Gossie & Gertie (Dunrea, 2002, 2002) to each child. After reading each book, the child retold the story while looking through the pictures as a guide, yielding 12 SLI samples and 16 TL samples. The stories were audio-recorded and transcribed using a consensus method of reliability. Researchers then coded the stories for presence and quality of the following components: Character, Setting, Initiating Event, Internal Response, Plan, Action/Attempt, and Consequence. Once coded, the components were then scored on a 3-point scale using Gillam et al. (2012) narrative development progress-monitoring tool. Results and Conclusions. First, outcomes of the two stories were compared using an ANOVA design with Story Components and Story as within group factors. Because Gossie & Gertie had one more character than Gertie, it naturally scored significantly higher on Characters. Otherwise, the stories did not reliably differ and were combined for further analysis. Next a mixed model ANOVA design with Story Components as a within group factor and Group as a between group faction was conducted. The results indicated no statistically significant main effects or interactions. The findings did not support the hypothesis, suggesting that the narrative skills of children with SLI are equivalent to their language similar peers with TL. It may be as children get older and their narratives become more complex, children with SLI begin to fall further behind yielding the differences reported in the literature. This project prompts future questions about narrative macrostructure skills of young age-matched children with SLI and TL and use of macrostructure skills in more complex stories.

91. PPAR-ALPHA INTERPLAYS WITH CYP2A5 TO REGULATE HIGH FAT DIET-INDUCED METABOLIC SYNDROME

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Background/Aims: PPAR-alpha is a chief regulator for lipid metabolism in the liver. PPAR-alpha works as a sensor of fatty acid and regulates fatty acid oxidation and glucose homeostasis. Fibroblast growth factor 21 (FGF21), a new metabolic regulator, is mainly produced in liver and regulated by PPAR-alpha. FGF21 can lower blood glucose levels and enhance effects of insulin on blood glucose levels. Overexpression of FGF21 is capable of protecting mice from diet- induced obesity. CYP2A6 (CYP2A5 in mice) is mainly expressed in the liver. CYP2A6 expression is increased in patients with alcoholic or non-alcoholic fatty liver. Alcohol feeding induced CYP2A5 in mice and alcohol-induced fatty liver disease was enhanced in CYP2A5 knockout (cyp2a5-/-) mice, suggesting a protective effect of CYP2A5 on alcoholic fatty liver disease. Very interestingly, both PPAR-alpha and FGF21 were upregulated in cyp2a5-/-mice. In this study, we examine whether CYP2A5 interplays with the PPAR-alpha-FGF21 to regulate hepatic lipid metabolism and glucose homeostasis. Methods: The cyp2a5-/- mice, PPAR-alpha knockout (ppara-/-) mice, and CYP2A5 and PPAR-alpha double knockout (ppara-/-/cyp2a5-/-) mice were applied in this study. Body weight change and blood glucose levels were observed in mice models after being fed high fat diet (HFD). The body weight was measured weekly. Glucose tolerance test (GTT) and pyruvate tolerance test (PTT) were performed after 10 weeks of HFD feeding. The mice were sacrificed after an overnight fast. Blood was collected for FGF21 measurement. The liver samples were used for pathological evaluation and biochemical assays. Results: After 10-week HFD feeding, body weight was increased in cyp2a5-/- mice to a greater extent than in cyp2a5+/+ mice. The cyp2a5-/- mice fed HFD also showed elevated blood glucose levels. GTT suggests that cyp2a5-/- mice were intolerant to glucose. Pathological evaluation suggests that HFD-induced fatty liver was more pronounced in cyp2a5-/- mice than in cyp2a5+/+ mice. As we observed before, basal expression of hepatic PPAR-alpha and blood FGF21 levels were higher in cyp2a5-/- mice than in cyp2a5+/+ mice, but HFD feeding did not increase PPAR- alpha and FGF21 in cyp2a5-/- mice while PPAR-alpha and FGF21 were induced in cyp2a5+/+ mice. To examine the possible role of PPAR-alpha-FGF21 in the enhanced HFD-induced metabolic syndrome in cyp2a5-/- mice, we created ppara-/-/cyp2a5-/- mice. The littermates (ppara +/+/cyp2a5-/-) were used as control. Due to the absence of PPAR-alpha, serum FGF21 was almost undetectable in ppara-/-/cyp2a5-/- mice, confirming the regulating role of PPAR-alpha in blood FGF21. After HFD feeding, ppara-/-/cyp2a5-/- mice gained less body weight than ppara +/+/cyp2a5-/- mice did. However, HFD-induced fatty liver was more severe in ppara-/-/cyp2a5-/- mice than ppara +/+/cyp2a5-/- mice. GTT and PTT suggest that glucose homoestasis was more susceptible to interruption in ppara +/+/cyp2a5-/- mice than ppara-/-/cyp2a5-/- mice. Conclusion: HFD-induced body weight gain, hyperglycemia, and fatty liver were more severe in cyp2a5-/- mice, suggesting that CYP2A5 is protective against metabolic syndrome. After HFD feeding, ppara-/-/cyp2a5-/- mice exhibited less body weight gain and blood glucose elevation but more severe fatty liver compared with ppara +/+/cyp2a5-/- mice, suggesting that PPAR-alpha may interplay with CYP2A5 to regulate HFD-induced metabolic syndrome.

92. PREVALENCE OF DIABETES IN U.S. VETERANS: FINDINGS FROM NHANES 2005-2014

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Background: Diabetes is the seventh leading cause of death in the United States. More and more people have suffered from diabetes and its serious complications including heart disease, blindness, etc. The U.S. Department of Veterans Affairs (VA) reported that nearly 25% of veterans, enrolled in the Veterans Health Administration (VHA), have diabetes, which is much higher than the general population. Objective: This study aimed to estimate the prevalence of diabetes in the U.S. veterans using the up-to-date National Health and Nutrition Examination Survey (NHANES) data since VHA has a relatively low coverage (less than 30% of veterans each year were enrolled). Methods: Five biennial cross sectional surveys (NHANES) from 2005-2014 were used in this study. Total 2,940 veterans were included to estimate the prevalence of diabetes. Total diabetes was defined as any participant who had at least one of four conditions: (1) a hemoglobin A1c at least 6.5%, (2) fasting plasma glucose (FPG) at least 126mg/dL, (3) a 2-hour plasma glucose (PG) at least 200mg/dL, (4) diagnosed with diabetes by a doctor or other health professional. Results: The overall prevalence of total diabetes (including diagnosed and undiagnosed diabetes), undiagnosed diabetes and obesity were 20.54%, 3.37% and 40.68%, respectively. The family poverty level and education were significantly associated with the presence of diabetes with p=0.005 and 0.03, respectively. Highest prevalence diabetes and obesity existed in veterans aged 65yrs and over and 45-64yrs, respectively. The overall prevalence trend of diabetes significantly increased from 15.52% (95%CI: 12.36-18.68%) in 2005-2006 to 20.54% (95%CI: 15.92-25.17%) (p=0.04 for trend test) and prevalence significantly increased in male veterans (p=0.04) and those who did not finish high school education (p=0.04) and who had college education (p=0.03). Conclusion: In 2013-2014, the estimated prevalence of diabetes was 20.54% among U.S. veterans, with higher prevalence among participants who were 65 years old or older, and had low socioeconomic status (including less education and poverty status).

93. ROLE OF NANOPARTICLES IN VOLTAMMETRIC SIGNAL ENHANCEMENT EXHIBITED BY LAYER-BY-LAYER GOLD NANOPARTICLE-MODIFIED SCREEN-PRINTED CARBON ELECTRODES

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Screen-printed electrodes (SPEs) have found wide use as sensing platforms due to their simple fabrication, customizability in terms of geometry and composition, and relatively low cost of production (especially for carbon-based SPEs, i.e. SPCEs). Nanoparticles have often been incorporated in or interfaced with SPEs in order to improve sensor response or provide electrocatalytic capabilities. Though nanoparticle-containing or nanoparticle-modified SPEs are becoming increasingly common sensing platforms, the benefits provided by nanomaterials are often demonstrated through voltammetric studies with common redox probes, such as ferricyanide. However, reports have documented the ferri-/ferrocyanide redox couple to be an unreliable system for characterizing some carbon-based electrodes due to its surface sensitivity. Here, we investigate the voltammetric responses of ferricyanide and other redox probes on bare and gold nanoparticle (AuNP)-modified SPCEs to determine the potential role of AuNPs in improving sensor response through electrochemical signal enhancement. Strategies for more complete characterization of AuNP-modified SPCEs are also explored. In addition to clarifying the role of AuNPs for these particular nanostructured SPCEs, studies here may also extend to observations made based on the ferri-/ferrocyanide redox couple with other nanoparticle-modified SPEs in a way that can lead to more informed strategies for preparing nanoparticle-modified electrochemical sensing platforms and thus better sensors.

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94. 3D-printed flow cells

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Biomarkers are measurable indicators of health status or disease state that can be used for diagnosis and may help guide patient treatment strategies. Biomarkers for cancer include proteins and DNA mutations related to uncontrolled cell growth. Many clinical tools and techniques currently used for measuring proteins lack sensitivity, demand high analysis cost, are often not well-suited for measuring multiple biomarkers in a single sample, and require long analysis times. Here, a simple, low-cost, 3D-printed flow-through electrochemical sensing device, which should provide an inexpensive, robust platform for measuring protein biomarkers. Flow-through devices are fabricated from photocurable

resin using a desktop digital light processing projector-based 3D printer to produce 500-800 um square cross-sectional fluidic channels. The design includes threaded ports at the ends and center of the channel for connecting commercially available fittings and tubing for fluid delivery as well as simple electrodes for electrochemical measurements.

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95. HEAVY METAL CONCENTRATIONS IN SURFACE WATER: WASTE TRANSFER STATION AND LANDFILL PROXIMITY EFFECTS TO CASH HOLLOW CREEK IN JOHNSON CITY, TN

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Landfills and waste convenience centers house solid wastes that can be sources of toxic pollutants, including heavy metals. When landfills and waste transfer stations are located immediately adjacent to water sources, the potential for metals contamination and subsequent human exposures are increased. To determine the heavy metal concentrations in Cash Hollow Creek, water samples were collected from Cash Hollow Creek near the Cash Hollow Convenience Center once a week for four weeks in the month of October. Sampling sites chosen included a tributary stream that runs adjacent to the convenience center and intersects Cash Hollow Creek, an upstream site approximately 20 m upstream from the stream/tributary junction, and another site approximately 20 m downstream from the intersection. The samples were then analyzed by inductively coupled plasma-mass spectrometry to determine the concentration of the following metals: arsenic, cadmium, lead, mercury, copper, and iron. Results showed that of the metals tested, only iron and arsenic were detectable above the practical quantitation limit. Iron was the only metal tested with a concentration high enough to be of concern. Future testing should continue to focus on heavy metals, particularly in sediment where metals often accumulate, and expand to include organic contaminants of concern associated with the waste transfer station and landfill.

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96. BIOCHEMICAL CHARACTERIZATION OF SIP470, A LIPID TRANSFER PROTEIN, AND ITS ROLE IN STRESS SIGNALING

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Plants are constantly challenged with environmental (abiotic) and biological (biotic) stressors that may result in a defensive chemical response. Salicylic acid (SA) is an important plant hormone and a signal molecule that responds to hemi/bio-trophic pathogenic challenge. Salicylic acid-binding protein 2 (SABP2), an esterase-like enzyme, catalyzes the conversion of inactive MeSA into an active SA for defense responses

(Kumar and Klessig, PNAS, 2003; Forouhar et al. PNAS, 2005). SA binds to the SABP2 in its active site and modulates its enzymatic activity. An accumulation of SA has been shown to induce systemic acquired resistance (SAR), a form of immunity upon secondary pathogen challenge produced by pathogen recognition receptors. To learn more about the role of SABP2 in protecting plants through SAR, a yeast two-hybrid screening was performed using SABP2 as a bait and tobacco cDNA library as the prey. This screening identified several interacting proteins of SABP2 Interacting Proteins (SIP), including SIP470. SIP470 is a lipid transfer protein (LTP) (Chapagai 2014). LTPs are ubiquitous in plants and have multiple roles including cutin biosynthesis, surface wax formation and pathogen defense responses. With both SA and SABP2 having some form of direct role in the defense mechanism, it is predicted that SIP470 likely has a role in pathogenic responses. To test this hypothesis, Arabidopsis knockout mutants lacking SIP470 homolog protein were analyzed for their response to pathogens. The mutant plants showed no effect in inducing SAR but showed an effect in basal resistance. Since SIP470 was originally identified in tobacco plants, it is prudent to study its role directly in tobacco plants. Towards this, transgenic tobacco lines that are silenced in SIP470 via RNAi have been generated and are ready to be analyzed for their response to pathogen challenge. The overexpressors transgenic lines of SIP470 also have been generated. These lines are under the control of an estradiol inducible promoter. These plants will be screened and tested for their response in basal resistance and in SAR. Because LTPs are also known to have a role in environmental stress in plants, abiotic stress tests are also being conducted. For abiotic stress tests, the transgenic plants will be treated with mannitol (osmotic stress), NaCl (salinity stress), abscisic acid (stress hormone) and hydrogen peroxide. To learn more about this protein, the biochemical analysis is also being conducted. Thus far, analysis has confirmed that SIP470 is a lipid binding protein. An eGFP fusion with SIP470 protein has been created to study the subcellular localization of SIP470 in tobacco cells.

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97. CRYSTALLIZATION OF A FLAVONOL-SPECIFIC-3-O GLYCOSYLTRANSFERASE FOUND IN GRAPEFRUIT

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Citrus and other fruits produce secondary metabolites that are synthesized, regulated, and modified in part by a class of enzymes called glycosyltransferases. This class of enzymes is of substantial interest to this lab due to their unique structural and functional properties. Glycosides of flavonoids produced by glycosyltransferases have emerged in recent years as a critical part of plant metabolism, thus impacting every aspect of their growth, cultivation, production, and utilization. One such glycosyltransferase, found in Duncan Grapefruits (Citrus paradisi), was previously identified, recombinantly expressed, and shown through biochemical characterization to exclusively glycosylate the flavonol class of flavonoids. The structural basis that accounts for a glycosyltransferase's selectivity has been determined by protein crystallization in other labs, yet no structural basis currently exists for the specificity exhibited by this flavonol-specific glycosyltransferase. Currently, the WT enzyme and two mutants were expressed in E. coli, where they underwent site-directed mutagenesis to insert thrombin cleavage tags for removal of

protein purification vectors, with the goal of transforming into yeast for adequate protein production. Subsequent purification and crystallization screens will allow for formation and acquisition of glycosyltransferase crystals, whose x-ray diffraction patterns will be decoded, thus revealing the enzyme's complete structure. We hypothesize that obtaining a crystal structure for this enzyme will illuminate the structural basis of its specificity. Additionally, we hypothesize that a thrombin- cleavage gene vector inserted for removal of purification tags will have no impact on enzyme activity or specificity.

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98. IN SEARCH OF THE PEOPLE WHO LIVED HERE BEFORE: USING ARCHAEOLOGICAL GEOPHYSICS AND TEST EXCAVATIONS AT A TENNESSEE STATE HISTORIC SITE

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Carter Mansion is a State Historic site where Tennessee's oldest frame house, built in the 1770s, still stands. Tourists who visit the site learn a great deal about Tennessee's history and the Carter family's prominent status within the region, but little about who lived there prehistorically. We know from surface artifacts and decades-old excavations that the site also holds a prehistoric component, which may be vital for understanding Native American settlement and coalescence in the region. Our research in the broader region suggests that there may be a significant piece of Cherokee history here; however, more evidence is needed. Thus, we set out to examine the site with funding from the Tennessee Historic Commission. An extensive geophysical survey of the property was conducted using ground-penetrating radar (GPR), magnetometry, and electromagnetic induction (EMI). These geophysical techniques allow us to locate and identify subsurface archaeological features prior to excavation. Our survey goals were to (1) evaluate an existing map of the historic structures that have since been lost, and determine their level of preservation, (2) search for evidence of prehistoric occupation, particularly houses and associated features of habitation, and (3) locate unmarked prehistoric and historic graves. This required careful survey of the property in 10 x 10 m squares in order to navigate around the mansion and other landscape features (trees, gardens, historic cemeteries). Several historic and prehistoric features were identified in the geophysical data, including the remains of the Carter family's barn, prehistoric fire pits, and Native American burials. Unfortunately, no prehistoric houses were visible. However, ground-penetrating radar proved to be especially useful, allowing us to differentiate between prehistoric and historic occupations and identify burials. Test excavations followed the geophysical survey. Here we targeted potential prehistoric features to obtain Accelerator Mass Spectrometry (AMS) and Optically-Stimulated Luminescence (OSL) samples for dating, and to increase our knowledge and understanding of the Carters Native American predecessors. Based on the artifacts recovered and dates obtained, Native Americans occupied the site from approximately AD 1500-1770. Although the date range is much later than expected, it does correspond to similar Mississippian sites located on the Watauga and Nolichucky rivers confirming our ideas of regional coalescence.

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99. THE ROLE OF BIOGENIC AMINES ACROSS BEHAVIORAL CONTEXTS IN THE FUNNEL-WEB SPIDER, AGELENOPSIS PENNSYLVANICA

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Biogenic amines (BAs) are neurotransmitters which have been consistently linked to behaviour. Many of these studies investigate BAs in only one behavioural context and few have tried to assess the underlying roles of BAs in cross-contextual behavioural syndromes. Because spiders are ecologically dynamic, acting as both predator and prey, they offer a novel model system in which to investigate the effects of BAs on behaviour. For this study, we analyzed temporal patterns of antipredator behaviour (boldness) and latency to attack (aggression) in female Agelenopsis pennsylvanica, a funnel-web spider. Behaviour was then compared to temporal patterns of octopamine (OA) and serotonin (5HT), two catecholamines known to influence aggression/wariness in invertebrates. Preliminary data suggest that boldness, aggression, and catecholamine levels cycle with time of day. Additionally, these variables were found to be statistically significant in regards to individual behaviour between several of the time points. Further research is needed to confirm these findings as well as determine the role catecholamines serve in influencing behaviour.

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100. URBAN EXPANSION IN NAIROBI, KENYA (1986 – 2016) USING REMOTE SENSING TECHNOLOGY

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Nairobi, Kenya, like many cities in Africa and around the world, has experienced dramatic growth in recent decades. In most cases such growth is a sign of economic advancement, but at the same time can cause problems with environmental conservation. The study objective was to assess the city's use of land cover and to analyze the changes over a period of 30 years (1986 to 2016). Data used for this study was the Landsat 5-TM

image data taken on January 5, 1986 and Landsat 8 image data taken on January 24, 2016, acquired from the USGS Earth Explorer website. The images were plugged into the TerrSet remote sensing software for processing satellite image data. False color composite of the images was performed to show multiple clusters representing the land cover. Unsupervised classification method was used to assess the changes and conversion in land cover types. A cross-tabulation of the result from unsupervised classification was done to calculate the areas of change in the land cover over the period. Significant changes were observed as residential and commercial areas increased at the detriment of water cover, forest, grassland and green vegetation. Results from the crosstab show that a total of 174,324,600 m2 of the green vegetation, grassland and forest had changed into residential and commercial areas with the most used up being the grassland. About 93,202,200m2 of the grassland area converted into residential area, while 47,603,700m2 of the same changed into commercial area (business, roads and infrastructure). Most of the areas classified as covered by water were also converted into some residential and grassland areas while low cost housing area (slum) grew tremendously. The results could be beneficial to governments and other similar countries and could be a guide in urban policy and planning. It could also provide useful insights in preservation of the environment and natural resources.

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101. METAGENOMICS REVEALS MICROBIOME ASSOCIATIONS WITH PERSONALITY IN A SOCIALLY POLYMORPHIC SPIDER, ANELOSIMUS STUDIOSUS (ARANEAE: THERIDIIDAE)

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Our fundamental understanding of an individual organism is changing as we recognize that phenotype is not only affected by the individual's genotype, but also by the vast microbial community the individual supports. The unifying concept of endosymbiosis and the ‘holobiont' is that the interaction of the microbial community and the host's biology can affect myriad processes from speciation to gene to physiology to behavior. The goal of this study was to explore the role of the microbiome as a potential facilitator of the rapid evolution of social behavior in a socially polymorphic species of spider, Anelosimus studiosus. Adult female A. studiosus were collected from solitary and social colonies two sites in east Tennessee and behaviorally assayed to assign individuals to the ‘docile' or ‘aggressive' phenotype. The microbiomes of individuals of each phenotype from both locations were analyzed by 16s rRNA sequencing. Docile phenotype spiders had significantly lower microbial species richness than aggressive spiders, though species evenness did not differ between phenotypes. Principle components analysis of sequence reads found significant separation by location along PCs 2-3, and significant separation between personalities along PC3. Notably, the intracellular endosymbiont Wolbachia was dominant in the microbiomes of spiders from Melton Hill, and significantly more abundant in aggressive spiders. At Warrior's Path, however, the intracellular

endosymbiont Rickettsiella was dominant and significantly more abundant in aggressive spiders. While causation has not yet been established, these data suggest that aggression in these spiders may be affected by their microbiome and, thus, may represent a source of heritable variation on which selection can act.

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102. WASPS 2.0: MODELING POLISTES DOMINULA NEST CONSTRUCTION

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Biologically-inspired algorithms are found in many fields, including robotics, algorithm construction, artificial intelligence, and artificial life. In previous work (Karsai and Penzes, 1993) that investigated social wasp nest-building behaviors, nests of P. dominula were modeled on a two-dimensional grid of hexagonal cells. Our goal was to extend this earlier model with a hexagonal coordinate system. This study simulated P. dominula nest construction through mapping generated nest structures to hexagonal and rectangular coordinate systems. Plotting hexagonal cells on a rectangular coordinate system includes a v3 coefficient for one dimension due to the 30-60-90 triangle formed between hexagonal cell centers. Hexagonal coordinate systems use three axes in two dimensions. Each axis is separated by 60° and ordered triples of integers indicate hexagonal cell centers. To compare both coordinate systems, two programs were created: a nest generation utility and a graphical utility to visualize nests mapped to both coordinate systems. All nest permutations for nests sized N<9 cells were generated and mapped to hexagonal and rectangular coordinates. Distinct permutations were found using compactness numbers (the sum of distances from a nest's center of mass to the center of each cell) calculated from coordinates of both systems. Rectangular and hexagonal coordinates resulted in the same number of distinct nest configurations for N<9, including 324 distinct permutations for N=7 and 1377 distinct permutations for N=8. The ratio between compactness numbers calculated with rectangular coordinates and hexagonal coordinates was v2/2:1 for all distinct permutations N<9. Further investigations into P. dominula nest construction behaviors will include mapping modeled nest structures to hexagonal coordinates for comparison with real nest structures.

