2ND ANNUAL

MISSISSIPPI IDeA CONFERENCE FOR BIOMEDICAL RESEARCH

August 2, 2019

Hilton Jackson
Jackson, Mississippi

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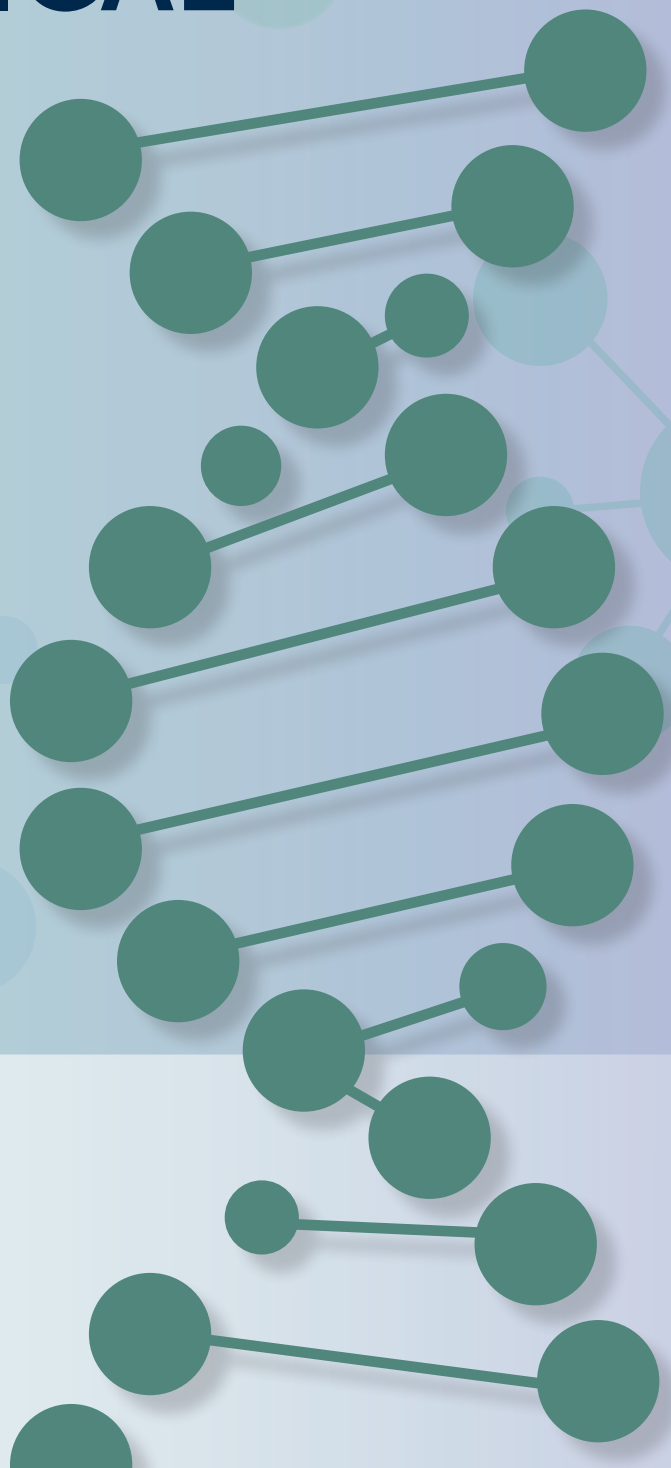

NIH
National Institute of General Medical Sciences

IDeA
Institutional Development Award™

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Welcome!

We are so glad you are able to join us today for the **2nd Annual Mississippi IDeA Conference**, which was designed by the organizing committee to bring together researchers from across the state to share research findings and build synergistic collaborations. This conference is also designed to provide a stimulating opportunity for Mississippi students who are pursuing careers in health-related fields.

We have a very impressive roster of speakers that cover several areas of research that are of critical importance for our state such as Obesity, Cancer, and Infectious Diseases. We have also included a session on Biotechnology which is a critical field we seek to promote in our state and encourage more participation by our students. Finally, we recognize that promoting health in our state is not limited to laboratory research and should include engaging the community. This is particularly important as we seek to address health disparities in our state.