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103. EMERGENT PROPERTIES IN COMPETITION AND PREDATION

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Within a population, individuals act independently causing differing dynamics. Coexistence and competition through observable population fluctuations are emergent properties inside of an agent based model. Carrying capacity and other blanket population constants are unnecessary. Interactions between predator and prey entities are modeled in a dynamic way. Each agent is programmed to seek out a persistently fluctuating energy sources imposed by population size and location of consumer group(s). Consumer collected energy is transferred to predators through predation. The energy level of the predator and prey entities dictate if the entity reproduces. The model, as a baseline, seeks to test four distinct hypotheses: 1) Extinction of two consumers with the same life history will happen independent of the energy influx in the system. 2) Extinction between one of the two consumers with non-identical life histories will happen faster than in one. 3) Behaviors that lead to niche partitioning or differences in resource use will lead to slower extinction in the presence of one or more predators indicating greater coexistence. 4) Emergence of niche partitioning through a change in resource use between consumers will increase the number of predators in the model. A model was built with three distinct entities: producer, consumer, and predator. The producers were given a starting value and reproduced at a consistent rate. Two identical consumer groups were entered into the model and allowed to access the producers at the same rate. The characteristics of one consumer entity was then changed to create niche partitioning. Influxes of energy were manipulated and the survival rate of the two consumer entities and the predator entity were measured. Two consumers groups with the same life history become extinct at the same rate independent of the energy influx to the system. Through modeling small changes to entities' individual traits survival of both predators and consumers is affected. Changes in speed between the two consumer groups causes variable survival rates based on the amount of energy available to the system. Environments rich in energy cause larger and slower entities to better survive because they have more surface area allowing them to find food easily. Models with low levels of energy available to the entities offer smaller faster entities better survival than larger slower entities. The introduction of a predator entity into the dynamics between the two prey groups lead to better survival durations in both groups of consumers. This suggests better coexistence between the two consumer groups. When entities use the energy in the model more efficiently the number of predators increased. The simple models created simulated general real-world systems. The tipping point in population size, leading to extinction, is validated through comparison to known systems. Validated models allow scientists to make predictions about real world outcomes. The addition or subtraction of certain traits help assess characteristics that lead to better outcomes for a population. With the growth in agent based models, scientists test more informed hypotheses and expedite the scientific inquiry into population dynamics.

104. CHARACTERIZATION OF SIP68, A GLUCOSYLTRANSFERASE PROTEIN AND ITS ROLE IN PLANT STRESS SIGNALING

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SIP68 is a SABP2-interacting protein identified in a yeast two-hybrid screen. It interacts with one of the important plant protein, SABP2 which catalyzes the conversion of methyl salicylate to salicylic acid. Salicylic acid is one of the important plant hormones that provides defense at both local as well as distal uninfected plant organs known as Systemic Acquired Resistance (SAR). SIP68 was characterized as UDP-glucosyltransferase (UGT). UGT catalyzes the formation of a glycosidic bond by transferring glycosyl moiety from an active donor to an acceptor molecule. Plants UGT are involved in many important plant functions like detoxification, stabilization of pigments, maintaining cellular homeostasis, cell wall biosynthesis etc. Since SABP2 has a role in plant defense and UGT are involved in many important plant processes, there is the possibility of a role for SIP68 in plant abiotic and biotic stress signaling. SIP68 was previously cloned and expressed in E. coli and Pichia pastoris. The study showed recombinant SIP68 glucosylates flavonols (kaempferol, quercetin, gossypetin, fisetin), flavanones (hesperetin, naringenin), flavones (apigenin, luteolin,), and isoflavones (4-acetone-7 Hydroxy-6-methoxy-isoflavone) with varying degree. The highest activity was detected with kaempferol followed by quercetin while no significant activity was observed in reactions involving azelaic acid and the simple phenolic compounds benzoic acid, SA, p-hydroxybenzoic acid, and MeSA. Further, HPLC was used to verify the results using kaempferol, quercetin, naringenin, hesperetin and SA as acceptor which confirmed that SIP68 as a flavonoid UDP-glucosyltransferase and not an SA glucosyltransferase. Our aim is to assess the role of SIP68 in abiotic and biotic stress signaling in the plant. One of the approaches is to alter the expression of SIP68 in the plant. For this newly discovered CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) Cas9 technique will be used which helps us in efficient gene editing, knockout, activation and repression of our gene of interest. Plants with altered SIP68 expression will be analyzed for their response to pathogen infection and environmental stress. We also aim to localize SIP68 inside tobacco cell using fluorescent protein (eGFP) fusion. Our research will help us to add another clue in understanding the plant defense as well as localization of our protein of interest inside the plant cell. This project will also help us to adapt the newly discovered technique of gene editing (CRISPR/Cas9) for the first time in our lab at ETSU.

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105. BIOCHEMICAL CHARACTERIZATION OF TOMATO FATTY ACID AMIDE HYDROLASE

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N-acylethanolamines (NAEs) are present in wide range of organisms and belong to family of functionally diverse signaling lipids. They consist of a fatty acid with varying chain lengths and ethanolamine linked via an amide bond. The level of NAEs is modulated by their hydrolysis to ethanolamine and fatty acid by an enzyme fatty acid

amide hydrolase (FAAH). FAAH is an integral membrane protein that belongs to "amidase signature" superfamily of proteins, which is characterized by highly conserved region rich in serine, glycine and alanine. FAAH directly or indirectly plays a role in modulation of various physiological processes by regulating NAE levels. Although the role of NAEs and its key modulator FAAH has been studied in other plants, their role in tomato model is limited and unknown. More recently, SlFAAH1, an ortholog of AtFAAH1, was identified in tomato and cloned into bacterial expression system. However, putative SlFAAH1 function and distinct features are yet to be determined. It is hypothesized that the putative SlFAAH1 catalyzes the hydrolysis of NAEs and modulates the level of NAEs during the seedling development in tomato. To this extent, a putative SlFAAH1 (previously identified and cloned in pET-23a vector) will be biochemically characterized and also effect of NAEs on seedling development will be studied. Thus far, SlFAAH1 cloned in pET-23a vector was expressed in RIL cell line (prokaryotic expression system) followed by conformation of positive transformant by colony PCR. Currently, protein expression and confirmation of SlFAAH in the positive transformant is being done. The expressed protein will be characterized for its hydrolytic activity using radiolabelled substrate. The effect of exogenous NAEs during seedling development will be studied with regards to expression level of SlFAAH1 by qPCR and composition of NAE during the seedling development to determine the role of NAE during seedling development. Thus, this study is expected to not only characterize a protein in tomato but also determine its role in mediating NAE metabolism and seedling development. Long-term studies will identify the significance of highly conserved NAE pathway in eukaryotes.

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106. ECOLOGICAL INFORMATICS: AN AGENT BASED MODEL ON COEXISTENCE DYNAMICS

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The joint impacts of competition and predation on coexistence dynamics within a structured habitat have been controversial. Fragmented habitats have detrimental effects upon the species dynamics and overall coexistence while connected habitat systems enhance species survival as they provide means for better mobility, foraging grounds and refuge. Previous study done by Karsai and Kampis presented that connected habitats are better equipped to stabilize the system by enhancing coexistence This present research studies the emergent properties of coexistence patterns within a simulated fragmented habitat system connected by corridors. The regeneration time of producers was varied in combination with varying levels of quality of predators and the structure of habitats. The producers were represented by energy patches in the model. The primary consumers (Prey) and secondary consumers (Predators) had more complex life history parameters including reproduction, level of efficiency in converting food into energy and its speed. Targeted parameter sweeps allowed to vary the regeneration rates and to study its effects upon the entire system. Information was gathered on prey and predator populations and corresponding survival times. It was observed that in case of non-fragmented habitats which were inhabited by fast regenerating producers, the survival time was highest for high quality predators. When these habitats were inhibited by slow regenerating

producers, the system destabilized and collapsed. This outcome changed for the case of fragmented habitats. When these habitats were inhabited by fast regenerating producers, the survival time was highest for the average quality predators. As the habitat was inhibited by slow regenerating producers, the system again destabilized and collapsed. This effect worsened as the level of fragmentation of the habitats was progressively increased causing widespread extinction of predators and prey alike. Also, it was observed that the average survival times of the predators in case of fragmented habitats were usually lower than predators from non-fragmented and connected habitats. When habitat connectivity was introduced, the results were different. When these connected habitats were inhabited by fast regenerating producers, the survival time was higher for low quality predators. Similarly, when these habitats were inhabited by slow regenerating producers, the survival time was higher for high quality predators. It was observed that when habitat connectivity was introduced, the systems were more stabilized. Including additional primary consumers (Prey 2) which shares similar life history parameters and ecological niche as that of primary consumers (Prey) in such systems would allow to study the effect of competition within the primary consumers and its resulting interaction with that of predation on coexistence dynamics of prey and predator population. Besides the ecological insights we obtained from this study on coexistence dynamics, we concluded that agent based simulations could be one of the most effective tools in the field of ecological informatics and computational ecology.

Master's Candidates

✵ Society, Behavior and Learning, Group A ✵

107. E-CIGARETTE USE AMONG HIGH-RISK STUDENTS IN A RURAL APPALACHIAN HIGH SCHOOL

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Nationally, e-cigarette use among high school students has increased dramatically from 1.5% in 2011 to 16.0% in 2015. Although Northeast Tennessee has nearly the highest prevalence of tobacco use nationwide, very limited information is available concerning e-cigarettes. This study aimed to determine the prevalence and behaviors associated with e-cigarette use among students in rural high schools and inform a youth tobacco cessation program tailored to this population. In November of 2016 a school-based survey was administered at one rural high school (9th-12th grades) in Northeast Tennessee (n=212). Current use of e-cigarettes was ascertained through self-report. Descriptive statistics and multiple logistic regression were used to determine associations of behaviors among high risk participants. Student's responses to two questions (e-cigarette use in the past 30 days, and cigarette use in the past 30 days) were added together to determine a total risk score for each student. Scores of 0-5 indicated low-risk, while 6-12 indicated high-risk. The prevalence of current e-cigarette use was 4.8%, while 5.2% reported current use of conventional cigarettes. Interestingly, 6.2% of students reported dual use of e-cigarettes and conventional cigarettes. Logistic regression analysis showed that high-risk students

were 2.3 times more likely to prefer e-cigarettes to cigarettes (OR=2.32, p=.040). High-risk students were twice as likely to feel that e-cigarettes are less addictive than conventional cigarettes (OR=2.03, p=.016), and have friends who use e-cigarettes (OR=3.20, p=.003). This study shows dual use of conventional cigarettes and e-cigarettes among high-risk rural Appalachian school-going adolescents is more pervasive than single use of either method. E-cigarette use among high-risk adolescents may be explained by social influence and perception of addictiveness. Urgent preventative measures and cessation programs are needed in rural Appalachia to avert nicotine addiction in adolescents prior to reaching adulthood. Further research is necessary to determine if these findings are generalizable.

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108. VIDEOGAME PREFERENCE AS PREDICTORS OF PROBLEMATIC GAMING-RELATED BEHAVIORS

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The DSM-5 introduced Internet gaming disorder (IGD) as a diagnosis to consider for inclusion in future editions of the manual. Behavioral addictions, sometimes referred to as impulse control disorders or non-substance addictions, are becoming a growing interest in clinical psychology, but still relatively little is known about the various factors that may increase risk for specific addictions. As videogame use has become increasingly popular among people of all ages, there is a need to identify gaming-related behaviors that may increase risk of disordered gaming. In the current study, we seek to investigate whether time spent playing videogames and videogame preference plays a role in IGD. Participants were asked in a survey to rank genres (e.g., shooter, role playing, and sports) of games they enjoyed most. "Tied" rankings were not permitted. Then they were asked a series of questions related to specific problematic gaming-related behaviors adapted from the DSM-5 suggested criteria. Results from this scale are scored from 0-42, with higher scores indicating more problematic behaviors. Using R, analyses will be conducted to calculate participants' rank ordered genre preference as possible predictors of problematic gaming-related behaviors. It is hypothesized that certain genres will better predict higher incidence of problem behaviors than other genres. If certain types of games are shown to be statistically significant predictors of IGD symptoms, recommendations can be made to suggest placing warning labels on games to inform players of possible risk of IGD. Furthermore, additional, more detailed qualitative analyses can be conducted which explore some common features of games/genres which may contribute to higher risk for IGD.

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109. EVALUATION OF UNDERGRADUATE PEER EDUCATION COURSE

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The purpose of the present study was to evaluate East Tennessee State University's adaptation of BACCHUS' Certified Peer Education Training Program which is currently a semester long class aimed towards undergraduate students across all majors. The BACCHUS curriculum teaches listening skills, bystander intervention, self care, and group development among other topics. The wellness topics that have been added to the curriculum include anxiety, stress, suicide prevention, tobacco use, public safety, nutrition, and stress management. Peer education has been found to be an effective way to address student health concerns on campuses across the nation. Students are more likely to relate to their peers who are more accessible than professors or counselors. Therefore, it is very beneficial to have appropriate training for students on campus who can encourage peers to take charge of their health and take appropriate steps to do so. These types of efforts have been made in numerous universities such as Winston-Salem and Appalachian State University which have found this approach effective in alleviating stress, improving eating habits, and decrease of binge drinking to name a few. Based off a survey with 222 respondents conducted at East Tennessee State University, it was found that majority of students felt peer education would be beneficial on campus and felt a course would be appropriate. Therefore, a course was created include wellness information from campus experts on relevant wellness topics. This course which is currently in its third semester, provides the knowledge and skills for students to enhance their own personal wellness level, initiate conversations with their peers concerning healthy behaviors, provide referrals to campus services, and work as a group to plan campus-wide wellness initiatives. Students enrolled in the course were primarily female undergraduates taking the course as an elective. Methods of evaluation for this course included a pre-post course evaluation that students filled out to assess their competency on three levels: personal, interpersonal, and group skill development related to their role as a peer education. Pre-post differences for personal, interpersonal, and group skill development scales were compared using paired t-tests ($n = 12$). Results show significant differences ($p = .000$) after the training program for all three competency levels with higher mean score differences found for changes in personal skill (mean = -9.58) and interpersonal skill development (mean = -7.58). The results of this study indicate that the training program successfully enhanced students' personal, interpersonal and community-level competency levels for acting as a peer educator program on the ETSU campus. Therefore, Peer Education is a promising approach of not only teaching undergraduate students personal wellness knowledge and skills that can be taken into the professional field, but also has further reaching effects on the broader campus community.

110. SYMPTOMS OF ANXIETY AND DEPRESSION AND SUICIDAL BEHAVIOR IN COLLEGE STUDENTS: CONDITIONAL INDIRECT EFFECTS OF NON-SUICIDAL SELF-INJURY AND SELF-COMPASSION

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Suicide is the 2nd leading cause of death among individuals 15 to 24 and young adults attending college may be at particular risk, perhaps due to increased rates of psychopathology (e.g., anxiety, depression). As well, 17% of college students report engaging in non-suicidal self-injury (NSSI) and, according to the Gateway Theory of Suicide, repeated engagement in NSSI is predictive of future suicidal behavior. However, not all individuals who experience psychopathological symptoms or who self-harm go on to engage in suicidal behavior, perhaps due to individual-level protective factors that buffer risk. One such factor, self-compassion, which encompasses self-kindness (kindness and understanding toward 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 and suicide, but no research has examined the progression from psychopathological symptoms to NSSI to suicide-related behavior, accounting for the role of self-compassion. We examined the mediating effect of NSSI on the psychopathology-suicidality linkage, hypothesizing that higher levels of psychopathology would be related to greater engagement in NSSI and, in turn, to more suicidal behavior, and that self-compassion, and its subcomponents, 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) and completed self-report measures: Beck Depression Inventory, Beck Anxiety Inventory, Self-Harm Inventory, Suicidal Behavior Questionnaire-Revised, and the Self-Compassion Scale. Conditional indirect analyses were conducted, covarying age, sex, and race. In multivariate analyses, the direct effect of depressive/anxiety symptoms on suicidal behavior decreased in significance when NSSI (depression: DE=.12, SE=.01, p <.001; IE lower 95% CI [.09, .15]; anxiety: DE=.10, SE=.01, p<.001, IE lower 95% CI [.07, .12]) was tested, indicating mediation. Further, self-compassion moderated the psychopathology-NSSI relation (depression: β =-.01, SE=.004, t(315)=-3.21, p<.01; anxiety: β =-.01, SE=.01, t(315)=-2.50, p<.01). When the subscales of self-compassion were examined independently, self-kindness (SK) and common humanity (CH) moderated the anxiety symptom-NSSI linkage (SK: β =-.01, SE=.004, t(315)=-3.27, p<.01; CH: β =-.01, SE=.005, t(315)=-2.15, p=.03); mindfulness did not significantly moderate any paths. Self-kindness and common humanity also moderated the depressive symptom-NSSI linkage (SK: β =-.02, SE=.004, t(315)=-4.05, p<.001; CH: β =-.01, SE=.01, t(315)=-2.19, p=.03), and common humanity moderated the depressive symptom-suicidal behavior linkage (β =.01, SE=.01, t(315)=2.29, p=.02); mindfulness did not significantly moderate any paths. Individuals with greater psychopathology reported more engagement in NSSI and, in turn, more suicide risk, and self-compassion (total score, SK, and CH) weakened the psychopathology-NSSI linkage. Our findings may have clinical implications. Therapeutically addressing risk factors for

suicidal behavior, including psychopathology (e.g., via Cognitive Behavioral Therapy) and engagement in NSSI (e.g., via Dialectical Behavioral Therapy and Problem Solving Therapy), as well as promoting self-compassion (e.g., via Compassion Focused Therapy), may reduce suicide risk in college students.

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111. ASSOCIATION BETWEEN HEAVY ALCOHOL CONSUMPTION AND CORONARY HEART DISEASE AMONG U.S. ADULTS: USING THE 2015 BRFSS ANNUAL SURVEY DATA

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Background: Significant evidence exists about J-shaped relationship between alcohol consumption and total or cardiovascular disease (CVD)-specific mortality in US middle-aged adults. Epidemiologic investigations presume that the J-shaped distribution is the sum of the detrimental effect of high levels of consumption on other causes of death and the protective effect on coronary heart disease (CHD) morbidity and mortality. Several studies demonstrated that moderate alcohol consumption reduces the risk of CHD. However, results have been inconsistent among heavy drinkers. In this study, we investigated the association of heavy alcohol consumption with CHD among adults aged 18-years or older in the US. Methods: Data from the 2015 Behavioral Risk Factor Surveillance System (BRFSS) were used to conduct this study. BRFSS is an annual cross-sectional survey administered to >400,000 adults in all 50 states to collect information about their health-related risk behaviors, chronic health conditions and the use of preventive services. Self-reported responses to BRFSS questionnaire were used to define study variables. Heavy alcohol consumption was defined as greater than 14 drinks (1 drink =12 ounces of beer) per week for men and 7 drinks per week for women. Logistic regression analysis was conducted to determine the association between history of coronary heart disease or angina and heavy alcohol consumption. The model was also adjusted for demographics (age, sex, and race), behaviors (exposure to tobacco smoking, physical activity, fruit consumption), other chronic conditions such as high blood pressure (ever been told having high blood pressure or not), high cholesterol (ever been told having high blood cholesterol or not) and overweight or obese. Results: Approximately 6% of study population reported history of CHD and 5% reported heavy alcohol consumption. The odds of having coronary heart disease or angina among heavy alcohol drinkers was 43% less than those who were not heavy alcohol drinkers (adjusted odds ratio: 0.57, 95% confidence interval: 0.52-0.62, $p<0.0001$). Fruit consumption and regular physical activity were also found to be associated with decreased odds of CHD in US adults. Conclusion: The study findings demonstrate that heavy alcohol consumption is a protective factor for CHD morbidity. Future observational studies should be conducted to determine the overall benefits of heavy alcohol consumption as it relates to coronary heart diseases.

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112. EFFECTS OF ADVERSE CHILDHOOD EXPERIENCES ON MENTAL HEALTH

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Background: Research shows that previous exposure to adverse childhood experiences (ACEs) can lead to poor mental health. Poor mental health impacts overall quality of life by having a negative effect on social, emotional, and physical aspects of life. This study investigated the effect household dysfunction and abuse have on adult depressive disorder diagnosis and reporting poor mental health days. Methods: Data were collected from 2011-2012 Behavior Risk Factor Surveillance System (BRFSS). The sample size was 84,255 and included only the states that answered the ACE questionnaire (Iowa, Minnesota, Montana, North Carolina, Tennessee, Vermont, Washington, and Wisconsin). ACEs were categorized into two categories: household dysfunction and abuse. Household dysfunction variables included parent/guardian depression, alcohol or substance abuse, incarceration, divorce, and family abuse. Variables in the abuse category included physical and sexual abuse directed toward the respondent. Descriptive statistics were followed by simple and multiple logistic regression analysis controlling for age, gender income, education, marital status, and race. Logistic regression analysis was used to examine the association of abuse and household dysfunction and the relative odds of being diagnosed with a depressive disorder and reporting poor versus good mental health in the past month. Results: Those who experienced abuse had double the odds of being diagnosed with a depressive disorder or reporting poor mental health days (OR=2.06, CI 1.96-2.15; OR=1.92, CI 1.84-1.99 respectively). Household dysfunction exposure odds were not as high as abuse exposure; however, they were still found to be significant (OR=1.61, CI 1.54-1.69). When looking at household dysfunction and reporting of poor mental health days, there was not a significant increase (OR=1.19, CI 1.15-1.24). It was found that as income increases, the odds of being diagnosed with a depressive disorder decreased. Those between the ages of 45-54 and 55-64 had almost double the odds of being diagnosed (OR=1.94, CI 1.77-2.13 and OR=2.101, CI 1.91-2.31 respectively). When looking at the second model, as age and income increased the odds of reporting poor mental health days decreased drastically. Conclusion: Significance was found among adults who experienced ACEs and having poor mental health days or being diagnosed with a depressive disorder. Those exposed to abuse were more likely to be diagnosed with a depressive disorder than those that were exposed to household dysfunction. Similarly, those exposed to abuse were more likely to report poor mental health days than those exposed to household dysfunction. Studying the effects of ACEs on mental health could contribute to the understanding of mental health conditions and the impact of a person's childhood on adulthood. This could lead to better treatment programs and a shift in the stigma of mental health conditions. Moreover, studies need to be conducted to fully understand the effect of adverse childhood experiences on mental health.

113. SOCIAL MEDIA USE AND INDOOR TANNING BEHAVIOR AMONG COLLEGE STUDENTS: INNOVATIVE SPACES TO INTEGRATE PUBLIC HEALTH MESSAGES

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Melanoma is among the most common cancers in people under age 30. Incidence rates continue to rise in certain groups, particularly among women in their 20s. Researchers partially attribute this alarming trend to indoor tanning (IT). College students report the highest IT use rates of any group with 59% reporting ever-use and 43% reporting use in the past year. Young adults also use social media more than any other age group with 86% of 18- to 29-year-old Americans reporting current use of at least one social media application. While not widely utilized for skin cancer prevention interventions, social media have been used in other cancer prevention efforts and may be suitable platforms for dissemination of tailored content discouraging IT among college-aged adults. Given the opportunity to incorporate public health messaging about IT in social media spaces, this study aimed to explore the association between IT behavior and social media activity among students at East Tennessee State University. Students were surveyed through an anonymous research participation system (SurveyMonkey via SONA) from Sept-Dec 2016 and received class credit for survey completion. Responses from participants over age 25 were excluded, leaving a total of 637 respondents. Data were imported, cleaned, and analyzed in SPSS (Version 23.0). Responses from female participants were extracted for further analysis. Those identifying as female represented 73.2% (n=466) of survey participants aged 18-25 with a mean age of 19.3 years. Over half of female respondents (57.7%) reported having ever used a tanning bed, and 43.5% reported habitual tanning bed use (i.e., 10+ IT sessions in the past year). 83.3% of female respondents reported having an active Facebook account, while 53.6% reported having an active Twitter account. Of those who were active on social media at the time of the study, a majority reported either intermediate (i.e., active several times per week) or high (i.e., active several times per day) use of both Facebook (68.7%) and Twitter (74.3%). Reported IT use in the past year was significantly associated with level of Twitter use ($X2 = 6.741$, $p<.05$), with habitual tanners using social media more regularly than non-habitual tanners. Results of this study build on previous findings from research on IT and social media indicating that tanners are highly active on social media. Based on these results, there are clear opportunities to reach and engage college-aged female tanners with skin cancer prevention messaging on social media platforms. Future research should explore the feasibility of social media interventions and campaigns aimed at reducing IT prevalence and melanoma incidence among college-aged women.