Mississippi is part of the Institutional Development Awards (IDeA) program, which is funded by the National Institute of General Medical Sciences (NIH/NIGMS). This program has allowed us to build up the biomedical research infrastructure in the state. This conference is an expression of the collaborative efforts between the centers of excellence that are funded by the IDeA program. This conference would not be possible without the full support of the Directors of these centers who make up the organizing committee. These centers have accumulated an extensive amount of expertise and technology in several scientific areas and have contributed greatly to the biomedical infrastructure in Mississippi.

Finally, we would like to thank the exhibitors who have enthusiastically supported this conference and encourage the attendees to engage them and learn about these companies.

With appreciation,
The Conference Organizing Committee

Mississippi IDeA Network of Biomedical Research Excellence (INBRE)
Director: Mohamed Elasri, PhD, The University of Southern Mississippi

Center of Biomedical Research Excellence (COBRE): Cardiorenal & Metabolic Disease Research Center
Director: John Hall, PhD, University of Mississippi Medical Center

Center of Biomedical Research Excellence (COBRE): Natural Products Neuroscience
Director: Soumyajit Majumdar, PhD, University of Mississippi

Center of Biomedical Research Excellence (COBRE): Pathogen-Host Interactions
Director: Stephen Pruitt, PhD, Mississippi State University

Center of Biomedical Research Excellence (COBRE): Mississippi Center of Excellence in Perinatal Research
Director: Jane Reckelhoff, PhD, University of Mississippi Medical Center

Mississippi Center for Clinical and Translational Research (IDeA-CTR)
Director: James Wilson, MD, University of Mississippi Medical Center

Conference Agenda

	7:30 - 9:30 a.m. **Registration**	8:00 - 9:30 a.m. **Student Mentoring Breakfast** *Grand Ballroom* *Chair: Dr. Glen Shearer, MS-INBRE*
9:15 – 9:30 a.m. **Break**		
9:30 - 10:45 a.m. **Scientific Session I:** **Obesity & Cardiometabolic Diseases** *Cabana* *Chair: Dr. Licy Cardozo, UMMC*	9:30 - 10:45 a.m. **Scientific Session II:** **Infectious Disease & Immunology** *Diplomat* *Chair: Dr. Keun-Seok Seo, MSU*	9:30 - 10:45 a.m. **Scientific Session III:** **Neuroscience** *Amphitheater* *Chair: Dr. Nicole Ashpole, UM*
10:45 - 11:00 a.m. **Break**		
11:00 - 12:15 p.m. **Poster Session A** *Grand Ballroom*		
12:15 - 1:15 p.m. **Lunch** *Grand Ballroom B&C*		
1:15 - 2:30 p.m. **Poster Session B** *Grand Ballroom*		
2:30 - 2:45 p.m. **Break**		
2:45 - 4:00 p.m. **Scientific Session IV:** **Cancer** *Diplomat* *Chair: Dr. Nita Maihle, UMMC*	2:45 - 4:00 p.m. **Scientific Session V:** **Biotechnology** *Amphitheater* *Chair: Dr. Gene Bidwell, UMMC*	2:45 - 4:00 p.m. **Scientific Session VI:** **Behavior Management &** **Technology Supported Solutions to** **Address Health Disparities** *Cabana* *Chair: Dr. Jennifer Lemacks, USM* *Co-Chairs: Dr. Sandra Melvin, OAHCC* *Dr. June Gipson, MBK*
4:00 - 4:15 p.m. **Break**		
4:15 - 5:15 p.m. **Scientific Session VII:** **Integrating Omics Technology** *Amphitheater* *Chair: Dr. Alex Flynt, USM*	4:15 - 5:15 p.m. **Student Engagement & Career Development** *Diplomat* *Chair: Caroline Iverson, MS-INBRE*	4:15 - 5:15 p.m. **Scientific Session VIII:** **Community Engagement & Interest Group hosts The Voice of Community Academic Partnerships** *Cabana* *Chair: Dr. Sandra Melvin, OAHCC* *Co-Chairs: Dr. Jennifer Lemacks, USM* *Dr. June Gipson, MBK*
5:30 - 7:00 p.m. **Keynote Speaker & Awards Banquet** **Keynote Speaker: Dr. Isiah Warner, LSU** *Grand Ballroom*		

Keynote Speaker

Isiah M. Warner, PhD

Louisiana State University

Vice President for Strategic Initiatives; Boyd Professor and Philip West Professor of Analytical and Environmental Chemistry; Howard Hughes Medical Institute Professor

Professor Isiah Warner is an analytical/materials chemist with more than 360 refereed publications and a dozen acquired or pending patents. He has particular expertise in the area of fluorescence spectroscopy, where his research has focused for more than 40 years. He is considered one of the world's experts in analytical spectroscopy. For example, from 1992 to 2016, he was the corresponding author in the highly cited biannual reviews on "Molecular Fluorescence, Phosphorescence, and Chemiluminescence Spectrometry" for the journal, *Analytical Chemistry*.

Over the past 20 years, he has also maintained a strong research effort in the areas of organized media, separation science, and more recently in the area of ionic liquid chemistry, particularly as applied to solid phase materials for applications in materials science and nanomaterials. He has also conducted educational research that focuses on mechanisms for maintaining and enhancing student education in science, technology, engineering, and mathematics (STEM), with a particular focus on encouraging under-represented students (women and minorities) to pursue terminal degrees in STEM.

Dr. Warner was recently recognized as 2016 SEC Professor of the Year, member of the American Academy of Arts and Sciences (2016), Fellow of the National Academy of Inventors (2017), Fellow of the Royal Society of Chemistry (2017), and Nature Mentor of the Year (2019). He is Phillip W. West Professor of Chemistry, Howard Hughes Medical Institute Professor at LSU, and has achieved the highest professorial rank in the LSU system, i.e. Boyd Professor. He has chaired sixty-five doctoral theses and is currently supervising seven others. More than half of his doctoral students are women and more than a third are under-represented minorities.

Scientific Session I:

Obesity & Cardiometabolic Diseases

9:30 AM - 10:45 AM

Session Chair:

Licy Cardozo, PhD

University of Mississippi Medical Center

9:30 AM **"Opening Remarks"**

Nicole Ashpole, PhD

Department of Neurobiology, University of Mississippi

9:35 AM **"The potential of manipulating essential amino acid nutrition in the treatment of obesity"**

Thomas W. Gettys, PhD

Professor of Nutrient Sensing and Adipocyte Signaling, Pennington Biomedical Research Center, Baton Rouge, LA

Dietary methionine restriction (MR) produces a series of beneficial metabolic responses including improved insulin sensitivity, increased energy expenditure, and reduced fat deposition. Transcriptional profiling of tissues established that hepatic expression of FGF21 is robustly increased by MR. *Fgf21*$^{-/-}$ mice were used to test whether FGF21 is an essential mediator of the physiological effects of dietary MR. The MR-induced increase in energy expenditure and genes associated with activation of thermogenesis in adipose tissue were lost in *Fgf21*$^{-/-}$ mice. In contrast, dietary MR produced a comparable reduction in body weight and adiposity in both genotypes because of a negative effect of MR on energy intake in *Fgf21*$^{-/-}$ mice. Despite the similar loss in weight, dietary MR produced a more significant increase in *in vivo* insulin sensitivity in WT than *Fgf21*$^{-/-}$ mice. Collectively, these findings illustrate that FGF21 is a critical mediator of the effects of dietary MR on energy expenditure and increased insulin sensitivity.

9:50 AM **"The Impact of Diabetic Conditions and AGE/RAGE Signaling on Cardiac Fibroblast Behavior"**

James A. Stewart, Jr., PhD

Associate Professor, School of Pharmacy, Division of BioMolecular Sciences,
The University of Mississippi, Oxford, MS