114. TREATMENT ADHERENCE IN FIBROMYALGIA: IMPACT OF PERCEIVED IMPAIRMENT, DEPRESSION, AND SELF-COMPASSION

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Fibromyalgia is a chronic illness characterized by fatigue, sleep disturbances, and pain, contributing to high levels of perceived impairment. Inability to complete routines of daily living may result in distress, including depressive symptoms. Together, these disruptions to functioning and mood may make it difficult to adhere to treatment recommendations; yet, this premise has not been examined. Further, not all persons with a chronic illness or impairment become depressed and, as well, not all impaired/depressed persons have difficulty completing treatment regimens, perhaps due to the presence of individual-level protective factors. One such protective factor, self-compassion, is conceptualized as the extension of kindness to oneself in adverse or difficult times, and is comprised of three components: self-kindness, common humanity, and mindfulness. In previous research, self-compassion exerts beneficial effects on mental and physical health, including adherence. However, its role in a comprehensive model of illness, impairment, mood dysfunction and treatment engagement, is unknown. Thus, we examined the mediating role of depressive symptoms on the relation between perceived impairment and treatment adherence and, further, the moderating role of self-compassion on all model paths. At the bivariate level, we hypothesized that perceived impairment (PI) and depression would be positively related, as would self-compassion (SC) and treatment adherence (TA), and that PI and depression would be inversely related to SC and TA. At the multivariate level, we hypothesized that the relation between perceived impairment and treatment adherence would be mediated by depression, and that this association would be moderated by self-compassion. Participants (N=508) with self-reported fibromyalgia, most of whom were White (91.8%) females (95.7%) (Age: M=47.72, SD=13.14), were recruited nationally via support organizations, and completed an online survey: Fibromyalgia Impact Questionnaire; Depression, Anxiety, and Stress Scales; MOS Treatment Adherence Scale; and, Self-Compassion Scale Short-Form. All bivariate hypotheses were supported, with significance at the $p<.01$ level. In simple mediation analysis (10,000 bootstrapped samples), the direct effect of perceived impairment on treatment adherence reduced in significance (SE=.0234, $p<.001$) when depression was added to the model, indicating mediation. The moderating effects of self-compassion were significant on the "a path" (SE=.002, $p<.001$) and "b path" (SE=.007, $p<.05$), indicating that self-compassion weakened the impairment-depression linkage, as well as the depression-adherence linkage. Our findings suggest that perceived functional impairment is related to negative mood and, in turn, to poor treatment adherence. However, to the extent that an individual with fibromyalgia is able to engage in self-compassion, the "downward spiral" from impairment to distress to maladaptive health behaviors may be averted. Our findings may have clinical implications. Therapeutically addressing depression (e.g., Cognitive-Behavioral Therapy)

and enhancing self-compassion (e.g., mindfulness, changing critical self-talk) may weaken the deleterious impact of fibromyalgia-related impairment on both mood and health behaviors, thereby promoting better mental health functioning and successful engagement with treatment recommendations in persons with fibromyalgia.

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115. *withdrawn*

116. EXAMINING FACTORS CONTRIBUTING TO HIGH BREAST CANCER INCIDENCE IN IRAN

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Introduction: Breast cancer (BC) is the leading cause of mortality among women globally. Even though countries in North American and Northern Europe account for the highest incidence of BC rates, the disease is raising in developing countries. Iran has historically had the lowest BC incidence rates in Asia. However, according to a recent report, BC rates in the country have been increasing and currently ranks first among all cancer diagnosed cases in women. Between 2003 and 2009, incidence rates increased from 16.0 to 28.3 per 100,000 while deaths rates increased from 0.96 to 4.33 per 100,000. Objective: To systematically analyze the epidemiological risk factors for raising BC among women in Iran. Methods: Evidence-based search was performed in PubMed (2007-present), Medline (1950- present), Science Direct (1997-present), CINAHL (2000-present) and Psych INFO (1993-present) for relevant studies using combinations of the following key terms/phrases: risk factors OR contributing factors AND breast cancer OR neoplasm AND women AND Iran. Inclusion criteria were any studies on risk factors of BC among women in Iran, and published in English. Next, the titles and abstracts of identified articles were reviewed using screening algorithm based on established inclusion criteria. The investigators then rated each paper as "relevant" or "not relevant" according to the study design, participation, outcome measures and main findings. Results: Comprehensive literature searches identified 42 articles. After reading the full articles, 30 articles were excluded. Based on the selection criteria established, 12 cross sectional studies remained eligible. Twenty-three (23) different variables were measured in the eligible articles. For instance, women with family history diagnosed with BC have a higher risk of developing the disease. Similarly, women who had use contraceptive pills within the previous years had an increase in the risk of BC. By measuring parity, the overall relative risk of BC for women with more pregnancies is less compared with women with only one pregnancy. The study found a modest association between occurrence of BC and factors related to higher risk of BC among women in Iran. The risk factors include: an increase in age, body mass index, duration of breast feeding, menopause at old age, unemployed, smoking, low parity, family history of BC, use of oral contraceptive pills, hormone replacement therapy, education level, occupation, age at menarche, history of abortion, marriage age, first pregnancy age, history of genital disease, positive history of breast oozing, a high fat diet, stress and migration. Conclusion: The results of the study provide better understanding on risk factors associated with BC in Iran. For instance, findings reveal that most of the risk factors are due to behavioral lifestyle changes among women. Consequently, the provision of public

education to encourage healthy lifestyle choices, periodic check-ups for early BC detection as well as culturally sound society-based interventions are essential in order to reverse the current BC trend in Iran.

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117. SHAME, GUILT, AND SUICIDE RISK AMONG VETERANS: SELF-COMPASSION AS A MODERATOR

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Among the 19.3 million veterans residing in the U.S., suicide is a primary mental health concern, with risk for suicide among veterans being 21% higher than for the general population. Increased suicide risk for veterans may be linked to strong negative emotions associated with the requirements of being in the military. For instance, many veterans describe feelings of guilt, defined as remorse or responsibility for one's actions, such as for experiences during combat exposure (e.g., having to kill someone). Shame, or the belief that there is something inherently wrong or defective with the self, often occurs following a violation of personal values or morals (e.g. participation in violence, missing important family events during deployment), and frequently coexists with feelings of guilt. As well, many members of the military experience sexual trauma, which may induce shame. For some veterans, suicide may become a viable alternative to these overwhelming negative feelings. However, not all veterans are at risk for suicide, perhaps due to individual-level protective factors. One such factor is self-compassion, which is composed of self-kindness, community, and mindfulness. Positive emotions (i.e. self-compassion) may buffer against negative feelings about the self or one's actions (i.e. guilt and shame), thereby decreasing suicide risk. Our study aimed to test these associations in the context of moderation analyses. At the bivariate level, we hypothesized that guilt and shame would be negatively related to self-compassion and positively related to suicide risk. Also, we hypothesized that self-compassion would be negatively related to suicide risk. At the multivariate level, we hypothesized that self-compassion would moderate the relations between guilt and suicide risk, and between shame and suicide risk, weakening both associations. Our sample of veterans (N=422) was primarily white (n=366) and male (n=291). Participants completed self-report measures including the Differential Emotions Scale-IV, Self-Compassion Scale Short-Form, and Suicide Behaviors Questionnaire-Revised. Bivariate correlations and multivariate analyses, per Hayes (2013), were conducted covarying age, sex, and ethnicity. In bivariate correlations, guilt and shame were positively related to suicide risk ($p<.01$) and negatively related to self-compassion ($p<.01$). Also, self-compassion was negatively related to suicide risk ($p<.01$). In multivariate analyses, self-compassion significantly moderated the relation between guilt and suicide (SE=.046, t=-2.93, $p<.01$, CI[-.227, -.045]), and between shame and suicide (SE=.048, t= -3.31, p=.001, CI[-.254, -.065]), such that greater levels of guilt and shame were related to higher levels of suicide risk, and self-compassion attenuated these associations. Supporting hypotheses, our results suggest that self-compassion may buffer against negative feelings about the self or one's actions and subsequent risk for suicide. Therapeutic interventions focused on the promotion of self-compassion (e.g. mindful self-compassion training, positive self-talk) may alleviate feelings of shame and guilt and, thus, suicide risk among veterans.

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118. OBESITY AMONG FIRST AND SECOND GENERATION HISPANIC ADOLESCENTS IN THE UNITED STATES: INSIGHTS FROM 2011-2012 NATIONAL SURVEY OF CHILDREN'S HEALTH

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Introduction: More than one-third of adults and 17% of children/adolescents in the US are overweight or obese contributing to significant morbidity and mortality, and healthcare costs. Studies have reported the persistence of adolescent obesity to adulthood, resulting in increased risk of chronic diseases such as asthma, type 2 diabetes mellitus, cardiovascular, and liver diseases. Little is known about obesity patterns in subethnic populations in the US with high prevalence of obesity or overweight reported in Hispanic youth (21.9%) compared to non-Hispanic blacks (19.5%) and non-Hispanic whites (14.7%). Several genetic, uterine, and nutritional factors, and unhealthy behaviors were identified as risk factors. Evidence is emerging about the possible role of generational status in influencing adolescent obesity. The purpose of this study is to assess the association of generation status with adolescent overweight or obesity in Hispanics in the US. Methods: Data from the 2011-2012 National Survey of Children's Health (NSCH) were used to conduct this study. Only Hispanic adolescents aged 10 to 17 years were included as study population. Using the age-sex-race specific cut-off points, we defined adolescent as being overweight or obese if they were above 85th or 95th percentile cut-off point values for BMI. Generation status of an adolescent was categorized into three groups: a) generation 1 for those who were not born in US or to US citizens abroad, and migrated to US as children, b) generation 2 are those born in US but have at least one parent who is foreign born, and c) generation 3 or higher adolescents are those born in US to native-born parents. Multivariable models were conducted to test the association of generation status with adolescent obesity in Hispanics, adjusting for potential confounders. Results: A total of 5,217 Hispanic adolescents were included in the study. Approximately 1,650 and 31.7% of adolescents reported being overweight or obese. Approximately 857, 2,216 and 2,144 of adolescents are 1st, 2nd and 3rd generation Hispanic youth. Comparing to 3rd generation adolescents, those belonging to 1st and 2nd generations were associated with increased odds of adolescent obesity in Hispanics OR 1.48, 95% CI 1.177 – 1.867 and OR 1.405, 95% CI 1.227-1.610 for 1st and 2nd generation, respectively. Conclusion: Generational status is associated with increased relative odds of overweight or obesity in Hispanic adolescents. Aggregated estimates not accounting for nativity or county of origin of an adolescent contribute to significant heterogeneity or disparities in obesity prevalence or patterns, with implications for generation-specific interventions.

119. A TEAM CARE SCREENING TOOL TO ADDRESS SOCIAL DETERMINENTS OF HEALTH IN PEDIATRIC PRIMARY CARE

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Health encompasses our lives in various ways; where we live, how we work, and how we play. These differentiating factors, or "social determinants", may impact physical and mental health in a prominent manner. Screening for social determinants of health in pediatric primary care may help to identify important areas to intervene with families to address barriers to receiving care and improve health outcomes. East Tennessee State University (ETSU) Pediatrics aimed to find the prevalence of varying social determinants in their patient population through a 6-item screening tool—the Team Care screener. A Team Care screener was administered to the caregiver(s) of every child that came into the clinic for a newborn appointment, six month appointment, or one year well child examination. Caregivers responded with *Yes* or *No* to the screener's six items concerning the following: (1) ability to understand written and spoken English; (2) experiencing financial stress related to housing, food, and utilities; (3) stress around substance use; (4) incidents of domestic abuse; (5) feelings of depression and possible suicidal ideation; and (6) if transportation has been a barrier to attending medical appointments. After the screener was collected, if any social determinants were marked as *Yes* on the screener, a needs assessment was completed with the caregiver(s). The family then received resources to address needs at the appointment or by phone follow up, if applicable. This procedure is ongoing at the clinic. Results indicated that of the 1,009 Team Care screeners administered over a four-month period, 15% (*n*=153) of patients' caregivers reported a deficit in at least one social determinant. More specifically, 8% (*n*=79) endorsed experiencing financial stress, 5% (n=49) reported strain from acquiring transportation to appointments, 4% (*n*=17) expressed concerns related to substance use, 1% (*n*=14) noted difficulties with comprehending English, and less than 1% (*n*=6) reported possible incidents of domestic abuse. After discussion with caregivers, the most frequently reported stressors were determined to be access to adequate food, housing, and utilities as well as distress concerning transportation to medical appointments. Overall, our results suggest that a large portion of the patient population demonstrates varying social needs which have the potential to influence health outcomes. The Team Care screener has elucidated which patients are at particular risk, which allows clinic staff to provide more efficient patient-centered care.

120. ASSOCIATIONS BETWEEN MULTIPLE CARDIOVASCULAR DISEASE RISK FACTORS AND DIABETES AMONG ASYMPTOMATIC INDIVIDUALS IN A HARD-TO-REACH POPULATION

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Background. Diabetes is the sixth leading cause of death in the United States (U.S), and a major risk factor for cardiovascular disease (CVD). The prevalence of diabetes in central Appalachian region of the U.S. is higher than the rest of the nation (14.4% versus 9.0%, respectively). Yet, research regarding the influence of CVD risk factors on diabetes in the Appalachian region is scarce. Objectives. This study aimed to examine the association between multiple risk factors for CVD and diabetes in asymptomatic adults in central Appalachia. Methods. Between January 2012 and July 2016, 3,000 community-dwelling asymptomatic individuals from central Appalachia participated in screening for subclinical atherosclerosis. Participants were asked to report their diabetes status (yes/no). In addition, data on coronary artery calcium (CAC), a marker for subclinical coronary atherosclerosis, in quartiles (0, 1-99, 100-399, =400), obesity (body mass index =30 kg/m2), hypocholesteremia (yes/no), hypertension (yes/no), current smoking (yes/no), sedentary lifestyle (yes/no), and family history of coronary artery disease (CAD) (yes/no), were collected. Multivariable logistic regression analyses were conducted to assess association between CVD risk factors and diabetes. Results. Of the 3,000 participants, 2,509 subjects (mean age: 58.3 years; SD = 9.8 years) had complete data on variables of interest. Approximately, 14% of the study population reported having type 2 diabetes. Among subjects with diabetes, 58% had a CAC score =1, 22% were obese, 17% had hypocholesteremia, 20% had hypertension, 16% were current smokers, 17% had a sedentary lifestyle, and 15% had a family history of CAD. After adjusting for sex and age, having a CAC score of 1-99, 100-399, and =400 increased the odds of having diabetes (Odds ratio (OR): 1.4, 95% Confidence interval (CI) = 1.02-1.9; OR: 2.0, 95% = 1.4-2.8; OR: 3.1, 95% = 2.1-4.7, respectively) in a linear fashion. Being obese (OR: 3.2; 95% CI = 2.5-4.0), having hypocholesteremia (OR: 1.8; 95% CI = 1.4-2.4), being hypertensive (OR: 3.0; 95% CI = 2.3-3.8), being a smoker (OR: 1.5; 95% CI = 1.1-2.1), and being sedentary (OR: 1.6; 95% CI = 1.3-2.0) were significantly associated with diabetes. Having three (OR: 3.0; 95% CI = 1.3-6.6), four (OR: 4.4; 95% CI = 2.0-9.7), five (OR: 7.0; 95% CI = 3.1-16.1) or six (OR: 9.9; 95% CI = 3.5-27.7) CVD risk factors significantly increased the odds of diabetes. Subjects with any of the seven risk factors under study were 1.7 times (95% CI = 1.5-1.9) more likely to have diabetes. Conclusion. Findings suggest that odds of type 2 diabetes increase with higher number of risk factors for CVD in this central Appalachian population. Results support the use of multifaceted CVD and diabetes prevention programs to lower the incidence of type 2 diabetes.

121. INVESTIGATION OF CHILD SEXUAL ABUSE IMPACT ON BINGE DRINKING AMONG ADULTS IN THE US

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Background: In 2012, 62,939 cases of child sexual abuse (CSA) were reported in the United States (US). During the same year, binge drinking (BD) cost the US nearly $250 billion. Currently there are 38 million Americans who participate in BD. Researchers have found a significant association between adults who experienced adverse childhood events (ACEs) and BD in adulthood. However, CSA and BD have yet to be investigated using a nationally representative study sample. Objective: This study seeks to investigate the association between CSA and BD among adults in the US. Methods: Data from 2012 Behavioral Risk Factor Surveillance System (BRFSS) were used to analyze a sample of 25,037 adult participants from states that included the ACE questionnaire in the survey. CSA components, including forced touched sexually, forced to touch sexually, and forced sex, were assessed in relation to BD. Covariates included parental alcoholism, parental substance abuse, parental depression, age, sex, income, race, education level, and marital status. Descriptive statistics and logistic regression models were conducted using SAS 9.4. Results: Approximately 17% of the study sample reported BD. Adults who had been touched forcefully during their childhood had around 2.18 times increased odds (adjusted odds ratio (aOR): 2.18; 95% confidence interval (CI) 1.97 – 2.41) of being involved in BD compared to those who did not have this experience. Being forced to touch sexually or forced to have sex during childhood was not significantly associated with BD and was not included in the adjusted model. Having parents who abused drugs (aOR 6.14; 95%CI: 5.56–6.79) and parents who were depressed (aOR: 3.35; 95%CI: 3.09-3.64) significantly increased the odds of BD among this population. Conclusion: Forced sexual touch was found to be significantly associated with BD. Further epidemiologic studies are necessary to determine if this is consistent in different years for the association between CSA and BD, since forced to touch sexually and forced sex were not found to impact BD in adults. The increased odds for BD from experiencing forced touch identifies a population where health education and awareness is vital to reduce the risk for BD in adults, thus reducing alcohol-related health problems and injuries. Health promotion campaigns for families affected by parental substance abuse and parental depression is also important to reduce the risk for BD among adults growing up with these experiences.

122. ASSOCIATION BETWEEN PHYSICIAN/HOSPITAL VISITS AND HOSPITALIZATIONS FOR MOSQUITO-BORNE ILLNESS IN NUEVA VIDA, NICARAGUA

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Introduction: Surveillance concerning hospitalizations for Chikungunya, Dengue, Malaria, and Zika are important to understand the impact they have in Nicaragua. Coinfections for Chikungunya, Dengue, and Malaria have been found to be likely, however very little annual data has been collected on how many people are infected in this area. While Malaria prevalence is low in Nicaragua, the incidence for Zika cases have recently increased. This study investigated the likelihood for hospitalizations in addition to hospital and doctor visits associated with mosquito-borne illnesses (MBI), specifically Malaria, Chikungunya, Dengue, and Zika in Nueva Vida, Nicaragua. Methods: This study sample is primarily based on what type of neighborhood, or etapa, people live in and how many people were currently living in the home during a cross-sectional study in Nueva Vida. Primary data collection was performed in July 2016 and included1,015 participants. Questions used in this data analysis involved what etapa people lived in (type of neighborhood), how many people were living in the home, the number of people who sought physician care for MBI, and those who went to the hospital or were hospitalized for MBI. Covariates included were the number of people with Malaria, Chikungunya, Dengue, and Zika. Descriptive statistics and logistic and linear regression models were completed. The associations between the number of people living in the home, in which etapa they lived, and the impact on seeking help from a physician, hospital, or being hospitalized were assessed via relative odds. Results: Hospitalizations for MBI were significantly associated with the respondent's etapa and how many people were living in the home. Controlling for the number of people with Chikungunya and the number of people in the home, those who lived in etapa 4 were 62% less likely to be hospitalized due to MBI (OR:0.38, 95%CI:0.18-0.78) in comparison to etapa 1. Those with >7 people with Chikungunya in the home were more likely to be hospitalized for MBI, controlling for which etapa they lived (OR:2.19,95%CI:0.99-4.48). Those living with 10 to 15 people in the home were nearly 3 times more likely to be hospitalized for MBI (OR:2.81,95%CI:1.38-5.76). For every increase in new cases of Chikungunya among persons living in the home, there was a 1.39 increase in the number of hospital visits, holding the number of people in the home, number of people with Malaria, and what etapa they lived in constant. For every unit increase in the number of people with Malaria, there was a 1 unit increase in the number of hospital visits, holding the number of people in the home, number of people with Chikungunya, and etapa constant. Conclusion: Hospitalizations for MBI were significantly associated with which etapa someone lived in and how many people were living in the home. Those living in homes with >7 people were at increased odds of hospitalizations for MBI. This study aided in identifying the increase in hospitalizations for MBI among those living in homes with several people. To prevent hospitalizations, health education programs for prevention and awareness of MBI are necessary.

123. ASSOCIATION BETWEEN BULLYING VICTIMIZATION AND FAILURE TO USE CONDOM IN LAST SEXUAL INTERCOURSE AMONG U.S. HIGH SCHOOL STUDENTS

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Background- Bullying victimization, both physical and electronic, has been associated with health risk behaviors such as smoking and substance use; and chronic conditions such as obesity, depression and sleep disorders. The purpose of this study was to examine the association between bullying victimization and risky sexual behavior. Failure to use condom in last sexual intercourse was used as an indicator of engagement in risky sexual activities. Methods- Data from the 2015 Youth Risk Behavior Survey (YRBS), a biennial nationally representative survey of 9-12 grade students (N=15,624) were used. After cleaning and re-coding the data set, a total of 5,037 students who reported ever having sex in their lifetime were included in the analyses. The explanatory variable included in the multiple logistic regression analysis was bullying victimization. Marijuana use and feeling of sadness or hopelessness in a row for two weeks or more during past twelve months were included as covariates. The analyses were adjusted for age and race, and odds ratios were stratified by gender. Results- No significant association was found between being a bullying victim at school property and not using condom in last sexual intercourse for both male (OR: 1.08, 95% CI: 0.71-1.65) and female (OR: 0.98, 95% CI: 0.65-1.47) students. This finding was consistent for both male (OR: 1.80, 95% CI: 0.89-3.65) and female (OR: 1.04, 95% CI: 0.70-1.55) victims of electronic bullying. Failure to use condom in last sexual intercourse was found to be associated with male students who were sad or hopeless in a row for two weeks or more during past 12 months (OR: 1.49, 95% CI: 1.13-1.96). Conclusions- Failure to use condom in last sexual intercourse was not found to be significantly associated with bullying victimization. Other risky sexual behaviors such as having multiple sex partners, use of protective methods other than condom and use of drugs or alcohol before engaging into sexual relationship should be examined in further studies.

124. ASSOCIATION BETWEEN SLEEP DURATION DURING ADOLESCENCE AND VIOLENT BEHAVIOR AMONG YOUNG ADULTS IN THE UNITED STATES

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Youth violence is a public health threat in the United States (US). The Centers for Disease Control and Prevention (CDC) defines youth violence as "an act of young people (10 – 24 years) intentionally using physical force or power to threaten or harm others". In 2015, 22.6% of US youth had been involved in a physical fight and 2.9% had been injured in physical fight where they were required to be treated by a doctor or a nurse, in the past 12 months. Studies have shown that factors ranging from individual, family to community level can explain violent behavior among youths. Inadequate sleep is one of the individual level risk factors of interest. However, the majority of previous studies were cross-sectional and focused only on adolescents. The objective of this study was to investigate the association between average hours of sleep during adolescence and violent behavior in early adulthood. Participants of Wave II (1996) of National Longitudinal Study of Adolescent and Adult Health who also completed Wave III survey (2000-2001) (n = 3,557) were included in the study. A composite variable on violent behavior was created by adding the scores to 3 different questions related to involvement in fighting or using a weapon. Demographics (age, gender, and ethnicity), history of involvement in violent behavior (wave II), depressive symptoms, impulsivity, and average hours of sleep in wave III were considered as covariates during model building. Negative binomial logistic regressions were conducted using SAS 9.4. The mean age of the participants was 15.85 years (SD 1.62) in wave II and 21.29 years (SD 1.60) in wave III. The majority of the participants were female (54.15%) and non-Hispanics (88.93%). In the unadjusted model, the association between average hours of sleep in wave II and violent behavior in wave III was not statistically significant (p=0.75). The association became significant in the second model after adjusting for age, gender and ethnicity. Higher average number of hours of sleep during adolescence was found to be associated with reduced likelihood of engagement in violent behavior during early adulthood (beta=-0.0935, p=0.032). The association, however, became insignificant in the final model where remaining covariates were added. In the final model, gender (beta=1.65, p<0.001), age (beta=-0.1267, p<0.001), violent behavior during wave II (beta=0.3158, p<0.0001), average hours of sleep in wave III (beta=-0.073, p=0.044), depressive symptoms (beta=0.0834, p <0.0001), and impulsivity (beta=0.1379, p<0.0001) were found to be significantly associated with violent behavior in early adulthood. Reduced number of sleep hours during early adulthood increased the likelihood of getting involved in violent activities during the same period. More longitudinal studies with shorter time period between data collection are required to further understand the effect sleeping behavior has on future behaviors and health status. This information might be useful to promote healthy behavior among individuals in all phase of their life.

Undergraduates

❋ Society, Behavior and Learning, Group A ❋

125. EFFECTS OF ACADEMIC PERFORMANCE AND STRESS MANAGEMENT ON INTERNALIZING SYMPTOMS

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During the transition to college, several stressors (e.g., adapting to new expectations) may negatively impact psychological wellbeing (Laurence et al., 2009). Consistent with self-discrepancy theory (Higgins, 1987), a difference between expected and actual academic performance may lead to internalizing symptoms (Ferguson et al., 2012). In addition, discrepancies between actual and expected academic stress management (e.g., time management and seeking help) may impact internalizing symptoms. It is expected that students who have high expectations for academic performance and stress management and do not meet them will experience more internalizing symptoms during the first year of college. First-year college students (N=96, 57 women) completed surveys across one year. During the first eight weeks of the Fall, students completed the Anticipated College Belongingness Scale (based on Hurtado & Carter, 1997) to measure expected four-year grade point average (GPA), and expected academic stress management (e.g., difficulty staying on schedule or communicating with instructors). The Adult Self Report (ASR; Achenbach & Rescorla, 2003) was used to measure anxiety and depression during the previous six months. In the last three months of the Spring, the College Belongingness Scale was used to measure actual academic stress management, and the ASR was completed again. Cumulative first-year GPA was obtained from the school. The effects of GPA and stress management on Spring internalizing symptoms, while controlling for Fall internalizing symptoms, were tested using regression. Although the discrepancy in GPA was not a significant predictors of later internalizing symptoms, a higher cumulative GPA was associated with significantly lower Spring internalizing symptoms (β =-.064, p=.032). Lower actual stress management significantly predicted more internalizing symptoms (β =-.210, p=.003). The discrepancy in stress management was also significant (β =-.181, p=.004), indicating that students who expected to manage stress well, but had poor stress management, experienced more internalizing symptoms than those who met their expectations. When combined, differences in stress management significantly predicted Spring internalizing symptoms, while GPA was only marginally significant (R2=.659, F= 59.35, p<.001). These results demonstrated that academic stress can impact internalizing symptoms during the college transition. The discrepancy in stress management, which may result from unrealistic academic expectations due to inexperience, was the strongest predictor of internalizing symptoms. Inability to meet expectations could lead to negative emotions contributing to internalizing symptoms (Quas, et al., 2003). Furthermore, low GPA could contribute to internalizing symptoms because students may have feelings of learned helplessness that are frequently linked to depression (Abramson et al., 1978). Therefore, programs should be developed to teach stress management skills.

126. BCI PERFORMANCE IMPACTED BY THE REMOVAL OF INTER-STIMULUS-INTERVAL

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Brain-computer interfaces (BCI) technology can provide an alternative form of communication for individuals who lose their ability to communicate due to stroke, brain injury, or from amyotrophic lateral sclerosis (ALS). One of the most studied BCI's is known as the P300 Speller. The P300 Speller presents a matrix of letters, numbers, and computer commands (8x9 in the current study). Each item in the matrix flashes at a rapid rate and the participants' task is to count the number of times the desired letter flashes. When the attended letter flashes a P300 event-related potential will occur. The BCI can detect which stimulus produced a P300 and provide the stimulus as feedback to the participant. A primary goal of BCI research is to improve the speed and accuracy of the system by manipulating stimulus presentation parameters. One such parameter is the inter-stimulus-interval (ISI), which is the time between the offset of one stimulus (i.e., character in a grid of letters and numbers) and the onset of another stimulus.
Previous studies have examined the effect of varying the ISI; however, to date, no study has included a condition that has no ISI between stimuli. This study compares BCI speed, accuracy, and bit rate from a condition that has no ISI to a condition that has an ISI of 62.5ms. In addition to evaluating performance, the current study also evaluates which of the two conditions is preferred by the participant. Preliminary data have been collected from seven able bodied participants. Each participant completed No-ISI and a 62.5ms ISI spelling task (counter-balanced). Before each spelling task a calibration period including eighteen characters (three six letter words) was conducted. After calibration, the participant was presented with an additional 18 characters and the computer provided online feedback indicating whether or not the BCI selected the correct character. Performance data were analyzed using t-tests. The No-ISI condition produced significantly higher bit rate than the 62.5ms ISI condition ($p=0.039$). No differences in accuracy (i.e., number of correct selections) or selections per minute (i.e., letters typed per minute) were observed, $p=0.106$ and $p=0.088$, respectively. In regard to the preference data, no significant difference was observed between the No-ISI and 62.5ms ISI condition ($p=0.356$). These data indicate that a No-ISI P300 BCI is a viable alternative to paradigms that included an ISI between sequential flashes of the matrix items. In addition, the results yielded higher bit rates and no difference in preference was observed. Based on these preliminary data, we suggest that the No-ISI paradigm should be tested in participants who have severe communication disorders.

127. ACADEMIC MAJOR AND GENDER ASSOCIATIONS WITH SLEEPINESS IN COLLEGE STUDENTS

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Previous research shows that environmental, biological, social, and cultural factors may influence gender differences found in sleep. Biological and hormonal changes in women can impact sleep health and may cause sleep disorders that are more frequent in women than men (i.e. obstructive sleep apnea [OSA], restless leg syndrome [RLS], and insomnia). Recent studies have demonstrated that women sleep longer than men. Male and female college students often stay up late for academic reasons, but research shows that females sleep more than males, which can affect classroom performance and sleepiness levels if women do not receive proper amounts of sleep and have poor sleep quality. Research also shows that medical students have high academic demands that can lead to sleep disorders. A recent study showed that the training that nursing students encounter could lead to emotional stress, which may result in abnormal sleep behaviors. The current study examined the relationship between sleepiness, gender, and college major. It was hypothesized that women would report being sleepier than men. Additionally, it was hypothesized that students studying in the science, technology, engineering, and mathematics (STEM) related fields (i.e. biology and mathematics) would report being sleepier than students studying in non-STEM related fields (i.e. government and theater). An online survey was administered to undergraduate college students at a small, liberal arts college. Students were asked to complete demographic information that included academic major, gender, and general sleep habits. The Epworth Sleepiness Scale (ESS), a validated measure of self-reported sleepiness, was used to determine amount of sleepiness in students. Participants included 321 undergraduate college students (111 men). An independent samples t-test was conducted to examine gender differences in reported sleepiness. Preliminary analyses revealed a statistically significant difference between men (M=6.70, SD=4.29) and women's (M=8.19, SD=4.88) self-reported sleepiness, t(303)=-2.67, p=0.008, two tailed. Female students reported being sleepier than male students, which may indicate that women may be getting less sleep or lower quality sleep compared to their male counterparts. A one-way independent-measures ANOVA was also conducted to examine potential differences in types of academic majors and self-reported sleepiness. No significant differences were found between STEM (M=8.01, SD=5.03), non-STEM (M=7.38, SD=4.78), or health majors (M=7.89, SD=4.10), F(2, 309)= .603, p=.548. Unexpectedly, academic major was not related to the level of self-reported sleepiness in students. Further investigation is needed to determine if there are gender differences in sleep duration and quality, which would provide more information regarding differences in sleepiness. Understanding the underlying causes for the gender differences observed in sleepiness may lead to better designed sleep interventions for students and the general population.

128. USING NON-ELECTRONIC PLATFORMS TO DEVELOP SEQUECNING ABILTY IN EARY CHILDHOOD: A MID-STUDY REPORT

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Computer Science (CS) is a basic necessary skill for success and economic opportunity in the modern world. While most educators agree that there is critical need to teach CS, there are legitimate concerns regarding implementation. Some concerns include; "screen time", age appropriate activities, and limited access to devices for children in poverty. This study investigates a possible solution by examining the impact that non-electronic formats have on sequencing ability in 4-year-olds. Sequencing is the ability to list commands in logical order and is heavily associated with computer programing. In total, 26 4-year-old children attending Child Study Center (CSC) and Little Bucs (LB) at ETSU were eligible to participate in the study. Of these, 20 Children from CSC were randomly assigned into a treatment group or a control group and 6 children from LB only participated in pre-and post-testing. The treatment group played Robot Turtles (RT), a game developed to help children learn logical sequencing skills. Children create sequential commands to navigate the game piece (turtles) using directional cards to reach the goal (capturing the gem). The control group played Candy Land (CL), a game that prior research has shown to have no measurable effect in mathematical skills. LB children did not participate in any group activity outside of their normal curriculum. In both the control and the treatment group children played in groups of 3-4, in the same room, using the same chairs and tables at different times, for a duration of 15-20 minutes. At the end of each 4-week game play session researchers will administer the Logical Sequencing test individually to all children pre-test, mid-test, and post-test. A Three Factor Experiment with Repeated Measures on One Factor Analysis of Variance (ANOVA) will be used to determine the effects of playing RT on a task involving Logical Sequencing measure. The main hypothesis for this study is that students who play RT will show a 10 times greater increase in logical sequencing than those playing CL and those not involved in game play at all. The implications of such a result could lead to increased use of logical sequencing games in early childhood curriculum.

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129. EXAMINING THE CORRELATION BETWEEN CHILDHOOD TRAUMA AND ADULT SUBSTANCE ABUSE

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Researchers postulate that it is important to find the root of substance abuse in order to help prevent adults from developing these dangerous habits. There is various data in literature that shows general childhood trauma and their correlation with adult substance abuse, such as that reported by Lake et al. (2015), which shows overall childhood trauma and the influence it has on adult substance abuse. It is hypothesized that there we will

find a positive correlation between substance abuse and the various types of childhood trauma. It is also hypothesized that physical neglect and abuse leads to significantly strong correlations with drug and alcohol abuse. Taking this into account, we investigated the correlation of various types of childhood trauma, including physical and emotional abuse, physical and emotional neglect, and minimization. Our sample consists of 224 college students from a rural Southeastern university who completed measures via online survey software. The sample is 70.5% Female and 29% Male with 75.9% of participants identifying as European American or white. Participants completed the Michigan Alcoholism Screening Test (MAST), Drug Abuse Screening Test (DAST), and the Childhood Trauma Questionnaire (CTQ). The correlations in this study show that there is a significantly strong correlation between substance abuse and various types of childhood trauma, especially physical abuse and neglect.

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130. DIFFERENCES IN NEURAL ACTIVITY AND LOCATION CORRELATED WITH VIEWING THREATENING OR ATTRACTIVE IMAGES OF INDIVIDUALS OF THE SAME OR DIFFERENT SEX AND RACE

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Previous research investigated prejudice differences due to an individual's sex and showed that women displayed more internal motivation to express less prejudice whereas men displayed more internal and external motivation to express more prejudicial behavior (Ratcliff et al., 2006). O'Conner et al. (2000) showed similarities towards biased media in concern to young Caucasian and African American females regardless of race. In a study from Wittenbrink et al., (1997) Caucasian Americans displayed prejudice towards African Americans implicitly more than explicitly. They suggest that the display of implicit prejudice is due to cultural norms changing that restricts the display of explicit prejudice. This experiment investigated prejudice by recording and analyzing EEG and ERP data with Neuroscan SynampsRT bioamplifier. Data acquisition and analyses was accomplished using Neuroscan ACQUIRE and ANALYZE software. Stimuli were presented using Neuroscan STIM hardware and software. African American and Caucasian Male and Female participants completed a survey regarding their attitudes of interracial relationships, sexual preference, and differences in threat perception as related to ethnicity and gender. Participants then viewed photographs of Male and Female African American and Caucasian individuals that were either attractive or threatening. Pictures of African American and Caucasian infants served to create a neural activity baseline. Analysis of ERP components at approximately 160 milliseconds, representing stimulus identification (innate response), and ERP components at approximately 300 milliseconds representing stimulus decisions (socialized response) indicated significant differential neural response with significantly stronger amplitude of ERP components in prefrontal and anterior frontal areas of the brain (i.e. FP1 & FP2 significance from p=.01 to p=.008), with strongest responses in the right hemisphere. The researchers concluded that while some individuals showed significant differences in ERP amplitude for innate responses there was no overall significance for innate responses. However, there was a significant difference in ERP amplitudes for socialized responses as well as differences in

overall amplitude from innate to socialized responses in prefrontal and anterior frontal areas of the brain representing differences in executive function. Additionally, source analyses indicated different areas of the brain activated for ERP components for the different conditions presented to the subjects.

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131. CHILDHOOD TRAUMA AS A PREDICTOR OF PERSONALITY TYPES

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Research indicates childhood trauma can increase an individual's risk for developing adult morbidities, including chronic physiological diseases and cognitive and/or mental disabilities. Studies have shown correlations between specific NEO personality types and experiences of childhood trauma as well as relationships between NEO personality types and increased risk of developing adult morbidities. This study investigated possible correlations between childhood trauma and personality traits in the NEO-Five Factor Model to address current literature conclusions. It was hypothesized that a high CTQ score will correlate with the neuroticism subscale, correlate negatively with the extraversion subscale, and correlate negatively with the agreeableness subscale. Undergraduate students (N=364, where 229 are female and 130 are male and 5 did not report gender) took the Childhood Trauma Questionnaire and the NEO-Five Factor Inventory through an online, self-report survey software. The total CTQ score had a correlation value of r(362)=.198, p=.000 with respect to the neuroticism scale with all participants (N=364). Males were found to have a significantly more positive correlation with neuroticism than females do (r(128)=.311, p=.000 and r(227)=.117, p=.078 respectively where sig=.695, t=3.604, p=.000). Secondly, in the case of both females and males, no significant negative correlation was established with CTQ scores and extraversion (r(227)= -.116, p=.078 and r(128)= -.095, p=.283 respectively). Lastly, a weak but significant negative correlation was established between CTQ scores and the agreeableness scale (r(362)= -.154, p=.003). For females, the correlation was much stronger (r(227)= -.243, p=.000); while males showed a significant difference in the strength of the correlation (r(128)= -.122, p=.168) with respect to the agreeableness subscale (sig=.986, t=2.920, p=.004). Analysis of our sample showed no significant negative correlation with extraversion between genders or in general. Finally, our research found that females had the most significant negative correlation between CTQ scores and the agreeableness subscale score. Our analysis supports literature regarding the positive correlation in CTQ scores and a neurotic personality type. This work is helpful for testing the generalizability of current research findings. More research in this area is needed to find the mechanism by which childhood trauma may influence personality types. This research can aide in treatment of patients by influencing models of addressing individuals with discrete personality types.

Undergraduates

❋ Society, Behavior and Learning, Group B ❋

132. A COMPARISON OF RELIGIOUS COMMITMENT BETWEEN CONVERT AND NON-CONVERT MUSLIMS IN THE U.S.

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This study examines the difference in commitment between Muslim individuals born into Islam and those who make the decision to convert to Islam in the United States. Religious commitment is dependent on many different factors. Tradition and culture of a family can partially explain the level of commitment in individuals born into Islam. On the other hand, in converted Muslims, commitment can be accredited to the initial research and personal commitment required in the converting process. This study will be a secondary data analysis of a data set created by the PEW research center. In this study I hypothesize that converted Muslims are more religiously committed than those born into Islam. It will also provide further insight into the stem and cause of religious devotion, Islam, and Muslims.

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133. PRIMARY VS. SECONDAY VIOLENCE EXPOSURE AND MENTAL HEALTH OUTCOMES IN YOUTH WHO ENGAGE IN SEXUALLY ABUSIVE BEHAVIORS

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According to the U.S Department of Health and Human services, each year approximately 826,000 children were the victims of abuse, and/ or neglect, which does not include other types of victimization like parental substance abuse and domestic violence within the home. Primary violence exposure (e.g., physical and sexual abuse) in childhood can result in anxiety, depression, and difficulty forming attachments. Secondary violence exposure (e.g., neglect, parental substance abuse, and domestic violence) can cause chronic stress in children and negatively impact physical, cognitive, and emotional growth. Unfortunately, examining the impact of primary and secondary victimization is complicated by the interrelatedness. This current study aims to examine the unique impact of primary and secondary violence on mental health outcomes in a sample of youths receiving residential sex offender treatment. We hypothesize that primary violence exposure will be highly associated with the number of mental health

diagnoses, and use of psychotropic medications, while controlling for the impact of secondary exposure. The sample includes male adolescents (N=245: 84.1% Caucasian) who have engaged in sexually abusive behaviors and received residential treatment. Data were collected from archival records. Participants' mean age is 14.77 (SD=14.77) at time of first admission in the facility. Additionally, participants seeking mental health treatment were, on average, 10.22 years of age (SD= 4.187) at the time of first mental health diagnosis. Variables include exposure to physical or sexual abuse, experience of neglect, the presence of domestic violence and substance abuse in the home of orgin, the types of mental health diagnosis, use of psychotropic medications, and the age of onset of earliest diagnosis. First, we used partial correlations to find associations between type of violence exposure and mental health diagnoses, age of first diagnosis, and use of psychotropic medications, while extracting the influence of the alternate type of exposure. Correlations between primary violence exposure and diagnoses of mental health concerns, yielded significant associations between primary exposure and mood disorder (r=.133, p=.041) diagnoses. Also, a significant association was found between primary exposure and anxiety/trauma- related disorders (r=.160, p=. 013). Significant associations were found for both mood disorder (r=.162, p=.012) and behavioral disorder (r=.212, p=.001). Age of onset of first mental health diagnosis was not significantly correlated with primary violence exposure or secondary violence exposure. While partialing out secondary violence exposure, primary violence was associated with use of mood stabilizers (r=.127, p=.05) and antipsychotic medications (r=.146, p=.024). Secondary violence exposure was exclusively related to use of any psychotropic drugs (r=.127, p=.004), mood stabilizers or antidepressants (r=.127, p=.05), and antipsychotic medications (r=.180, p=.05). Chi-square analyses will be conducted to further differentiate these outcomes following primary and secondary violence exposure.

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134. P300 Brain Computer Interface: Two-Stimulus Presentation Paradigm

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Non-invasive Brain Computer Interface (BCI) technology can be incredibly important for those who are no longer able to communicate to due loss of muscle control. However, in comparison to other methods of non-muscular communication, such as an eye tracker, the BCI method of communication can be slow. Therefore it is important to implement techniques that can improve both accuracy and speed of BCI performance. Currently, the P300 Speller allows communication at a rate up to eight selections per minute. Given this relatively slow rate of communication highly accurate classification is of great importance. One method of improving accuracy in BCI performance has been the presentation of familiar faces rather than traditional letter flashes or character flashes. Previous studies have shown that the use of faces elicits both an N400 and N170 component in conjunction with the P300 component, resulting in greater speed and accuracy of letter selection. Functional MRI studies have shown that images of familiar locations produce unique brain responses located in distinct brain regions (i.e. parahippocampal place area). These two types of stimuli (images of faces and images of familiar locations) were incorporated into simultaneous two-stimulus presentation paradigm with the intention of developing two distinct classifiers to discriminate between

the cognitive responses produced by the spatially disparate areas. By developing stimulus specific classifiers, the BCI system could eliminate half of the characters in the matrix as potential selections, thus reducing the amount of error in performance. The present study aims to provide proof of concept. Ten able-bodied participants completed one experimental session consisting of two calibration phases. Each participant completed two calibration phases: one for face stimuli and one for house stimuli. In each calibration phase, participants spelled three-six letter words using an 8x9 matrix of alphanumeric characters and symbols. During each calibration phase, only one of the two images were presented to the participant (i.e., faces only or houses only). Participants then completed a copy spelling portion that consisted of spelling six words containing six characters each. During this time, participants received feedback in regard to the accuracy of the BCI systems character selections. Participants were instructed to continue spelling the word without correcting errors made by the BCI system. Offline analyses were conducted to examine BCI accuracy, selections per minute, and bitrate for stimulus specific classifiers. Results indicated no significant differences in accuracy; however, results showed a significant interaction of classifier (i.e., face or house classifier) by image type (i.e., face or house) for selections per minute and bitrate. Specifically, the house classifier produced higher selections per minute and bit rate when applied to house data than the house classifier applied to face data, and vice versa for the face classifier. These results indicate that stimulus specific classifiers may be able to eliminate half of the characters located in the matrix as potential character selections, thereby increasing overall BCI performance.

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135. HEALTH-RELATED QUALITY OF LIFE AND DEPRESSION AMONG PERSONS WITH CANCER: CAN GRATITUDE BE GRATIFYING?

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Depression, which is characterized by persistent negative emotions (e.g. sadness, hopelessness, guilt, worthlessness) and a loss of interest in enjoyable activities, is a primary mental health concern among the 14.1 million individuals living with cancer in the United States. Relative to the general population, persons with cancer are three times more likely to experience depressive symptoms. This heightened risk may be due to poor perceived health-related quality of life (HRQL), including illness-specific factors (e.g., pain, functional impairment), aversive effects of cancer treatment (e.g., chemotherapy) on health, and social impact (e.g., reduced ability to engage in social activities). However, not all persons with cancer are at risk for depression, perhaps due to individual-level

protective factors. One such factor is gratitude, defined as a deep appreciation for someone or something and the readiness to show thankfulness or reciprocate kindness to others. Positive emotions, such as gratitude, may provide a cognitive-emotional buffer in the context of compromised physical health, thereby decreasing subsequent risk for depression. In our current study, we examined the association between HRQL and depression, and the potential moderating effect of gratitude, in a sample of individuals currently diagnosed or in remission from cancer. At the bivariate level, we hypothesized that HRQL would be positively related to gratitude and negatively related to depression. Additionally, we hypothesized that gratitude would be negatively related to depression. In multivariate analyses, we hypothesized that gratitude would moderate the relation between HRQL and depression, such that higher levels of gratitude would weaken the association between poor HRQL and depression. Our sample of cancer patients (N=235) was primarily white (91.9%; n=216) and female (64.3%; n=151) with a mean age of 61.28 (SD=27.63). Participants completed self-report measures including the Short Form-12 Health Survey, Gratitude Questionnaire, and Beck Depression Inventory-Second Edition. Bivariate correlations and multivariate analyses, per Hayes (2013), were conducted covarying age, sex, and ethnicity. In bivariate correlations, HRQL was negatively related to depression ($p<.01$), but was not significantly related to gratitude; however, gratitude was negatively related to depression ($p<.01$). In multivariate analyses, gratitude significantly moderated the relation between HRQL and depression (SE=.004, $t=2.09$, $p<.05$, CI [.0005, .0180]), such that poorer HRQL was related to greater depression, and gratitude attenuated this association. Supporting hypotheses, gratitude moderated the relation between HRQL and depressive symptoms. It may be that, the ability of persons with cancer to develop and express gratitude can ameliorate the deleterious impact of poor health on mood. Therapeutic interventions focused on the promotion of gratitude (e.g., gratitude journals, small acts of kindness, blessings list), and which promote improved perceived health (e.g. pain, functional impairment, disease severity) may reduce the risk of depression among persons with cancer.