Roughly 30 million Americans suffer from diabetes and these individuals are at an increased risk of developing cardiovascular complications. The most common type of cardiovascular complication is heart failure, where the heart is unable to adequately pump blood throughout the body. Heart failure can be a result of the stiffening of the left ventricle which occurs when cardiac fibroblasts become "active" and begin to remodel the extracellular matrix (ECM). Fibroblast "activation" can be triggered by the AGE/RAGE signaling cascade. Advanced Glycated End products (AGEs) are produced and accumulate in the ECM over time in a healthy individual, but under hyperglycemic conditions, this process is accelerated. We aim to investigate how the presence of AGEs in the either diabetic or non-diabetic ECM can affect fibroblast ECM remodeling as well as determine the role of AGE/RAGE signaling during this process. In order to assess this question, diabetic and non-diabetic fibroblasts were embedded in 3D matrices composed of collagen isolated from either diabetic or non-diabetic mice. Fibroblast function was assessed using gel contraction, migration, proliferation, and protein expression. The role of AGE/RAGE signaling during the 3D matrix experiment was determined by either activating the signaling pathway using AGE-BSA or inhibiting specific signaling components through drug treatments. Non-diabetic fibroblasts displayed similar gel contraction to diabetic cells when embedded in diabetic collagen. Thus, suggesting the diabetic ECM can alter fibroblast function from "inactive" to "active" states. In addition, increasing the AGE/RAGE cascade leads to increase gel contraction whereas inhibiting the cascade leads to little or no gel contraction. These results indicate 1) the ECM from diabetic and non-diabetic mice differ from one another, 2) diabetic ECM can impact fibroblast function and shift them towards an "active" state, and 3) that fibroblasts can modify the ECM through activation of the AGE/RAGE signaling cascade. These results suggest the importance of understanding the impact diabetes has on the ECM and fibroblast function, more specially how these two components are intertwined with one another. Unraveling this issue will provide better insight into the impact of diabetic and cardiovascular complications.

10:05 AM "Role of microRNAs on the metabolic effects in Polycystic Ovary Syndrome"

Damian G. Romero, PhD

Associate Professor, Department of Cell and Molecular Biology, University of Mississippi Medical Center

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder in reproductive-age women. PCOS is characterized by oligo- or anovulation, clinical and/or biochemical signs of hyperandrogenism, and polycystic ovaries. Epidemiological studies have shown that PCOS women present a significantly higher incidence of cardiovascular risk factors such as obesity, insulin resistance and dyslipidemia. In the US, up to 80% of PCOS women are obese and have insulin resistance. Effective therapeutic approaches to treat the metabolic dysfunction present in PCOS women are limited and there is a need for additional therapeutic options. MicroRNAs (miRNAs) are endogenous, small, non-coding RNAs that downregulate the expression of specific proteins. Several miRNAs are dysregulated in PCOS women and a few have been implicated in PCOS metabolic manifestations. Although miRNAs are highly attractive therapeutic targets that are making their way into the clinic, the role of miRNAs as therapeutic agents to treat the metabolic dysfunction of PCOS remains unexplored. MicroRNA-21 (miR-21) is an attractive target because it is one of the most upregulated circulating miRNAs in PCOS subjects and experimental animal models of PCOS. miR-21 is highly expressed and dynamically regulated in multiple tissues including adipose tissue, liver and muscle. All of these tissues have been implicated in the metabolic dysfunction observed in PCOS. Our results suggest that miR-21 genetic ablation in mouse experimental model of PCOS protects against androgen-induced increase in body weight and fat mass accumulation. These results suggest that miR-21 downregulation could be a novel therapeutic approach for the androgen-induced metabolic dysfunction observed in PCOS that alone or in combination with other therapies will reduce the cardiovascular risk factors in PCOS subjects leading to a reduction in cardiovascular events.

10:20 AM "Impact of parental obesity on developmental programming of metabolic and cardiorenal dysfunction"

Jussara M. do Carmo, PhD

Associate Professor, Department of Physiology and Biophysics, Mississippi Center for Obesity Research, University of Mississippi Medical Center

There is limited understanding of the mechanisms that contribute to transmission of obesity from one generation to the next. Also, there is an urgent need to investigate mechanisms linking parental obesity to adverse outcomes in their offspring. The link between parental obesity and long-term cardiovascular and metabolic diseases in the offspring was investigated in mouse pups from male and female parents fed a HFD prior to gestation (F0) and maintained on the diet throughout gestation and after birth. Intergenerational obesity did not significantly alter calorie intake, total energy expenditure, oxygen consumption or motor activity, but impaired glucose handling. Intergenerational obesity also significantly altered body weight, fat mass, increased blood pressure and urinary albumin excretion, and increased mitophagy and endoplasmic reticulum (ER) stress in the kidneys. In addition, intergenerational obesity was associated with impaired diastolic function and reduced tolerance to exercise but showed preserved ejection fraction. These results suggest that intergenerational obesity alters body weight regulation, increases blood pressure, reduces glomerular filtration rate, and is associated with diastolic dysfunction and reduced exercise capacity. (NHLBI-PO1HL51971, NIGMS P20GM104357 and U54GM115428)