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136. QUALITY OF LIFE AND DRUG USE AT THE INTERSECTIONS OF GENDER IDENTITY AND SEXUAL ORIENTATION

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Sexual minorities, or those who do not identify as straight, face stigmatizing experiences which can lead to disparities in physical and mental health, as well as social and economic resources. Additionally, transgender and gender non-conforming (TGNC) persons, or those whose sex assigned at birth is not fully aligned with their gender identity, experience similar disparities related to stigma and lack of resources. The current study aimed to examine quality of life and drug use between TGNC and cisgender (or non-TGNC) individuals who all identify as sexual minorities to explore how being TGNC may further widen gaps in quality of life beyond sexual orientation. We examined four components of quality of life – physical, psychological, social, and environmental. Additionally, we examined frequency of use of various drugs as a component of quality of life and risk behavior. Within a sample of 213 sexual minorities, 63 (29.6%) identified as TGNC. Independent samples t-test were run to examine differences in quality of life

and drug use between TGNC and cisgender participants. TGNC participants reported significantly lower physical quality of life (M=13.35, SD=2.97) than cisgender participants (M=14.99, SD=2.59), t(211)=-4.05, p<.001; lower psychological quality of life (M=11.24, SD=3.18) than cisgender participants (M=12.62, SD=2.99), t(211)=-3.04, p=.003; and lower environmental quality of life (M=15.41, SD=2.78) than cisgender participants (M=16.83, SD=2.94), t(211)=-3.25, p=.001. Additionally, TGNC participants reported higher use of sleep medications (M=0.87, SD=2.01) than cisgender participants (M=0.39, SD=1.29), t(210)=2.06, p=0.040; higher use of opioids (M=0.30, SD=0.98) than cisgender participants (M=0.05, SD=0.38), t(210)=2.66, p=.008; and higher use of barbiturates (M=0.03, SD=0.18) than cisgender participants (M=0.00, SD=0.00), t(211)=2.21, p=.028. These findings indicate that experiences related to gender identity may explain additional disparities in quality of life above and beyond those related to sexual orientation, and that future research should examine multiple identity characteristics when attempting to explain health disparities.

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137. DIFFUSION OF 100% TOBACCO FREE POLICIES IN HIGHER EDUCATION INSTITUTIONS IN TENNESSEE

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Annually, tobacco use in Tennessee (TN) accounts for 11,380 premature deaths and over $5 billion in economic costs. Youth cigarette and smokeless tobacco use in TN is higher than the national averages (11.5% vs. 10.8% and 11.0% vs. 7.3% in 2015). As 99% of smokers take up the habit by age 26, it is crucial that higher educational institutions (HEIs) take roles in reducing usage of tobacco and alternative tobacco products (ATPs) such as e-cigarettes among student community climates by enforcing school tobacco policies (STPs). This project will incorporate a five-phase mixed-methods approach with qualitative and quantitative assessments. This approach involves literature reviews of methods used to rate STPs, conducting 6 focus group discussions with students and school administrators to discuss obstacles to STPs, developing a rating system to compare STPs, assessing the 108 STPs in TN, and publishing results. Of the STPs from the 49 public institutions in TN published online, 11 lack coverage for ATPs, and 6 only limit smoking within certain building radii. This demonstrates variance in TN STPs. Currently, no best practice TN policy instrument exists to guide HEIs in developing

policy, making it necessary to develop such an instrument. This project will define the obstacles to STPs, as well as incentivize institutions to improve their STPs by evaluating and publishing their deficiencies. Reports will also be sent to each HEI's President, Health Department, Student Government Association, and any other opportunity structure for change.

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138. ARE CHILDHOOD VICTIMS MORE ARTISTIC? THE RELATIONSHIP BETWEEN CHILDHOOD MALTREATMENT AND CREATIVE BEHAVIOR

Amy Holland, Jasmine Cabral, James Lewis, Joey Tucciarone and Dr. Chris Dula. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

The current rate of reported child abuse in the United States is that of 9.2 victims per 1,000 children, with 17% of those victims suffering from physical abuse. There is long-standing support within the literature that suggests childhood maltreatment can be detrimental, and lead to negative effects on socio-emotional, behavioral, and cognitive development later in life. This study attempts to examine the relationship between various types of childhood maltreatment and creative behaviors later in life. Creative behavior is defined as having heightened ability to create, especially within the arena of fine arts. The types of abuse covered within this study were: physical abuse, physical neglect, emotional abuse, emotional neglect, sexual abuse and minimization/denial as well as a measure of overall maltreatment. It was hypothesized that the various types of childhood maltreatment would be positively correlated to creative behavior, with physical neglect and physical abuse having the strongest relationships. The data was based on the Childhood Trauma Questionnaire (CTQ) and the Creative Behavior Inventory (CBI). It was collected via an online participant management system; through which psychology students complete self-report measures in exchange for extra credit in their courses at a rural, Southeastern university. Data was examined using the Statistical Package for the Social Sciences (SPSS) software. A significant, weak correlation was found between overall total of childhood maltreatment and creative behavior. A significant Pearson's Product Moment correlation of .16 was found between creative behavior and physical neglect and a correlation of .18 was found between creative behavior and physical abuse. Further, there was a significant correlation between sexual abuse and creative behavior of .17. Evidence suggests that engagement in creative behavior could be an effective coping mechanism for victims of childhood maltreatment.

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139. STIGMA AND SUICIDE RISK AMONG THE LGBTQ POPULATION: CONDITIONAL INDIRECT EFFECTS OF DEPRESSION AND CONNECTEDNESS

Megan Jordan, Kelley C. Pugh, Andrea Kaniuka, and Jameson K. Hirsch, Ph.D.
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Suicidal behavior is a significant public health problem, and LGBTQ individuals may be at particular risk, perhaps due to sociocultural (e.g., stigma) and psychopathological (e.g., depression) risk factors. For instance, LGBTQ individuals experience greater prevalence of depression, a known risk factor for suicide, at a rate 1.5 times higher than that of the general population. As well, up to 20% of sexual minority adults have attempted suicide in their lifetime, compared to 1% of the general population. It may be that the perceived stigma associated with minority sexual orientation contributes to the development of depressive symptoms, and, ultimately, to suicide. However, not all LGBTQ individuals who experience stigma or depression go on to engage in suicidal behavior, perhaps due to individual-level protective factors which buffer risk. One such protective factor is connectedness, which is understood as the aspects of community affiliation that fulfill one's need for belonging, and is associated with reduced risk for psychopathology among marginalized communities. However, no published research has examined the progression from perceived stigma to depression to suicidal behavior, accounting for the role of connectedness to the LGBTQ community. Thus, we examined the mediating effect of depressive symptoms on the perceived stigma-suicidality linkage, hypothesizing that higher levels of perceived stigma would be related to greater depression and, in turn, to greater suicide risk, and that connectedness to the LGBTQ community would moderate these associations. Our sample of self-identified LGBTQ individuals (N= 303), primarily identified as female (n=201; 44.8%) or male (n=135; 30.1%), White (n=365; 81.7%), and lesbian/gay (n=209; 46.8%), with a mean age of 35.18 years (SD=16.31), and completed self-report measures: Perceived Stigma Scale, Patient Health Questionnaire, Suicide Behaviors Questionnaire-Revised, and Connectedness to the LGBT Community Scale. Conditional indirect analyses were conducted, covarying age, birth sex, and race. In bivariate analyses, perceived stigma, depression, and suicide were all positively correlated ($p<.001$). Connectedness was negatively related to suicide ($p<.05$), but was not significantly related to other variables. In multivariate analyses (10,000 bootstrapped samples), the direct effect of perceived stigma on suicide risk decreased in significance when depressive symptoms (DE=.27, SE=.11, $p<.05$; IE lower 95% CI [.04, .49]) was tested, indicating mediation. Further, connectedness moderated the stigma-depression linkage (β =-.13, SE=.05, $t(293)=-2.59$, $p<.05$). Individuals with greater perceived stigma reported more depression and, in turn, more suicide risk, and connectedness to the LGBTQ community weakened this association. Our findings may have clinical implications. Therapeutically addressing depressive symptoms (e.g., via Cognitive Behavioral Therapy), and promoting connectedness to the LGBTQ community (e.g., encouraging LGBTQ

patients to attend advocacy marches or pride events) may reduce suicide risk among LGBTQ individuals.

140. POSTTRAUMATIC STRESS DISORDER SYMPTOMS AND SUICIDAL BEHAVIOR IN VETERANS: IS LACK OF SLEEP THE KEY?

Chelsea Lane, Jessica McKinney, and Jameson K. Hirsch, Ph.D. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Suicide is the 10th leading cause of death in the U.S. and, in the general population there were more than 41,000 deaths by suicide in 2015. Of those deaths, veterans comprised a disproportionate amount (18.5%), with risk for suicide 21% higher among veterans compared to civilian adults. One potential reason for these increased rates is the presence of PTSD, as veterans are more likely to have been exposed to traumatic events (e.g., combat, military sexual trauma). Of note, like suicide, rates of PTSD are disproportionately high in veterans, almost double the rate of civilians. Although previous research has speculated about underlying mechanisms linking PTSD and suicide (e.g., thwarted interpersonal needs, anger), not all potential explanatory factors have been explored. One relatively unexplored factor, insomnia (i.e., persistent problems falling and staying asleep), is a common symptom of PTSD, and may lead to disruptions in relationships, as well as vulnerability in emotion regulation (i.e., increased irritability) and executive functioning (i.e., poorer decision-making), thus increasing suicide risk. However, this premise has not been tested. In the current study, we hypothesized that PTSD symptoms, suicidal behavior, and insomnia would be significantly, positively related. We also hypothesized that insomnia would mediate the relation between PTSD symptoms and suicidal behavior, such that higher levels of PTSD symptoms would be related to increased levels of insomnia and, in turn, to greater suicide risk. Our sample was comprised of community-dwelling veterans who self-reported trauma exposure (N=545; 70.1% male (n=382); 86.4% Caucasian (n=469), Mean Age=49.86, SD=16.78). Participants completed self-report measures, including: PTSD Checklist-Military Version, Suicidal Behavior Questionnaire-Revised, and Insomnia Severity Index. Bivariate correlations and a simple mediation analysis were conducted, covarying age, sex, race, VHA usage, and service era. Supporting bivariate hypotheses (p-values <.001), PTSD symptoms, suicidal behaviors, and insomnia were all significantly, positively related. Further supporting hypotheses, in a simple mediation analysis (10,000 bootstrapped samples), the direct effect of PTSD on suicidal behavior (DE= .0631, SE= .0106, p<.001; IE 95% CI= .0423 to .0840) was reduced, but remained significant, when insomnia was added as a mediator, indicating mediation. Our findings indicate that the relation between PTSD and increased suicide risk may be due, in part, to the impact of insomnia. Our findings may have clinical implications. Treatments that focus on targeting both PTSD (e.g., Cognitive Processing Therapy, Prolonged Exposure Therapy) and insomnia (e.g., Cognitive Behavioral Therapy-Insomnia, sleep medications) may help reduce risk of suicidal behavior within the veteran population, particularly for those experiencing post-traumatic stress disorder.

141. ***withdrawn***

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142. EARLY AFFLICTION AND LATER ADDICTION: IS CHILDHOOD MALTREATMENT AND ADULT INSECURE ATTACHMENT STYLE RELATED TO SUBSTANCE ABUSE?

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This study examined how past exposure to various types of childhood maltreatment relates to attachment styles in adulthood, and how these two variables are associated with levels of alcohol/drug use and addiction issues. Understanding how substance use problems develop is important to prevention efforts and in treating addicted individuals. Frequently, drug addiction has been explained under the concept of the "disease" model, and research indicates there are various factors involved in this concept, such as maltreatment during childhood and adult insecure attachment styles. Childhood maltreatment has also been found to be associated with an insecure attachment style of adulthood (Hankin, 2005). Additionally, insecure attachment may increase susceptibility to, and/or maintenance of, substance problems (Thorberg & Lyvers, 2006). Participants came from a convenience sample of psychology classes at a middle-sized Southeastern university, who participated via an online participant management system, after IRB approval was obtained. It was hypothesized that experiences of childhood maltreatment would be significantly and positively correlated with adult insecure attachment scores, and that childhood maltreatment and insecure attachment would have significant, positive correlations with levels of alcohol/drug use and addiction issues. Pearson's productmoment correlation analyses findings supported H1, but only partially supported H2. There were significant positive correlations between types of childhood maltreatment and insecure attachment. However, adult insecure attachment scores were positively but weakly correlated with one measure of substance abuse/addition, specifically the DAST.

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143. WHERE'S THE FEMME: THE ABSENCE OF FEMME REPRESENTATION IN ANN BANNON'S NOVELS

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Prior to freedom rallies and equality parades, before inspiring speeches and inclusive journals, women were bound by the rules and laws of a man's world. Such restrictions were even harsher for homosexual women. From the 1950s to the Second Feminist Movement of the 1990s, social changes occurred within the gay and lesbian community due to writers such as Jack Kerouac and Allen Ginsberg—both known for experimenting with homosexual relationships — and the lesser known female writers of the day, including Joyce Johnson and Elise Cowan. One unusual case is that of Ann Bannon, a suburban housewife turned author of lesbian literature. Her pulp fiction writing style allowed for this minority group of women to tell a story they felt was being ignored — their own. These "girl meets girl" tales revolved around the secrecy associated with such

a relationship when it was socially unacceptable. The current study, a literary analysis, will examine butch and femme attributes within Ann Bannon's characters in Odd Girl Out and I Am a Woman. This study will focus on the three main relationships, interpreting conversations between characters and deciphering the actions and thoughts associated with the identified character. The relationships that will be examined include: Laura Landon and Beth Cullison; Laura and Marcie; and Laura and Betty Jean "Beebo" Brinker. By exploring the listed relationships, the expected results will indicate a limited representation of femme characters. If this proves the opposite, the next course of action would be to engage in the next two books of The Beebo Brinker Chronicles by examining butch and femme characteristics in developing relationships.

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144. YIK YAK: THE STUDY OF ANONYMOUS RACISM

Olivia Moses, Stefan Owens, Dr. Jason Steadman, and John Cain. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Yik Yak, a social media application where users can post anonymously, has gained widespread popularity recently amongst college campuses. Some publications are claiming that Yik Yak brings animosity to campuses and has potentially negative effects on users. However, in the current study, we seek to evaluate the true content of Yaks (user posts), with a future goal of assessing how different users respond to different contents. In the current study, a computer program called Yakle, written by one of the study authors, was used to capture 100 Yaks at a time from all locations entered into the program (using GPS coordinates). These Yaks are automatically saved as Excel spreadsheets. The entire process takes only a few seconds. In this study, we collected Yaks from a random sample of 50 different US universities, stratified into groups to ensure we collected from urban, rural, public, private, large, and not large (small or medium-sized) universities. Then, we combined all of the data from each university into a single excel spreadsheet. For the current study, we will import the spreadsheets into NVIVO for qualitative content analysis. Through NVivo, we will next search the Yaks for any content about race, in order to identify if there may be different racial attitudes present across different universities in different regions. These data will provide burgeoning evidence about how consumers use anonymous social media and generate insights into the nature of student life on college campuses. The methodology used in this study can be used across the country to evaluate crucial aspects of local life around college campuses.

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145. *withdrawn*

Undergraduates

❋ Society, Behavior and Learning, Group D ❋

146. SOCIAL SUPPORT FOR PHYSICAL ACTIVITY FOR HIGH SCHOOLERS IN RURAL APPALACHIA

Pooja Shah and Dr. Jodi Southerland. Department of Community and Behavioral Health, College of Public Health, East Tennessee State University, Johnson City, TN.

The purpose of the present study is to conduct a secondary qualitative analysis to examine parent, teacher, and high school adolescents' perceptions of social support for physical activity for high schoolers in Southern Appalachia. Social support for physical activity (PA) is linked to higher rates of physical activity participation in adolescents. Parents, siblings, and peers provide key sources of support. Social support for PA may be even more important in under-resourced communities such as Appalachia, where geographic, economic, and environmental barriers negatively impact PA engagement. During 2013-2014, focus groups and semi-structured interviews were conducted with parents of adolescents (n=39), high school teachers (n=38), and high school students (n=21) in six counties across rural Southern Appalachia as part of a grant-funded qualitative study to assess parental involvement strategies in school-based adolescent obesity prevention programs. We conducted a secondary analysis of the dataset from this study, focusing specifically on participants' responses about family and peer supports for PA for adolescents. We used thematic analysis to analyze the data and develop overall themes. Four categories of social supports for PA emerged: instrumental, conditional, motivational, and informational supports. Instrumental supports included providing transportation, paying fees, enrollment in sports, and access to equipment for PA at home. Performing PA with adolescents, modeling, watching/supervising, and prioritizing physical activity emerged as conditional supports. Several motivational supports were also identified: encouragement over life course, force, and admiration of people who are active. Participants also identified key informational supports including discussion by parents/teachers about how to be physically active, its importance and benefits and general advice/information. While some supports were widely available (e.g., equipment and encouragement), others such as transportation were limited in availability. Moreover, students highlighted being made fun of by peers when engaging in PA together as a constraint. Differences emerged in how the three groups conceptualized and attached meaning to the types of supports. While a range of social supports for PA exist for high schoolers in Southern Appalachia, supports emphasized by students, parents, and school personnel vary. These findings can be used to inform program and practice in physical activity research in rural Appalachia.

147. DEVELOPMENT OF SEXUALLY ABUSIVE BEHAVIOR IN ADOLESCENT MALES WHO HAVE BEEN SEXUALLY VICTIMIZED

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Childhood sexual abuse is represents a significant public health problem in the United States, as 21% of U.S. children experience sexual victimization prior to age 18. Research dedicated to preventing further sexual victimization has identified factors that influence the development of sexually abusive behavior. The abused-abuser hypothesis suggests that a prior history of sexual victimization may increase the risk of engaging in sexually abusive behavior among some victims. Some research has also investigated the relationship between characteristics of an individual's experiences of sexual abuse and the characteristics of their own sexually abusive behavior, but such research is scarce with inconsistent findings. For the present study, we first hypothesized that childhood sexual victimization is more prevalent among those who have engaged in sexually abusive behavior than those who have not. We also posited that among those who have engaged in sexually abusive behavior, their own sexual abuse experiences contribute to victim choice, the age at which they begin sexually abusing others, and the frequency of abuse. Our sample (N=529; 100% male; 84.7% Caucasian; M = 17.71) consisted of participants from two larger studies of university students with no known history of sexually abusive behavior (n = 286; 84.6% Caucasian; M = 20.18) and youth who have engaged in sexually abusive behaviors and received residential treatment in the Southeastern U.S (n = 243; 84.8% Caucasian; M =14.79). Data from university students were self-reported, while data from the residential youth were coded from archival records. Results of a chi-square analysis revealed that youth who have engaged in sexually abusive behavior were significantly more likely to have experienced childhood sexual abuse than non-sexual abusers, χ^2 (1, N=523) =210.788, p = .000. Additionally, within the sample of youth who have engaged in sexually abusive behavior, correlations were used to examine relationships between characteristics of their own sexual perpetrators and their victim choice. Results indicate being victimized by a male is significantly associated with having a male victim (r= .143, p=.033), being victimized by a relative is associated with sexually abusing a relative (r=.148, p=.024), and being victimized by a non-relative is associated with sexually abusing a non-relative (r=.194, p=.033). Findings thus far indicate that youth who have engaged in sexually abusive behavior have not only experienced greater sexual victimization than non-sexual abusers, but that the characteristics of their sexual perpetrators may relate to how they sexually abuse others, specifically with regard to victim choice. Additional analyses will examine whether these characteristics of sexual victimization influence the age of onset of their sexual offending and their number of arrests, sexual offenses, and victims. Future directions and limitations will also be explored.

148. P300 BCI: A SIMULATION OF RANDOM EYE MOVEMENT

Kelsey Shubert, Marissa Kellicut-Jones, Caitlyn Swymer, T. J. Wiley, Dave Ryan, and Eric Sellers. Department of Psychology, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

People who suffer from amyotrophic lateral sclerosis (ALS) eventually lose all voluntary muscle control. In the late stages of the disease, traditional augmentative and alternative communication (AAC) devices fail to provide adequate levels of communication. Brain-computer interface (BCI) technology has provided effective communication after all other AAC devices have failed. Nonetheless, EEG-based BCI devices may also fail for people with late-stage ALS due to loss of voluntary eye movement. Specifically, some people may suffer from random eye movement (nystagmus) and/or drooping of the eyelids (ptosis). The current study is the first attempt to simulate involuntary random eye movement in able-bodied individuals. This study employs the P300-based BCI. The system presents a matrix (6x6 in this study) of letters and numbers to participants on the computer screen and their task is to focus attention to a specific item within the matrix. The attended item of the matrix will produce a P300 event-related potential (ERP). The BCI determines which item produced the largest P300 ERP and presents (types) this item on the computer screen. To simulate involuntary random eye movement the 6x6 matrix would move in random directions in increments of 1–5 pixels "Jitter 1" or increments of 10–15 pixels "Jitter 2". Movement (i.e., jitter) occurs during the inter-stimulus interval (ISI), which is the time between the offset of one character flash and the onset of another character flash. The matrix can move in the X dimension, Y dimension, or in both dimensions simultaneously. Participants complete two conditions: 1) control (i.e., no jitter) and 2) one of the two Jitter conditions (counter-balanced). Prior to each condition, each participant completed a calibration phase with eighteen character selections (three six letter words). Following calibration, each participant was presented with 18 more characters and the computer provided online feedback to indicate if the BCI selected the character the participant intended for it to choose. To date, six participants have completed the experiment. Three participants completed the control condition and Jitter 1 and three completed the control and Jitter 2. Preliminary data indicate highest accuracy (number of characters selected correctly) in Jitter 1 (100%), followed by Control (94%), and lowest accuracy in Jitter 2 (81%). In addition, participants were surveyed in regard to distraction and attentional focus. Surveys indicate that participants in Jitter 1 found it less distracting and easier to focus in Jitter 1 than control. Whereas, participants in Jitter 2 found it more distracting and harder to focus in Jitter 2 as compared to control. The data indicate that modest amounts of matrix movement may not be deleterious to performance, and may in fact improve performance through increasing attentional resources to the task. In Jitter 2 a decline in performance was observed; however, accuracy was still adequate for effective communication.

149. THE RELATIONSHIP BETWEEN BREASTFEEDING PRACTICES AND POSTPARTUM DEPRESSIVE SYMPTOMS AT SIX MONTHS POSTPARTUM IN APPALACHIAN WOMEN

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Introduction: Postpartum Depression and postpartum depressive symptoms have been found to have a strong association with breastfeeding duration in a significant portion of women across a variety of geographical locations. The aim of this study was to explore the correlation between postpartum depressive symptoms at 6 months postpartum and total duration of breastfeeding measured at 15 months postpartum in Appalachian women. Methods: A longitudinal study was conducted in which 1,063 mostly low socioeconomic status women were recruited across 6 prenatal practices in Appalachia. At 6 weeks, 6 months, and 15 months postpartum, depressive symptoms were measured using the Edinburgh Postnatal Depression Scale (EPDS). From the original sample, 134 completed a self-report measure of breastfeeding initiation and duration at 15 months postpartum. Results: EPDS score did not predict whether or not women breastfed, only their duration of breastfeeding. Women who scored in the clinically significant range (13 or higher) on the EPDS at 6 months postpartum breastfed a significantly shorter length of time (Mean = 1.75 months, SD = 2.70) than women who scored below 13 on the EPDS (Mean = 4.48 months, SD 5.22; $t(133) = 3.61$, $p = .001$). Conclusion: Clinically significant Edinburgh Postnatal Depression Scale scores were predictive of shorter duration of breastfeeding.

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150. SHOULD INK EFFECT THE WAY YOU THINK? EXAMINING THE RELATIONS BETWEEN STIGMA AGAINST TATTOOS AND RELIGION

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This study will examine how affiliation with various religious beliefs impacts views on tattoos, and how these two variables influence one another relation to differences, such as gender and denomination. According to the literature, various religious beliefs view tattoos in association with deviant behavior. Tattoos are also associated with a negative stigma, in which people may hold fears or discriminatory feelings toward individuals with tattoos, which may cause some individuals with tattoos to be perceived as discredited by others in society. This study aimed to evaluate the correlation between religious beliefs, specifically denominations with more conservative beliefs, and tattoo stigma. Also, to determine if differences in sex or race have different views of stigma against tattoos. Participants from a convenience sample of various psychology classes at a middle-sized Southeastern university, will participate via an online participant management system, in exchange for modest extra credit. Data was examined by using a

Statistical Package for the Social Sciences (SPSS) software, and all research was approved by the Institutional Review Board (IRB), prior to data collection. It was hypothesized that with an increased acceptance of tattoos in mainstream culture, there would be a negative, significant relationship between religiosity and tattoo stigma, however, data did not support H1. As for H2, it was hypothesized that there would be significant difference in attitudes toward tattoos between males and females. An independent samples t-test was calculated to assess differences in reporting stigma against tattoos levels between females and males. There were significant sex differences. The result shows that there is a significant difference between the male (M=34.72, SE= 1.769) and female group (M=29.99, SE=.944) in terms of stigma level toward tattoos, with males significantly higher at .05 level. t(102.26 equal variance not assumed)=-2.362, P = .020>.025, supporting H2.

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151. USE OF POINT OF USE GRAVITY-FED ULTRAFILTRATION MEMBRANE FILTERS TO REDUCE DIARRHEAL ILLNESSES: A REVIEW OF THE LITERATURE

Jamie Wilson and Jodi L. Southerland, DrPH. Department of Community and Behavioral Health, College of Public Health, East Tennessee State University, Johnson City, TN.

Background. Nearly one billion people worldwide lack access to safe drinking water. Unsafe water is a primary cause of infectious diseases globally. In fact, approximately 5,000 children under 5 years of age die from diarrheal illnesses every day, often the result of ingesting polluted water. Point of use (POU) technology (eg, a method of purifying water at the time of consumption) is widely supported as a cost-efficient, intermediary solution to combat water insecurity, and typically leads to >45% reduction in diarrheal illnesses. Methods. The present review of the literature aims at examining the effectiveness of POU gravity-fed ultrafiltration membrane filters on reducing diarrheal illnesses in communities without access to safe drinking water. A comprehensive literature search was conducted to identify all studies published between 2006 to December 2016. Inclusion criteria: studies using the POU gravity-fed ultrafiltration membrane filters to improve water quality and prevent diarrheal illnesses. Results. Ten studies met all criteria. The majority were conducted in community-settings in Africa (n=4) or South America (n=2). The Lifestraw Family was the most commonly used filter (n=6), followed by Sawyer PointOne (n=2) and Skyhydrant (n=1) and 70% of the studies were published from 2012 onward (n=7). The types of interventions and study designs varied widely but most included training on adherence and use of the filters and used a randomized control trial design. The majority of studies (n=9) reported that POU ultrafiltration systems improved water quality. Of the six studies that assessed the filters' impact on reducing diarrheal illnesses, two-thirds found the filters effective. Differences in findings may be explained in part by differential adherence to filter use, storage of water, and continued use of nonfiltered water. Conclusion. This evidence suggests that POU gravity-fed ultrafiltration membrane filters offer a promising approach to improving water quality and reduction of diarrheal illness when used properly. Incorporating multifaceted approaches such as water, sanitation and hygiene (WASH) education and use and maintenance of filters may enhance effectiveness.

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152. EFFECT OF SOUTHWEST-AIRTRAN MERGER ON PRODUCT QUALITY

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Little attention has been given to the impact of airline merger on air product quality. This paper empirically investigates this issue for the merger between two low-cost carriers: Southwest and Airtran, by using difference in difference methodology. Product quality is measured by the percentage ratio of nonstop flight distance to the product's itinerary flight distance between origin and destination. Our results suggest that the merger is associated with a quality decrease in the routes where at least one of the merging airlines provided services during the pre-merger period. Furthermore, we find that the product quality is most negatively affected by the merger in the overlapping routes, where Southwest and Airtran competed with each other before the merger. This effect is least in the routes where only Southwest had pre-merger operation.

Undergraduates

❋ Biomedical and Health Sciences, Group A ❋

153. THE EFFECTS OF SIMULATED SPACEFLIGHT ON MOUSE OVARIAN MORPHOLOGY

Adegbemisola Khadijat Aregbe and Dr. Allan Forsman. Department of Health Sciences, College of Public Health, East Tennessee University, Johnson City, TN.

Over the last half century, humankind has successfully sent people into space. The majority of these spaceflights have been in orbit around Earth, and a small portion of these have extended to the moon. Spaceflights that orbit Earth can range in altitude from 160 to 2000km, with the international space station averaging approximately 400km. This range of orbit is referred to as low earth orbit (LEO). Organisms traveling in LEO receive higher doses of radiation than organisms living on Earth because they are outside of the ozone layer, which shields Earth from UV radiation. Earth is also shielded from cosmic radiation by a phenomenon known as the Van Allen Belts, which absorb high-energy cosmic radiation. However, outside of LEO and the Van Allen Belts, on journeys to the moon or potentially other planets, organisms are exposed to extensive amounts of radiation. Journeying to the nearest planet, which would take about 9months, would mean exposure to high energy radiation for extended periods of time. . If mankind is ever to venture to and colonize other planets it is essential that we understand the effects of radiation on the reproductive system. The effects of radiation on female reproductive tissues is relatively unstudied and thus unknown. The majority of data regarding the effects of exposure to high levels of radiation have come from studying survivors of the atomic bombings of Nagasaki and Hiroshima, or from nuclear accidents such as Chernobyl and Fukushima. Therefore this study was designed to determine the effects of whole body irradiation and or spaceflight on the female reproductive system, with a focus on the ovaries. To conduct this study, female mice were subjected to conditions which simulate various aspects of space flight such as simulated microgravity and whole body irradiation. The mice were divided into 4 groups; control, simulated microgravity, whole body irradiation and simulated microgravity/whole body irradiation. The experiment was then sub-divided into 3 phases whereby the mice were allowed to live for either 1 month, 4 months or 9 months, post irradiation. At the appropriate time, mice were sacrificed and the ovarian tissues were harvested and preserved in 4% paraformaldehyde. Tissues were subsequently embedded in paraffin, sectioned and stained using an H & E staining procedure. The stained tissue is being evaluated for follicular and luteal health using standard light microscopy and comparisons made between the various treatment groups. To date we have only just begun data collection.

154. OVEREXPRESSION OF CTRP3 PREVENTS ALCOHOL-INDUCED MORTALITY

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Cirrhosis of the liver is a disease in which continual damage to the liver tissue results in a gradual replacement of hepatic tissue (liver tissue) with scar tissue. Eventually, enough hepatic tissue is lost and the liver is no longer able to function. Hepatic cirrhosis is the 12th leading cause of death in the United States and the developed world, with excessive alcohol consumption, or Alcoholic fatty liver disease (ALD) accounting for more than half of all causes of hepatic cirrhosis. C1q/TNF-related protein-3 (CTRP3) is a novel adipokine, which has been shown to modulate hepatic glucose and lipid metabolism. In addition CTRP3 reduces high fat diet-induced hepatic lipid accumulation and inflammation, the precursors to hepatic cirrhosis. The overall purpose of our lab's research project is to determine if CTRP3 could prevent alcohol–induce liver lipid accumulation and inflammation, thus preventing Alcohol-induced cirrhosis. Specifically, our hypothesis for this experiment was that elevated levels of circulating CTRP3 would decrease mortality in mice exposed to chronic alcohol consumption. Methods: Wildtype C57BL/6 mice or littermates with a transgenic over-expression of CTRP3 were placed on Lieber-DeCarli liquid diet with or without 5% ethanol for six weeks. Results: wildtype female mice had a 50% mortality compared to Control fed animals and wildtype male mice had a 30% mortality rate. Transgenic overexpression of CTRP3 completely prevented ethanol induced mortality in male mice. Experiments with transgenic overexpression in female mice still need to be performed. Further, histological analysis of the livers showed a reduction of inflammation and hepatic lipid accumulation with CTRP3 overexpression. Conclusion: Excessive alcohol consumption causes observable changes to the histopathology of the liver, and those changes were prevented by over-expression of CTRP3. Future studies will need to determine if CTRP3 also protects female mice and if treatment with CTRP3 can help reverse alcohol-induced liver damage.

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155. PATHOLOGY OF INSULIN LIKE GROWTH FACTOR IN THE ANTERIOR CINGULATE CORTEX IN AUTISM

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Autism spectrum disorder is a condition that presents with a complexity of issues ranging from communication difficulties to sensory processing issues. Autism has grown in prevalence from 2000 by 119.4 percent with no etiology to link the growing diagnosis. However, one trademark of the disorder is the increase in synaptic connections

throughout parts of the brain. Insulin like growth hormone, IGF1, is produced by the liver and in the brain. In the brain, IGF1 is responsible for normal brain growth and proper neurotransmission. The hormone intracellular signaling cascade occurs through the membrane receptor IGF1- Receptor (IGF1R) to activate the Akt phosphorylation pathway that increases the expression of the mammalian target of rapamycin (mTOR). This pathway plays a major role in the creation of dendritic synapses and the maintenance of neuronal plasticity. Previous studies found that mTOR gene expression were decreased in ASD postmortem brain tissue when compared to typically developing control brain tissue while the peripheral levels of IGF1 were increased. The following study found that IGF1 gene expression levels were increased specifically in anterior cingulate cortical (ACC) brain tissue from ASD donors. Data from our laboratory previously demonstrated that gene expression for NTRK2, also an activator of mTOR, were decreased in ASD donor tissue. Therefore, IGF1R studies are crucial in determining if mTOR dysfunction is associated with changes in gene expression for two different membrane receptors, NTRK2 and IGF1R, that initiate the signaling cascade in the ACC in autism. Currently, treatments with IGF1 are being used in syndromic neurological disorders with autistic features including Rett Syndrome and Phelan-McDermid Syndrome. Our data demonstrates that IGF1 is elevated in ASD, thus treatment with the synthetic hormone may not be effective. The targeting of downstream signaling molecules may be a better avenue for drug treatments to reverse the impairments or symptoms of the disorder.

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156. STUDY OF THE ASSOCIATIONS OF METABOLIC HORMONES AND METABOLIC SYNDROME IN A PEDIATRIC HISPANIC POPULATION IN NORTHEAST TENNESSEE

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East Tennessee has one of the most rapidly growing Hispanic population in the country. Further, it has been previously reported that this population is at an increased risk for developing metabolic syndrome (MetS), which is characterized by central obesity, abnormal blood lipids, hypertension, insulin resistance, and glucose intolerance. Our collaborators at the Johnson City Community Health Center (JCCHC) observed these indicators of MetS even in young children, between the ages of two and ten. The principle objective of this research project was to examine the prevalence of risk factors for MetS and establish an expanded metabolic profile of young Hispanic children. These factors have not been previously examined in this population. Our working hypothesis is that even at a young age markers of MetS, specifically dysregulated hormone levels, are present in this pediatric population. Methods: In this cross-sectional analysis, a total of 118 Hispanic children between 2-10 years of age (Mean 6.4 ± 2.7, 45% male) age adjusted anthropometric measurements and blood samples were obtained. Blood samples were analyzed for glucose, and lipids (triglycerides, LDL (low density lipoprotein) and HDL (high density lipoprotein) cholesterol) and C-reactive protein through ETSU clinical labs. Insulin, adiponectin, leptin, ghrelin, CRP, IL-6, and TNF-a levels were measured using commercially available assays (Bio-Rad® Multiplex Immunoassay System). Results: There was a significant positive correlation with leptin and adiponectin levels

and BMI. Further, children with 2 or more risk factors for metabolic syndrome (as determined by age- and sex-specific: waist circumference, blood pressure, HDL, and triglyceride measures) had significantly elevated leptin levels. The proportional relationship between these metabolic hormone levels and the central obesity indicator confirms that metabolic abnormalities are present in the pediatric Hispanic population at a young age in Northeast Tennessee. The predisposition for this demographic developing metabolic syndrome is evident with indicators being present so early in life. With Tennessee being ranked third in the nation for Hispanic population growth rate, these findings indicate a need for early age intervention protocols for Hispanic children in order to reduce their risk of developing metabolic syndrome.

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157. MICROBIAL WARFARE: THE INHIBITORY EFFECTS OF ALCALIGENES FAECALIS ON STAPHYLOCOCCUS AUREUS AND CANDIDA ALBICANS

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Science and medicine are only beginning to appreciate the complex interactions among microorganisms, both in the environment and in the human body. Particularly important among these relationships are bacterial-bacterial interactions and bacterial-fungal interactions. Bacteria exhibit both mutualistic interactions with other microorganisms to promote pathogenesis, form complex biofilms, and develop antibiotic resistance, as well as, antagonistic interactions to gain a competitive advantage for nutrients, space, and other resources. Through these antagonistic interactions we can learn more about the strategies and arsenals at their disposal, thus, explore possible areas for development of new medical therapeutics. Our laboratory has previously shown that the bacterium Alcaligenes faecalis exhibits potent inhibitory effects on Staphylococcus aureus (a fellow prokaryote) and Candida albicans (a eukaryote). Currently, S. aureus and C. albicans are two of the most common hospital acquired infections, exemplify how microorganisms can acquire drug resistance, and the impact this has on human health. We therefore investigated the effects that A. faecalis in conjunction with antimicrobial treatment has on both clinical and laboratory strains of S. aureus and C. ablicans. Using both planktonic and biofilm assays we monitored the survivability of S. aureus and C. albicans strains when exposed to a combination of A. faecalis and current antimicrobial treatments for S. aureus (the antibiotic Bacitracin) and C. albicans (the antifungal Amphotericin B). Both organisms were inhibited by A. faecalis and antimicrobials separately. This inhibition was compounded when S. aureus or C. albicans were grown with a combination of A. faecalis and antimicrobials, thus showing a possible synergistic effect. These results were observed in both planktonic and biofilm assays. Our data indicates that S. aureus and C. albicans, when grown with A. faecalis, are more susceptible to antimicrobial treatments at lower doses than would typically be used for microbial selection. Elucidating the mechanisms from these experiments could potentially give new possibilities for treatment, as well as, possible new therapeutic interventions and targets.

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158. VITAMIN E IN HUMAN BREASTMILK

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Vitamin E is an essential nutrient that primarily acts as an antioxidant to eliminate harmful free radicals in cells. Its nutritional effects have been used to treat and prevent various chronic diseases including heart disease and cancer. There are eight forms of vitamin E that have assorted degrees of chemical and biological functions. Alpha (α), beta (β), gamma (γ), and delta (δ) isoforms of both tocopherol and tocotrienol comprise the eight forms, with tocopherol having a saturated side chain and tocotrienol having an unsaturated isoprenoid side. Given its antioxidant properties, this study examined levels of vitamin E's isoforms, α-, β-, γ- and δ-tocopherol, in human breastmilk (BM) from both overweight (OW) and normal weight (NW) women to find its relation to a woman's weight. A protocol of vitamin E extraction was first devised to provide a methodology for further analysis of tocopherol content. The samples were collected from 45 Caucasian women (24 NW, body mass index (BMI) 18.5 to 24.9 kg/m2) and 21 OW (BMI >25.0 kg/m2)) within their second and fourteenth lactation week. A 10 mL aliquot of BM samples was frozen (-80°C) for storage and later analysis. Each BM sample was first treated with an internal standard containing 0.124 μM Rac-5, 7-dimethyl tocol and ethanol. After hexane extraction, the sample solutions were dried under nitrogen gas and resuspended with an unsalted (lite) mobile phase solution of methanol and HPLC water. Tocopherol levels were analyzed by high pressure liquid chromatography (HPLC) and TotalChrome software. In human blood plasma samples, α-tocopherol is found at higher concentrations than the other isoforms: the percentages are 85, 14, and 1.6 for α-, γ- and δ, respectively. We found human BM (all subjects) to have a vitamin E distribution different from that reported for human plasma where the percentages in BM (all subjects) are 53, 35, and 11 for α-, γ- and δ, respectively. We also found that OW women had lower levels of BM α-tocopherol than the BM from NW women (5.03 vs 7.39 μM/ml, p=0.009). This suggests a chronic inflammation in the OW women which could contribute to the risk factors of metabolic syndrome. Understanding the levels of vitamin E within human breastmilk from women of varying body weights can elucidate its importance in alleviating oxidative stress processes in many chronic diseases, and later outcomes in offspring BMI development.

159. GENE EXPRESSION OF DNA REPAIR ENZYMES IN PYRAMIDAL NEURONS FROM CA1 HIPPOCAMPUS IN MAJOR DEPRESSIVE DISORDER

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Major depressive disorder (MDD) affects over 10 million people in the U.S. each year. Unfortunately, millions of patients do not respond adequately to existing drugs. A better understanding of the biology of depression is expected to facilitate the development of more effective treatments. Recent research implicates conditions of elevated oxidative stress in the brain in MDD. For example, elevated DNA oxidation, telomere DNA shortening, and elevated gene expression of DNA base excision repair enzymes have been observed in brain white matter and white matter oligodendrocytes from postmortem tissue donors that had MDD at the time of death. White matter oligodendrocytes are particularly sensitive to oxidative stress because of their cellular biochemistry. Elevated indices of oxidative damage to oligodendrocytes has been observed in numerous areas of the brain from MDD donors, including areas processing emotional behaviors as well as areas serving many other functions; hence it is difficult to understand how anatomically widespread oxidative damage to cells could produce a disruption of specific emotional behaviors that are associated with MDD. Oligodendrocytes are not the only cells in the brain that are normally sensitive to oxidative stress. Neurons located in the CA1 region of the hippocampus are also sensitive to the damaging effects of oxidative stress, and this brain region is part of the limbic (emotional) brain. Hence, this study was designed to study neurons located in the CA1 hippocampus to determine whether these cells exhibit evidence of elevated oxidative damage in MDD. To do this, hippocampal tissue was obtained from 6 MDD brain donors and 6 age-matched brain donors that had no psychiatric or neurologic illness at the time of death. Laser capture microdissection was used to capture 500 pyramidal neurons from the anterior hippocampal CA1 region from each donor. RNA was then isolated from the neurons and reverse transcribed to cDNA. End-point polymerase chain reaction (PCR) will be used to measure gene expression levels of two base excision repair enzymes, poly(ADP-ribose) polymerase-1 (PARP1) and 8-oxoguanine DNA glycosylase (OGG1), that were found previously to be upregulated in oligodendrocytes from MDD donors. The possible role of DNA oxidation and DNA repair mechanisms in limbic brain pathology of MDD has the potential to reveal numerous targets for the development of novel antidepressant drugs.

160. POLY ADP-RIBOSE PROTEIN (PARP) INHIBITION ALLEVIATED BEHAVIORAL ENDOPHENOTYPES DUE TO STRESS IN A RODENT DOUBLE-HIT 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 naÃ¯ve 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. Before each day of of the introduction of the stressor, animals were given saline or a 40 mg/kg dose of 3-aminobenzamide (3-AB), a poly ADP-ribose (PARP) inhibitor. PARP is a DNA repair enzyme that increases in activity in response to DNA oxidation. In the present study, residents established dominance over the intruder for 10 consecutive days and each day, social defeat stress was followed by another 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. Results demonstrated that 3-AB alleviated decreases in sucrose preference, a natural reward, along with avoidance on a social interaction test given at the end of social defeat. Therefore, it appears that PARP inhibition alleviated behavioral endophenotypes associated with stress and represents a new pharmacological treatment for major depressive disorder in humans.

161. INHIBITORY EFFECTS OF A PREVIOUSLY UNCHARACTERIZED MOLECULE FROM KLEBSIELLA ON ENTEROBACTERIACEAE FAMILY MEMBER BIOFILMS

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Bacteria have acquired the ability to adapt and survive in the often hostile environments found in both nature and in the human body. Biofilms are communities of bacteria, often polymicrobial in composition, that offer protection, provide nutrients/resources, help to spread infections, and can become highly antimicrobial resistant. Biofilms can form on nearly any implanted device such as catheters, central lines, heart valves, and shunts. Biofilms are responsible for over half of the nosocomially acquired infections in healthcare. The Enterobacteriaceae family of bacteria have gained national attention due to their dramatic increase in 1) drug resistance and 2) ability to form life threatening biofilms. Our lab has previously identified a secreted molecule that Klebsiella produces that has inhibitory effects on other members of the Enterobacteriaceae family members, particularly Citrobacter and Enterobacter, in planktonic culture. We therefore investigated the potential ability of this new molecule to inhibit Citrobacter and Enterobacter biofilms. In our experimental biofilm assays, Citrobacter and Enterobacter were incubated with the Klebsiella molecule both at the attachment and maturation phases of biofilm development and subsequently quantitated by optical density, colony forming units, crystal violet staining, and cell viability. Our results show that Enterobacter and Citrobacter biofilms are inhibited at both the attachment and maturation phases when exposed to the molecule. This was evident in reduced colony forming units, reduced biofilm mass, and reduced cell viability. From this data we explored the combined effect of this molecule in conjunction with low doses of antibiotics on the growth of Citrobacter and Enterobacter. The combination of the two inhibited growth of both bacteria at a greater level than the molecule or antibiotic alone. Taken together, we believe the new Klebsiella molecule could be useful in treatment of the highly drug resistant Enterobacteriaceae family. Identifying this molecule, purifying it, and characterizing its effect on bacteria could prove to be a valuable weapon against drug resistant bacteria alone or as an adjuvant.

162. DETERMINATION OF A MITOCHONDRIAL ROLE FOR THE CAENORHADBITIS ELEGANS ATR HOMOLOG ATL-1

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Ataxia telangiectasia and Rad3-related protein (ATR) functions as a cell cycle checkpoint kinase involved in DNA repair. Interestingly, more recent studies have demonstrated a new role of ATR in regulating cell death at mitochondria. The nematode Caenorhabditis Elegans (C. elegans) expresses an Ataxia telangiectasia mutated-like (ATL-1) gene; this is an ATR homolog. ATL-1 has been shown to be related to lifespan in C. elegans. Consequently, the study of ATL-1 in C. elegans may provide interesting new insights into the function of ATR at mitochondria and its potential roles in aging and life expectancy. C. elegans have an average lifespan of 3 weeks making them an excellent model organism to study aging due to their small size, transparency, rapid life cycle, and well understood genome. To study aging in C. Elegans, the ATL-1 gene was knocked down using RNA interference to determine effects on lifespan and mitochondrial function. Eggs were isolated from C. elegans, grown in liquid culture, and fed E. coli bacteria expressing double stranded RNA targeting the ATL-1 gene. Worms were checked for movement every two days by prodding with a platinum wire to monitor viability. Oxygen consumption analysis was also performed to determine effects on mitochondria function by placing 800 worms in a Clark oxygen electrode. It was hypothesized that knocking down the ATL-1 gene would extend lifespan of the worms and decrease mitochondrial oxygen consumption. By decreasing mitochondrial function, it was predicted that lifespan will be extended by decreasing reactive oxygen species production from the mitochondrial electron transport chain that are toxic and limit lifespan. If ATL-1 knockdown extends lifespan, future studies will be performed to determine its cellular localization, its effect on reactive oxygen species production, and any role that the protein plays in regulating cell death in worms.

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163. THE EFFECTS OF RADIATION ON THE MYOMETRIAL LAYER OF THE MOUSE UTERUS

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The possibility of extended space travel outside of low Earth orbit (LEO) is in the near future. Two main issues involved with spaceflight are the weightlessness of spaceflight and the elevated radiation exposure of spaceflight. This exposure is elevated to a higher degree once spaceflight extends past LEO. Studies of the effects of spaceflight on various body systems have be conducted but are essentially still in their infancy. More extensive studies need to be conducted to determine whether or not humankind will be able to withstand the effects of long duration spaceflight outside of LEO, such as an approximate

9 month trip to Mars. An area of great concern is the effects of spaceflight on the reproductive systems. One of the areas of the reproductive system that is of great interest is the myometrial muscle layer. A previous study involving rats that were exposed to spaceflight showed that those rats had difficulty during labor with reduced labor contractions and less forceful contractions. Postmortem studies showed that these mice had reduced myometrial muscle mass compared to the mice that had not been exposed to spaceflight. To better understand the effects of irradiation on uterine muscle tissue, ground-based studies were conducted in which female mice were divided into 3 groups which were then divided into subgroups. One of these groups was a control group. Another group was irradiated with proton radiation at 0.5 Gy. A third group was irradiated with proton radiation at2 Gy. The mice were sacrificed 7 days after the exposure to the radiation. The uteri of the mice were excised, embedded in paraffin, sectioned, mounted on glass microscope slides and stained with an Alcian Blue PAS staining technique. Measurements were made of the inner myometrial muscular layer, the outer myometrial muscular later, and the total myometrial thickness. Linear model ANOVA tests were conducted to compare the differences in the myometrial muscle thickness across various treatment groups. To date the data from this study indicates that the radiation exposure caused a significant thickening of the myometrial layers of the mouse uterus. This was shown by a T-value of -4.72. This data should not be considered conclusive as we have many more measurements to make and other statistical tests to apply to the data. Further research regarding the effects of radiation on the female reproductive structures will need to be conducted to verify the effects of spaceflight/radiation on the reproductive system.

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164. EXTRACELLULAR UBIQUITIN MODULATES IMMUNE RESPONSE DECREASING THE ADVERSE EFFECTS OF MYOCARDIAL ISCHEMIA/REPERFUSION INJURY IN MICE

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Background: Heart disease is ranked as the leading cause of death in the United States with over half a million deaths each year. Myocardial infarction often results from the buildup of plaque in the coronary arteries restricting the flow of oxygenated blood to the heart muscle. The insufficient supply of oxygenated blood to the heart, known as ischemia, can result in damage and death of the cardiac tissue and ultimately leads to cardiac dysfunction. Although essential to maintaining viability of the cardiac tissue, reperfusion of ischemic myocardium induces its own injury. Myocardial ischemia/reperfusion injury triggers an inflammatory response that, although necessary for wound clearance, can contribute to the adverse pathophysiology of cardiac remodeling and heart failure. During inflammation, activated leukocytes migrate to the injured area for cardiac repair. However, leukocytes also release cytotoxic products that can exacerbate the myocardial ischemia/reperfusion injury. Ubiquitin (UB), a small

molecular weight protein, is found in all eukaryotic cells. Intracellularly, UB functions to regulate protein turnover via the UB-proteasome pathway. Previously, our lab demonstrated that β -adrenergic receptor stimulation in myocytes increases extracellular levels of UB, and extracellular UB plays a protective role by decreasing β -adrenergic stimulated myocyte apoptosis and cardiac fibrosis in vivo and in vitro. The objective of this study was to explore the potential therapeutic role of extracellular UB as a protective agent in myocardial ischemia/reperfusion injury. Methods: 8-12 week old male C57Bl/6 mice were implanted with micro-osmotic pumps containing UB (1Âµg/g/h) or saline (vehicle) 1 day prior to myocardial ischemia/reperfusion surgery. The ischemia/reperfusion injury was induced by ligating the left anterior descending artery for 45 min followed by reperfusion for 3 days. UB infusion was maintained throughout the experimental period. Masson's trichrome staining of myocardial sections was used to analyze infarct size. Hematoxylin and eosin staining was used to analyze the number of leukocytes in the infarcted area. Immunohistochemistry was used to quantify the amount of neutrophils and macrophages in the infarcted area. Leder's stain was used to determine the enzyme activity of neutrophils in the infarcted region. Results: Percent infarct size was significantly reduced in the UB-infused mice. Fewer leukocytes accumulated in the infarcted area in the UB-infused mice. Specifically, the number of neutrophils and macrophages were significantly lower in the UB-infused mice. In addition, the enzyme activity of neutrophils in the infarcted region was significantly lower in the UB-infused mice. Conclusion: These results suggest a therapeutic anti-inflammatory role for extracellular UB and thereby a reduction of the extent of tissue damage following myocardial ischemia/reperfusion injury.

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165. TESTING VERT™ ACCELEROMETER TO IDENTIFY VALIDITY AND RELIABILITY WHEN COMPARED TO SWITCH MAT

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This present study was intended to identify the reliability and validity of the Vert™ device when compared to a Switch mat. Vert is a wireless device intended to measure jump count and jump height through an app on a smartphone or tablet and the Switch mat provides jump height by using wireless sensors. Jump height is an important factor in many sports such as volleyball and basketball and it is important to have devices that coaches and trainers can use for testing that they can rely on. If this device is found to be valid and reliable, coaches and trainers could potentially use it in more practical settings such as practice and games due to the portability and small size. This study consisted of 6 subjects who volunteered. The switch mat was connected to the device to display the jump height immediately after the jump. The Vert sensor was clipped onto the subject's hip near the center of mass and the jump count and height were then displayed on an app. The subjects completed a series of warm-ups followed by 3 sets of 5 repetition countermovement jumps while using both devices to collect the data. The total 15 jump heights from these 3 sets of 5 were then analyzed using Pearson correlation analysis as well as a paired sample T-test. The jump height recorded from the Vert was consistently about 10 cm off from the jump height of the switch mat, which for a volleyball player,

could be the difference between blocking and missing the ball. The results of this study showed that the Vert device is reliable but not practically valid. If technical improvements were made to the device to correct the height components the device could potentially be used in place of a force plate or switch mat when conducting athlete testing but the device is not currently valid for practical use.

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166. ***withdrawn***

Undergraduates

❋ Biomedical and Health Sciences, Group C ❋

167. DNA REPAIR ENZYME GENE EXPRESSION IN WHITE MATTER OLIGODENDROCYTES FROM RATS EXPOSED TO SOCIAL DEFEAT AND UNPREDICTABLE STRESS: MODELING THE BIOLOGY OF MAJOR DEPRESSIVE DISORDER

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Major depressive disorder (MDD) is a complex illness characterized primarily by persistent sadness and/or loss of interest in normally pleasurable activities. Approximately 1/3rd of patients with MDD do not respond adequately to currently available antidepressant medications. A greater understanding of the biological basis of MDD is expected to reveal novel targets for the development of better drugs to treat MDD. Recent findings demonstrate oxidative damage to white matter oligodendrocytes in brains from tissue donors that had MDD at the time of death, strongly implicating oxidative stress in the pathophysiology of MDD. Recent studies have also shown upregulated gene expression of DNA base excision repair enzymes in white matter oligodendrocytes in MDD, presumably in response to oxidative damage to DNA in these cells. Beside DNA repair, two of these enzymes, poly(ADP-ribose) polymerase-1 (PARP1) and 8-oxogaunine DNA glycosylase (OGG1), are also known to increase inflammation, and large increases in their activity deteriorates the health of cells. The present study was designed to determine whether a rodent model of MDD could be used to study the pathways engaged by DNA oxidation in white matter oligodendrocytes. Rats were exposed to two psychological stressors, social defeat and unpredictable stress, repeatedly over 10 days with control rats housed and handled similarly but not exposed to the stressors. Anhedonia was confirmed in rats exposed to the stressors, as revealed by reduced sucrose preference in a two-bottle choice task. It was predicted that white matter oligodendrocytes in stressed rats would demonstrate upregulation of the base excision

repair enzymes, PARP1 and OGG1, similar to what has been observed in human MDD. Frozen brain tissue sections from 8 control and 8 stressed rats were immunostained for the oligodendrocyte-specific protein, 2',3'-cyclic nucleotide 3' phosphodiesterase (CNP). From each rat brain, 1000 CNP-positive oligodendrocytes residing in white matter were isolated by laser capture microdissection. RNA was isolated from these cells and converted into cDNA using reverse transcription. End-point PCR will be used to quantify PARP1 and OGG1 gene expressions, using a combination of reference gene expressions for normalization of data. If PARP1 and OGG1 are upregulated in oligodendrocytes in this animal model of MDD, then the model will be useful for interrogating the mechanisms by which these enzymes induce damage to oligodendrocytes. Revealing the role of these enzymes in the etiology of stress-induced behavioral changes in rats has the potential to reveal novel targets for the development of drugs to improve the treatment of MDD.

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168. THE EFFECTS OF CHRONIC ALCOHOL CONSUMPTION ON OVARIAN FUNCTION/MORPHOLOGY.

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Chronic alcohol (ethanol) consumption has been known to affect the major organs of the body and particularly the liver. However, the effects of chronic ethanol consumption on the female reproductive system remain relatively unstudied. A convenient way to study these effects is by analyzing laboratory mice that have been fed an ethanol diet for an extended period of time and comparing them to control mice. In this study, female mice were separated into control and ethanol fed groups. The mice were placed on their specified diets and observed over the course of six weeks. The mice were fed and weighed daily throughout the duration of the experiment. Once a week, vaginal smears were performed on both groups of mice to determine the stage of the estrous cycle for each mouse. At the end of the six weeks, the mice were sacrificed and the ovaries were harvested and fixed in 4% paraformaldehyde. The ovaries were then paraffin embedded and sectioned. Glass microscope slides were then stained using Hematoxylin and Eosin staining procedures for evaluation using standard light microscopy. The tissue's morphology, follicle development, presence of corpora lutea, and overall appearance were analyzed. Due to the premature deaths of several mice in first group of ethanol fed mice, the experiment was repeated two more times to obtain a better representation of data. The data from the control group was compared to that of the ethanol fed group. The mice that received the ethanol fed diet ceased to cycle and arrested in the diestrous phase of their estrous cycle. To date, our data indicates that the ovarian follicles within the ethanol fed mice show signs of degeneration in the 4b, 5a, 5b, 6, and 7 levels of development. There are also no notable corpora lutea present within the ovaries of the ethanol fed mice. Our initial findings indicate that chronic alcohol consumption has deleterious effects on ovarian morphology in mice.

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169. INHIBITORY EFFECTS OF A NOVEL GEL ON BACTERIA TYPICALLY ASSOCIATED WITH BURN WOUND INFECTIONS

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Antimicrobial resistance is an ever increasing problem in the prevention and treatment of life threatening diseases. As antimicrobial resistance has increased over the past few decades, new and novel antimicrobial candidates have dwindled leaving healthcare providers with fewer options for those at greatest risk. Burn wound patients are particular vulnerability due to the breach of the body's physical barriers, tissue destruction, and environments that favor bacterial infection and growth. A novel gel compound has shown promise in providing antimicrobial effects on bacteria typically associated with burn wounds. Therefore we have started to investigate the characteristics of this gel compound on bacterial growth, both in planktonic and biofilm environments. Our experiments tested the ability of this gel to inhibit growth of the top causative bacteria involved in burn wound infections. Bacteria grown in the presence of the gel all had varying inhibited growth patterns as determined by optical density and colony forming units. Most notably of his panel of bacteria was Staphylococcus aureus which was inhibited by nearly 70% in planktonic culture. We further delineated the antimicrobial effects of the gel on bacterial biofilms. Biofilms are communities of bacteria that are able to grow on implanted devices (catheters, central lines, heart valves, shunts) both in and on the host body. Biofilms exhibit increased antimicrobial resistance and increased infection severity for the host. We assessed biofilm growth and the effects of the gel compound by examining colony forming units, optical density, staining of biofilm mass, and cell viability reactions. Supporting what was found in planktonic growth, S. aureus was inhibited in all three phases of biofilm growth: attachment, maturation, and dispersion as determined through decreased optical density, decreased biofilm mass, and decreased viability. Our results suggest that this novel compound could be very effective in the treatment of burn wounds and the inhibition and possible prevention of burn wound infections.

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170. THE EFFECTS OF CHRONIC ALCOHOL CONSUMPTION ON THE INTERSTITIAL CELLS OF MOUSE TESTIES

Chelsea Talbert and Dr. Allan Forsman. Department of Health Sciences, College of Public Health, East Tennessee University, Johnson City, TN.

Chronic consumption of alcohol has been shown to interfere with the production of testosterone. Our hypothesis is that alcohol consumption interferes with testosterone production in the interstitial cells of the testis by causing cell death via apoptosis. Both transgenic CTRP 3 overexpressing mice and wild type mice were used in this study. These mice were split into two groups. One group received a standard rodent diet while the other was fed a diet high in alcohol. These feeding experiments continued for six weeks. At the termination of the experiment the testis were harvested and fixed in 4% paraformaldehyde. Following paraformaldehyde fixation the tissues were paraffin embedded sectioned at 4Âµm and placed on glass microscope slides. The levels of

apoptosis will be determined using TUNEL assay kits. TUNEL assay kits are being used to stain and mark cells that have undergone cell mediated apoptosis. TUNEL assay kits work by labeling the fragmented ends of DNA that occurs when a cell dies in a controlled manner (apoptosis). Transgenic mice could be protected from apoptosis inducing effects of chronic alcohol consumption due to the protective effects of the overabundance of CTRP 3.

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171. CTRP3 OVEREXPRESSION DOES NOT ATTENUATE ETHANOL-INDUCED CHANGES TO THE FATTY ACID PROFILE OF THE RED BLOOD CELL MEMBRANE

Greta H. Trogen, Andrew Clark, and Jonathan M. Peterson. Department of Health Sciences, College of Public Health, East Tennessee State University, Johnson City, TN.

Excess alcohol consumption in humans can induce fatty liver disease (Alcoholic fatty liver disease, AFLD), which leads to liver cirrhosis, eventual liver failure and death. Currently, there are no pharmaceutical treatments for AFLD. CTRP3 is an adipokine (an adipose tissue-derived secreted protein) that has been shown to have a protective endocrine-like effect on hepatocytes (liver cells). Prolonged consumption of alcohol induces de novo hepatic lipogenesis: a process that alters the lipid profile of the red blood cell membrane over time. Specifically, a rise in red blood cell (RBC) membrane palmitic acid content would indicate an increase in de novo fatty acid synthesis, whereas CTRP3 is known to prevent the accumulation of hepatic lipids. Therefore, CTRP3 might reduce the alcohol-induced de novo hepatic fatty acid synthesis, specifically palmitic acid. Hypothesis: Excessive alcohol consumption will increase the content of palmitic acid in the red blood cell membrane and this shift will be prevented with overexpression of CTRP3. Methods: Wildtype C57BL/6 male mice or littermates with transgenic over-expression of CTRP3 were placed on Lieber-DeCarli liquid diet with or without 5% ethanol for six weeks. Approximately 100 Âµl of whole blood was collected in EDTA-containing tubes and the RBCs were harvested. Fatty acid methyl esters (FAME) were prepared from the red blood cell membrane fatty acids and were analyzed using gas chromatography. Five predominant fatty acids were identified (palmitic acid, stearic acid, oleic acid, trans-linoleic acid and arachidonic acid) representing over 90% of the identified FAME. Results: There was no significant difference in palmitic acid content on red blood cells between alcohol fed mice and non-alcohol fed mice. There was, however, a significant increase in stearic acid and trans-linoleic acid with alcohol fed mice. CTRP3 overexpression had no effect in lipid profile or palmitic acid content. Conclusion: Although CTRP3 can prevent hepatic lipid accumulation it does not appear to rescue ethanol-induced changes to non-hepatic tissue. This indicates that unique pathways are being affected that need to be examined further to develop new medical treatments for alcohol-induced syndromes such as fatty liver disease and liver cirrhosis.

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172. EFFECT OF SIMULATED SPACEFLIGHT CONDITIONS ON THE MUCIN LAYER OF THE MOUSE UTERINE TUBE

Grayson White and Dr. Allan Forsman. Department of Health Sciences, College of Public Health, East Tennessee State University, Johnson City, TN.

Studies into the environment of space — both its microgravity and its increased exposure to higher levels of radiation — have yielded evidence of harmful effects on various tissues throughout the body. Certain tissues have been better studied than others; however, the research into the effects of the space environment on tissues of the female reproductive system is still in its early stages. The purpose of this study was to focus on the epithelium of uterine tubes of female mice. Four treatments were applied to different groups of mice- untreated control, microgravity, radiation, and microgravity with radiation- and within each treatment the mice were subdivided based on how long the mice were allowed to live after treatment: one month, four months, and nine months. The tissues were quantitatively analyzed for the amount of mucin produced by measuring the thickness of the mucin layer in each region of the uterine tube: isthmus, ampulla, and infundibulum. General linear model ANOVA tests were conducted to compare mucin thickness between the treatment groups. To date our data indicates similar results in two regions of the tube, but with different results in the third region. Analysis of the isthmus mucin layer shows reduction in thickness across all three treatments in comparison to the control group, regardless of the length of survival time after the treatment. The mucin layers in the ampulla region show similar results, with thinning in all of the treated mice when compared to the control mice, and again with no notable difference based upon the length of survival thereafter. The mucin layers analyzed from the infundibulum regions did not show significant thinning under any of the treatments compared to the untreated control groups. Results discussed at this time are not final, as all tissues from the study have yet to be analyzed.

Undergraduates

❋ Natural Sciences, Group A ❋

173. ***withdrawn***

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174. A SURVEY OF NEARBY GALAXIES IN X-RAY, UV, AND INFRARED BANDS

Brianne Dunn and Dr. Beverly Smith. Department of Physics and Astronomy, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

We compared the X-ray, UV, and infrared properties of a sample of nearby equal mass merging spiral galaxies with a set of normal spirals and a set of elliptical and S0 galaxies using archived Chandra, GALEX, and Spitzer data. Various stages of mergers, from pre-merger systems to post-merger remnants were compared to isolated spirals and normal elliptical galaxies.

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175. DENSITY FUNCTIONAL THEORY (DFT) STUDIES ON CHARGE CARRIER TRANSMISSION THROUGH PORPHYRIN-FULLERENE COMPLEXES

Fletcher Griffitts and Frank Hagelberg. Department of Physics and Astronomy, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

This project involves controlling and characterizing the morphology of the active layer in a special type of organic photovoltaics (OPVs), consisting of porphyrin-fullerene composites, with emphasis on electron exchange interactions between the two components. The Vienna Ab Initio Simulation Package (VASP) is applied to model a variety of donor-acceptor complexes containing fullerene and porphyrin in terms of their stabilities as well as their geometric, electronic, and charge transfer features. The goal is to identify supramolecular chain structures with highest occupied molecular orbitals (HOMOs) (lowest unoccupied molecular orbitals (LUMOS)) that may serve as electron (hole) transfer channels in a photovoltaic device. The results for fullerene obtained from this work will be extended to the fullerene-derived unit Phenyl-C61-butryic acid methyl ester (PCBM). As fullerene, PCBM is a material of very high electron affinity, but it has better solubility properties than fullerene. It is often used in plastic solar cells or flexible electronics in conjunction with electron donor materials such as P3HT or other polymers.

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176. THE IMPACT OF MOZART MUSIC ON THE HIPPOCAMPUS

Alexis Hall, Amanda Johnson, Molly Ketron, and Brooks B. Pond, Ph.D. Department of Pharmaceutical Sciences, Gatton College of Pharmacy, East Tennessee State University, Johnson City, TN.

In vertebrates, the period of time just after birth is one of the most important stages in development. This development can be highly influenced by environmental factors. Previous studies have indicated that prenatal exposure to classical music, particularly Mozart, increases neurotrophic factors in the brain and increases neurogenesis or the production of new neurons in the dentate gyrus of the hippocampus. In the present study, the effects of exposure to Mozart music on the brains of newborn mice were investigated. Briefly, Swiss-Webster mice were divided into 2 cohorts: those exposed to Mozart music and those in standard housing. Animals in the Mozart group were housed in a separate area and music was played a volume between 65 to 75 dB. Immediately after birth of these animals, a playlist of Mozart pieces was repeatedly played for 12 hours from 7 PM until 7 AM, which corresponds to the dark cycle in our vivarium and encompasses the murine active period. Control mice were maintained in standard housing under the same light/dark cycle. After 3 weeks (21 days of age), all mice were injected with 50 mg/kg 5-ethyinyl-2'-deoxyridine (EdU), a thymidine analog that can be used to label newly generated cells. Twenty-four hours after EdU injection, mice were sacrificed via transcardial perfusion with 4% paraformaldehyde, and brains were collected. Brain tissue was frozen and sectioned on a cryostat. Sections were then stained using the Click-iT EdU imaging kit and double-labeled for the neuronal marker, NeuN, using immunohistochemistry. Numbers of EdU+/NeuN+ double-labeled cells and total numbers of NeuN+ cells were counted in the dentate gyrus of the hippocampus. Ratios

of double-labeled cells to total NeuN+ cells were calculated and compared between the groups. Preliminary data indicates that exposure to Mozart music during the perinatal period increases neurogenesis in the hippocampus. Thus, exposure to Mozart music may indeed have a positive impact on brain development.

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177. A COMPARATIVE STUDY OF LABORATORY METHODS TO CALCULATE HYDRAULIC CONDUCTIVITY IN ULTISOLS ON AN EAST TENNESSEE HILLSLOPE

Sydney Lawson, Dr. Ingrid Luffman, and Dr. Arpita Nandi. Department of Geosciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Hydraulic conductivity (K) quantifies the movement of groundwater through the pores and fractures of soil and rock and is an important metric of hydrogeological processes. The objective of this study is to compare different laboratory methods for measuring K in silty-clay soils. Two laboratory tests, Constant Head Permeameter Test and Grain Size Distribution Test (GSD), were performed on 81 samples, collected from various depths of silty-clay rich Ultisol soils collected from the ETSU Valleybrook Outdoor Soil and Water Laboratory in Washington County, TN. Two sites were tested with both methods, one in an upland pasture area and the other on the floodplain of an existing stream approximately 600 meters apart. For the Constant Head Permeameter Test, a 3-inch diameter closed cylindrical cell was filled with soil and compressed using porous stones. The length of the soil in the cell was measured from the base of the sample to the top and the difference in hydraulic head was measured from the base of the sample to the water line in an intake suspended above. Once the cell was saturated, the time for 50 mL of water to run through the cell was recorded and K was calculated using Darcy's Equation. The GSD method used a stack of eight sieves stacked from largest to smallest in size; 4 (4.75mm), 10 (2.0mm), 40 (0.425mm), 80 (0.18mm), 100 (0.15mm), 140 (0.106mm), and 200 (0.075). For each sample, the uppermost sieve was filled with 500 grams of soil and the stack was vibrated for ten minutes using a mechanical shaker. Hydraulic conductivity was then calculated using three different GSD methods: the Alyamani & Sen, Slichter, and Hazen equations. Results from the Constant Head Permeameter Test produced K estimates ranging from 9.52 x 10-6 to 2.06 x 10-3 cm/sec. The Alyamani & Sen, Slichter, and permeameter method produced similar K values at depths from 0 to 25.4 cm that ranged from 5.176 x 10-4 to 6.163 x 10-1 cm/sec. These are similar to USDA K values recorded at shallow depths ranging from 2.82 x 10-4 to 8.06 x 10-1 cm/sec. At depths from 25.4 to 76.20 cm, K values ranged from to 8.860 x 10-5 to 5.176 x 10-4 cm/sec. At depths from 76.20 to 134.62 cm, K values ranged from to 9.521 x 10-6 to 8.860 x 10-5 cm/sec. The Hazen method overestimated hydraulic conductivity for all depths and ranged from 8.100 x 10-3 to 1.089 x 10-1 cm/sec. Holding the ASTM (American Standards for Testing Materials) based Constant Head Permeameter Test as the accepted standard test we conclude that the Alymani & Sen method provides comparable results with less labor and more readily available lab equipment, suggesting that it may be a good substitute for the permeameter test in similar soils. Comparing these estimates helps to better understand the difference between various laboratory methods to compute the hydraulic conductivity.

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178. SYNTHESIS OF A 3-DIAZONIUM-4-(TRIFLUOROVINYLOXY)-(PERFLUOROBUTANE) BENZENESULFONYLIMIDE ZWITTERION PROTON EXCHANGE MEMBRANE FUEL CELLS

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

The objective of this research is to synthesize the compound 3-diazonium-4-(trifluorovinyloxy)-(perfluorobutane) benzenesulfonylimide zwitterion for polymerization and use as the electrolyte in Proton Exchange Membrane (PEM) fuel cells. As cleaner energy sources, PEM fuel cells produce 90% less pollution than fossil fuels. The target monomers are designed to have three major components, an aryl diazonium zwitterion, an aryl perfluoro vinyl ether moiety and a perfluoroalkyl (aryl) sulfonamide pendant. The diazonium zwitterion should chemically bond the monomer or polymer to the carbon electrode for better integration between the electrode and the electrolyte. After polymerization, the compound's perfluoroalkyl backbone increases the thermal and chemical stability and can increase the proton conductivity of the electrolytes. The perfluoro vinyl ether group carries an avenue for easier polymerization. Finally, the perfluoroalkyl (aryl) sulfonamide pendants in the polymers can be expected to have better ionic conductivity, be inert to electrochemical conditions and have a lower predisposition to dehydration and oxidative degradation. This compound was designed with a seven-step synthesis. So far, the first two steps, the sulfonation and aminolysis reactions have been carried out. The third step, the fluoroalkylation of the electron deficient phenol, is ongoing. All the intermediate chemicals were characterized by ^{1}H and ^{19}F NMR and FTIR.

Undergraduates

❋ Natural Sciences, Group B ❋

179. SUB-CELLULAR LOCALIZATION OF A DROUGHT RESISTANT PROTEIN-SIP 355 IN TOBACCO CELLS

Chendrikarao Naidnur, Balkrishna Thakuri, Shantaya Andrews, Saroj Lohani, and Dr. Dhirendra Kumar. Department of Biological Sciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

With dwindling resources and adverse climatic changes, the impact on crops can be severe. One of the worst enemies is drought. My research focuses on a drought activated plant protein, SIP 355 (SABP2 Interacting Protein), which interacts with plant immunity protein, SABP2 (Salicylic Acid Binding Protein 2). SABP2 is a critical component of the plant defense against pathogens. The focus of this research project is to study the subcellular localization of SIP355. By constructing a genetic fusion of SIP355 with a green fluorescent protein (eGFP), the recombinant SIP355 can be visualized inside the tobacco plant cell. SIP355 was cloned into pDONR355 plasmid vector via Gateway

technology that utilized BP (Bacterium-Phage) clonase enzyme. For this, the coding region of SIP355 was RT-PCR (Reverse Transcription- Polymerase Chain Reaction) amplified and gel purified. Specific primers were synthesized for the RT-PCR amplification. The cloning mixture was transformed into competent E. coli (Escherichia coli) cells prepared using a chemical method. The recombinant clones were selected on LB (Lysogeny Broth-nutrient rich) media plates containing appropriate antibiotics. The bacterial colonies were analyzed for the presence of SIP355-pDONR221 clone by colony PCR using M13 (Bacteriophage vector) and gene-specific reverse primers. The positive colonies were used for plasmid DNA preparation. The positive clones were further verified by DNA sequencing. The positive clone with a perfect match with SIP355 nucleotide sequence was used for subcloning into destination eGFP plasmid vector, pSITE2CA. The pDONR 221-SIP355 clone was subjected to LR (Left-Right) clonase reaction in which the enzyme, LR clonase, was used as described by the manufacturers. During this reaction, the clonase enzyme cleaves the SIP355 from the pDONR221 and ligates into pSITE2CA. The destination vector had the gene for the enhanced green fluorescent protein. The eGFP will serve as a biochromatic marker for the localization of the protein of interest, SIP355. Competent E.coli cells were utilized for the transformation. The transformed colonies were selected on spectinomycin-containing LB agar plates. The growth of colonies indicated the presence of antibiotic resistant gene sequence. The positive colonies were identified using colony PCR and further by DNA sequencing. The plasmid DNA clone, pSITE2CA-SIP355 will be finally transformed into Agrobacterium for transforming into plant leaf tissue by infiltration. The infiltrated leaves will be incubated under constant light for two days and then visualized. The confocal microscopy will reveal the accurate location of the protein in the plant cell with the help of the eGFP fluorescent tag.

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180. A HAZARD MITIGATION ANALYSIS OF THE 2016 KAIKOURA (NEW ZEALAND) EARTHQUAKE: EVALUATING LOCAL PREPAREDNESS AND POST-DISASTER MITIGATION EFFORTS

Mitchell S. Ogden. Department of Geosciences, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Geologic hazards are common in New Zealand due to the Australia-Pacific plate boundary and extensive fault systems. One such major geologic hazard event occurred in late November of 2016. The tourist town of Kaikoura in the northeast Canterbury region on the South Island was at the epicenter of a disastrous earthquake. At around midnight local time, the main 7.8 magnitude earthquake occurred with an intensity of IX on the Mercalli scale, indicating that damage caused by the quake impacted even well-constructed buildings. A review of local preparedness for geologic hazards, the event itself, and post-disaster mitigation efforts was conducted by examining literature on local geology and assessing publicly available government documents, news articles, and photographs. From this review, it was concluded that few additional efforts could have been taken in preparation for the unprecedented damage that this earthquake brought upon the area. The major roads in and out of town were made impassable by either ground rupturing or landslide activity, directly a result of the earthquake. No ships could be used to get citizens out of town because two meters of seabed uplift brought a large area of the seafloor up to the surface. While multiple pieces of legislation are already in

effect for disaster assistance, the great toll this event took on the town is likely to hamper the recovery process. Response and recovery efforts continue to be evaluated to determine if additional local or federal efforts should be undertaken.

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181. ***withdrawn***

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182. DETERMINATION OF THE SUBSTRATE SPECIFICITY OF THE MUTANT D344P OF CITRUS PARADISI FLAVONOL SPECIFIC 3-O-GLUCOSYLTRANSFERASE

Nathan Spaulding[1],, Shivakumar Devaiah[1,3], and Cecilia McIntosh[1,2]
[1] Department of Biological Sciences, College of Arts and Sciences, and [2] School of Graduate Studies, East Tennessee State University, Johnson City, TN;
[3] Biostrategies-LC, Arkansas Biosciences Institute, State University, AR.

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 substrate specificity of Cp3-O-GT. An initial quick-screening assay using radioactive UDP-glucose as a sugar donor suggested there may have been expansion of substrate acceptance. Confirming time course assays did not support this. Additionally, results of these assays show that D344P protein has decreased activity with flavonols as compared to wild type Cp3-O-GT. with no expansion of substrate specificity. Models suggest that a change in protein conformation has resulted in decreased activity.

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183. SUPERACIDIC POROUS MATERIALS CONTAINING EMBEDDED HETEROPOLYACID

Cameron Tate, Kenneth Seaton, Iuliia Little and Dr. Aleksey Vasiliev. Department of Chemistry, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Heteropolyacids (HPAs) containing tungsten in their structures are highly active in various catalytic reactions, such as hydration, polymerization or condensation. Their unique catalytic activity is the result of super acidity: HPAs are much stronger Bronsted acids than any mineral acid, and even stronger than high-silica zeolites, e.g. H-ZSM-5. An interesting property of HPAs is their ability to form insoluble salts with cations of alkali metals, whose salts with most of inorganic anions are typically well soluble. In particular, cesium phosphotungstate (Cs-PTA) with the ratio Cs/H=2.5 has higher acidity and, as a result, superior catalytic activity in acid-catalyzed reactions. However, their industrial use is limited by essential disadvantages: low porosity, surface area (<5 m2/g) and good solubility in polar solvents. A prospective strategy for preparation of porous insoluble materials with high contents of accessible acidic sites is co-condensation of a HPA with tetraethoxysilane by sol-gel synthesis. In this work we report the synthesis of highly porous silica gels containing PTA clusters embedded into a silica network. Content of PTA in the obtained material was found to be 18.4%. The Cs-exchanged material contained 17.1% of PTA and 2% of Cs. Thus the molar ratio Cs/PTA after adsorption was 2.54. XRD patterns showed an amorphous structure of the materials. The size of corresponding domains of Cs-PTA crystallites was found to be 11.8 nm. It is evident that PTA was embedded in the silica matrix on the sub-molecular level. The mesoporous material prepared by this method had high surface area and high concentration of surface acidic sites. The adsorption of cesium resulted in notable structural changes in the silica network: formation of new micropores and agglomeration of primary particles. In addition, formation of additional acidic sites was observed. The obtained data could be used in the development of catalysts for industrial processes, and adsorbents for clean-up of contaminated water.

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184. FINITE SOURCE EFFECTS IN THE MICROLENSING OF RADIAL PULSATING STARS

Ashton Morelock and Richard Ignace. Department of Physics and Astronomy, College of Arts and Sciences, East Tennessee State University, Johnson City, TN.

Simulating the microlensing events of a finite source star with a point-like lens can lead to predictions and diagnostics to advance our understanding of stellar astrophysics. The amplification of source stars by a foreground lens may highlight stellar properties that were previously too distant for current technology to detect. We compare microlensing events for stellar models including pulsating and non-pulsating stars and stars with and without limb darkening. Our goal is to simulate these events and to determine the discernible differences obtained by changing various parameters.

2016 ASRF Award Winners

Oral Presentations

Master's Candidates

Natural Sciences

First Place, Group A:
Jedaidah Chilufya
Faculty Sponsor: Dr. Aruna Kilaru
ANALYSES OF ANANDAMIDE-MEDIATED GROWTH INHIBITION IN PHYSCOMITRELLA PATENS

First Place, Group B:
Aubrey Sciara
Faculty Sponsor: Dr. Greg Ordway
CHARACTERIZATION OF ANTI-INFLAMMATORY MICROGLIA IN ANTERIOR CINGULATE CORTEX WHITE MATTER IN AUTISM SPECTRUM DISORDER

Society, Behavior, Learning, Humanities and Business

First Place, Group A:
Byron Brooks
Faculty Sponsor: Dr. Jameson K. Hirsch
ANXIETY SYMPTOMS AND HEALTHCARE UTILIZATION AMONG PERSONS WITH FIBROMYALGIA: MEDIATING ROLE OF TREATMENT ADHERENCE

Second Place, Group A:
Andrea Kaniuka
Faculty Sponsor: Dr. Jameson K. Hirsch
SUICIDAL BEHAVIOR AMONG FIBROMYALGIA PATIENTS: IDENTIFICATION OF RISK FACTORS AND THE PROTECTIVE ROLE OF SELF-COMPASSION

First Place, Group B:
Renice Obure
Faculty Sponsor: Dr. Megan Quinn
TEMPORAL TRENDS IN PRIMARY LIVER CANCER (PLC) SURVIVAL RATES IN US ADULTS 45 YEARS AND OLDER

Second Place, Group B:
Melissa Nipper
Faculty Sponsor: Dr. Amber Kinser
DIVERGENT DISCOURSE: A CASE STUDY ANALYZING THE EFFECTS OF CAMPUS COMMUNICATION ABOUT SEXUAL ASSAULT

Master's and Doctoral Candidates:

Biomedical and Health Sciences

First Place, Group A:
Katie McCreery
Faculty Sponsor: Dr. Marc Fagelson
FACTORS INFLUENCING HEARING HEALTHCARE AND HEARING AID ACCESS IN SOUTHERN APPALACHIA

First Place, Group B:
Hui Wang
Faculty Sponsor: Dr. Yue Zou
THE NOVEL ROLE OF ATR IN SUPPRESSING THE IONOMYCIN-INDUCED NECROTIC CELL DEATH RESPONSE

Doctoral Candidates:

Social and Behavioral Sciences

First Place, Group A:
Emma Fredrick
Faculty Sponsor: Dr. Stacey Williams
SELF-COMPASSION AND AUTHENTICITY MEDIATING STIGMA'S IMPACT FOR SEXUAL MINORITIES

First Place, Group B:
Brittany Williams
Faculty Sponsor: Dr. Jill Stinson
EATING AND EMOTION: ASSESSING THE RELATIONSHIP BETWEEN EATING PATTERNS AND DIFFICULTY IN EMOTION REGULATION IN A BARIATRIC SURGERY SEEKING SAMPLE

Medical Residents, Clinical Fellows, Medical Students and Pharmacy Students

First Place:
John Kirby
Faculty Sponsor: Dr. Michael Kruppa
POLYMICROBIAL INTERACTIONS: REDISCOVERY AND CHARACTERIZATION OF AN INHIBITOR OF NEISSERIA GONORRHOEAE

Poster Presentations

Undergraduates

Society, Behavior, Learning, Humanities, and Engineering

First Place, Group A:
Ashley Kazmark
Faculty Sponsor: Dr. Eric Sellers
DETERMINING THE ROLE OF EMOTION IN BRAIN-COMPUTER INTERFACE PERFORMANCE

Second Place, Group A:
Adam Denton / Charlotte Kaestner
Faculty Sponsor: Dr. Russ Brown
THE EFFECTS OF ANTIPSYCHOTIC TREATMENT UPON NICOTINE ASSOCIATIVE REWARD IN A NEONATAL QUINPIROLE MODEL OF SCHIZOPHRENIA

First Place, Group B (tie):
Rebecca Millard
Faculty Sponsor: Dr. Eric Sellers
THE EFFECT OF THE SIZE OF FACIAL STIMULI ON USING A P300 BRAIN-COMPUTER INTERFACE

First Place, Group B (tie):
Mariah Montgomery
Faculty Sponsor: Dr. Jameson K. Hirsch
FIBROMYALGIA IMPACT AND SYMPTOMS OF ANXIETY AND DEPRESSION: VITALITY AND HOPELESSNESS AS MEDIATORS

First Place, Group C:
Rachael Paul
Faculty Sponsor: Dr. Jameson K. Hirsch
QUALITY OF LIFE AND TRAUMA IN FIRST RESPONDERS: MODERATING ROLE OF SELF-EFFICACY

Second Place, Group C:
Darack Nanto
Faculty Sponsor: Dr. Paul Sims
ECO-SMART CAN

Natural Sciences

First Place, Group A:
Nathaniel Hancock
Faculty Sponsor: Thomas C. Jones
BEHAVIORAL EFFECTS OF SUB-LETHAL CADMIUM (Cd) EXPOSURE IN THE SPIDER ANELOSIMUS STUDIOSUS

First Place, Group B:
Susan Olmsted
Faculty Sponsor: Dr. Bev Smith
STAR FORMATION IN RING GALAXIES

Biomedical and Health Sciences

First Place, Group A:
Kristin Davis
Faculty Sponsor: Dr. Sean Fox
THE INHIBITORY POLYMICROBIAL INTERACTIONS OF ALCALIGENES FAECALIS AND STAPHYLOCOCCUS AUREUS

First Place, Group B:
Emma Pendola
Faculty Sponsor: Dr. Michelle Chandley
PRO-INFLAMMATORY MICROGLIA PATHOLOGY IN THE ANTERIOR CINGULATE CORTEX IN ASD

Graduate Students, Master's Candidates

Society, Behavior and Learning

First Place, Group A:
Trevor Dangel
Faculty Sponsor: Dr. Jon Webb
GRATITUDE AND SUICIDAL BEHAVIOR: PSYCHACHE AND DEPRESSION AS MEDIATORS

Second Place, Group A:
Casey Morrell
Faculty Sponsor: Dr. Megan Quinn
ANALYSIS OF TENNESSEE POPULATION SERVED BY CERTIFIED STROKE CENTERS

First Place, Group B:
Andrea Kaniuka
Faculty Sponsor: Dr. Jameson K. Hirsch
THWARTED INTERPERSONAL NEEDS AND SUICIDAL BEHAVIOR AMONG COLLEGE STUDENTS: CONDITIONAL INDIRECT EFFECTS OF NON-SUICIDAL SELF-INJURY AND SELF-COMPASSION

Second Place, Group B:
Leigh Kassem
Faculty Sponsor: Dr. Jennifer Pealer
THE IMPACT OF STAFF TRAINING ON RISK ASSESSMENT RELIABILITY: RESULTS FROM A STATE-WIDE TRAINING PROGRAM FOR JUVENILE PROBATION OFFICERS

First Place, Group C:
Anthony Peluso
Faculty Sponsor: Dr. Katie Baker
SOCIAL MEDIA USE AMONG PUBLIC HIGH SCHOOLS IN TENNESSEE: POTENTIAL PLATFORMS FOR PARENT-BASED HEALTH CAMPAIGNS

Second Place, Group C:
Chukwuemeka Ogbu
Faculty Sponsor: Dr. Shimin Zheng
ASSOCIATION BETWEEN PHYSICAL FIGHTING AND RISK FACTORS IN MIDDLE SCHOOL STUDENTS IN TENNESSEE: DATA FROM THE 2013 TENNESSEE YOUTH RISK BEHAVIOR SURVEY

Natural Sciences

First Place, Group A:
Raheem Ariwoola
Faculty Sponsor: Dr. Moin Uddin
USE OF DRONE AND INFRARED CAMERA FOR A CAMPUS BUILDING ENVELOPE STUDY

Second Place, Group A:
Melissa Campbell
Faculty Sponsor: Dr. Joseph Bidwell
EFFECTS OF PREDATION CUES ON METAL TOXICITY IN GAMBUSIA AFFINIS

First Place, Group B (tie):
Faisal Ibrahim
Faculty Sponsor: Dr. Hua Mei
SYNTHESIS OF DIAZONIUM (PERFLUOROALKYL) ARYLSULFONIMIDE (PFSI) MONOMERS FROM PERFLUORO (3-OXAPENT-4-ENE) SULFONYL FLUORIDE FOR PROTON EXCHANGE MEMBRANE FUEL CELLS

First Place, Group B (tie):
Sangam Kandel
Faculty Sponsor: Dr. Celia McIntosh
BIOCHEMICAL CHARACTERIZATION OF A Cp-3-O-GT MUTANT P145T AND STUDY OF THE TAGS EFFECT ON GT ACTIVITY

Biomedical and Health Sciences

First Place:
Tuqa Alkhateeb
Faculty Sponsor: Dr. Don Hoover
EFFECTS OF SEPSIS ON RENAL STRUCTURE AND SYMPATHETIC INNERVATION IN MICE

Second Place:
Danielle Williams
Faculty Sponsor: Dr. Christopher Pritchett
ELUCIDATION OF THE PATHWAY BY WHICH THE MINOR PILIN OPERON NEGATIVELY REGULATES ALGZ EXPRESSION IN PSEUDOMONAS AERUGINOSA

Graduate Students, Doctoral Candidates

Biomedical, Health and Natural Sciences

First Place, Group A:
Hannah Oakes
Faculty Sponsor: Dr. Brooks Pond
NEUROGENESIS WITHIN THE DENTATE GYRUS AFTER CHRONIC THERAPEUTIC OR ABUSIVE DOSES OF METHYLPHENIDATE

Second Place, Group A:
Allison Hilbun
Faculty Sponsor: Dr. Steve Karsai
BALANCING STRATEGY WITH PAIN

First Place, Group B:
Stephanie Scofield
Faculty Sponsor: Dr. Krishna Singh
EXTRACELLULAR UBIQUITIN DECREASES ADVERSE EFFECTS OF MYOCARDIAL ISCHEMIA/REPERFUSION INJURY IN MICE

Second Place, Group B:
Sean Stacey
Faculty Sponsor: Dr. Christopher Pritchett
ALGU REGULATES TSSA1 EXPRESSION IN PSEUDOMONAS AERUGINOSA

Society, Behavior and Learning

First Place, Group A:
Olivia Egen
Faculty Sponsor: Dr. Randy Wykoff
THE POOREST "STATE" IN AMERICA: THE HEALTH AND SOCIAL CONDITIONS OF AMERICA'S POOREST COUNTIES

Second Place, Group A:
Courtney Cook
Faculty Sponsor: Dr. Jill Stinson
EARLY CHILDHOOD ADVERSITY AND CHRONIC ILLNESS: AN EXAMINATION OF A HIGH-RISK FORENSIC INPATIENT POPULATION

First Place, Group B:
Jessica McKinney
Faculty Sponsor: Dr. Jameson K. Hirsch
FORGIVENESS AND SUICIDAL BEHAVIOR IN VETERANS: MEDIATING ROLE OF POSTTRAUMATIC GROWTH

Medical Students

First Place, Group A:
Alexandra Forth
Faculty Sponsor: Dr. Jake Drumm
SIMULATED MEDICINE IN ACTION: USING MEDICAL SIMULATION CAMPS FOR RURAL APPALACHIA HIGH SCHOOL STUDENTS TO IDENTIFY PERCEIVED BARRIERS TO MEDICAL EDUCATION

Second Place, Group A:
Kelley Cross
Faculty Sponsor: Dr. K. Krishnan
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

First Place, Group B:
Lizzie Monroe
Faculty Sponsor: Dr. Don Hoover
ZYMOSAN-INDUCED SIRS RESULTS IN SEVERE HYPOTHERMIA AND MILD DEPRESSION OF CARDIAC DROMOTROPIC FUNCTION IN MICE

Second Place, Group B:
Wyeth Lawson
Faculty Sponsor: Dr. Ivy Click
A RETROSPECTIVE ANALYSIS OF PREGNANCY AND BIRTH OUTCOMES ASSOCIATED WITH A PRENATAL CARE OUTREACH PROGRAM FOR HISPANIC WOMEN IN RURAL TENNESSEE

Pharmacy Students

First Place, Group A:
Sergio Alonso
Faculty Sponsor: Dr. Charles Collins
ACTIVE CONTENT OF VITAMIN D3 SUPPLEMENTS

First Place, Group B (tie):
Benjamin Sypniewski
Faculty Sponsor: Dr. Zachary Walls
ACTIVATABLE SUBCELLULAR DELIVERY OF A MULTIFUNCTIONAL PEPTIDE TO THE SECRETORY ORGANELLES OF BREAST CANCER CELLS

First Place, Group B (tie):
Ashley Walker
Faculty Sponsor: Dr. Nicholas Hagemeier
PHARMACY DESERTS: DISPARITIES IN PRESCRIPTION MEDICATION ACCESS IN WASHINGTON COUNTY, TN

Medical Residents, Clinical Fellows and Post-Doctoral Fellows

First Place, Group A:

Mudher Al Shathir
Faculty Sponsor: Dr. Jay Mehta
TUMOR LYSIS HIDING BEHIND SYSTEMIC INFLAMMATORY RESPONSE

Second Place, Group A:

Ragneel Bijjula
Faculty Sponsor: Dr. Dev Jaishankar
PLEURAL EFFUSIONS AND ELEVATED TROPONINS - CARDIAC RELATED? THINK AGAIN!

First Place, Group B:

Esha Cannon
Faculty Sponsor: Dr. Dev Jaishankar
PULMONARY NODULES "NOW YOU SEE THEM, NOW YOU DON'T"
REGRESSION OF METHOTREXATE INDUCED B CELL LYMPHOMA WITH CESSATION OF IMMUNOSUPPRESSION

Second Place, Group B:

Nagabhishek Moka
Faculty Sponsor: Dr. Kanishka Chakraborty
DOUBLE WHAMMY PATHOLOGY-PROTEIN IN KIDNEY, LYMPHOMA IN MARROW

First Place, Group C:

Joey Watson
Faculty Sponsor: Dr. Amanda Stoltz
EFFICACY OF IMPLEMENTING A TRANSITION OF CARE CLINIC IN AN APPALACHIAN FAMILY MEDICINE CLINIC

Second Place, Group C:

Angel Turner
Faculty Sponsor: Dr. Patricia Conner
IMPROVING MATERNAL OXYGEN DELIVERY FOR INTRAUTERINE FETAL RESUSCITATION AT AN APPALACHIAN REGIONAL MEDICAL CENTER