Scientific Session II:

Infectious Diseases & Immunology

9:30 AM - 10:45 AM

Session Chair:

Keun-Seok Seo, PhD

Mississippi State University

9:30 AM "Opening Remarks"

Keun-Seok Seo, PhD

Department of Microbiology, Mississippi State University

9:35 AM "**Chemical Cross Talk Between Two Skin Pathogens: *Mycobacterium ulcerans* and *Staphylococcus aureus*"**

Heather R. Jordan, PhD

Department of Biological Sciences, Mississippi State University

During infection of a host, an environmental pathogen encounters host flora, some which have opportunistic pathogen potential, which can lead to either mutualistic or antagonistic interactions. Thus, environmental pathogens often produce secondary metabolites as adaptive defenses or means of persistence within the polymicrobial host environment. In this study, we determined chemical antagonism exhibited by a toxin produced by *Mycobacterium ulcerans,* an environmental pathogen, and causative agent of Buruli ulcer, against the human skin organism, *Staphylococcus aureus.* Studies have shown that Buruli ulcer wounds are also colonized by several pathogens such as *S. aureus* and *Pseudomonas aeruginosa,* however, without specific pathology associated with those pathogens. An inability of these pathogen to cause infection in the debilitating condition of Buruli ulcer is intriguing. Hence, this study was focused on the role of *M. ulcerans* toxin, mycolactone (a major virulence determinant), in *M. ulcerans* chemical warfare against *S. aureus.* In this study, mycolactone was added to *S. aureus* and incubated for 3, 6 and 24 hours. At each time interval, *S. aureus* growth and hemolytic activity was measured, and RNA was isolated to measure virulence gene expression through qPCR and RNASeq analyses. Results showed that mycolactone reduces *S. aureus* hemolytic activity, and attenuated virulence genes without inhibiting *S. aureus* growth. Analysis of RNASeq data showed virulence genes downregulated, including 6 genes related to toxins. Although some virulence genes were upregulated, none of them were related to toxin production, but were associated with adhesion and evasion and protein production. The results suggest attenuation of *S. aureus* virulence genes, particularly toxin production in presence of mycolactone. The finding is significant as it aids explaining polymicrobial interactions, and chemical crosstalk of environmental pathogens with other opportunistic pathogens during infection and disease establishment. Further, it suggests a functional role of mycolactone for *M. ulcerans* in its natural environment.

9:50 AM **"Identification of novel host receptors for pneumococcal colonization factors"**

Justin A. Thornton, PhD

Department of Biological Sciences, Mississippi State University

Pneumococcal conjugate vaccines have been successful in preventing invasive disease, yet overall colonization rates have remained fairly constant and serotype replacement by non-vaccine serotypes is common. These and other weaknesses underline the need for a broadly protective protein-based vaccine. Protein candidates for such vaccines have primarily been identified based on their immunogenicity during natural infection, but this strategy overlooks one critical fact: *Humans are repetitively colonized by pneumococcus throughout their lives*. This indicates that many highly antigenic pneumococcal proteins may elicit *strong but not protective* immune responses against colonization. We determined differential protein expression of TIGR4 pneumococci grown under planktonic and biofilm conditions (37°C in culture tubes versus 34°C in tissue culture plates, respectively). 2-D electrophoresis and mass spectrometry were used to identify biofilm-specific proteins. Of 10 biofilm-enriched proteins, three were excised and analyzed by MS. Three of these proteins were identified as AmiA (SP1891), PsaA (SP_1650), and SP0148. These proteins will be expressed in our novel pOS1 staphylococcal expression system which results in secretion of proteins into the growth medium for ease of purification. Expressed proteins are biotinylated and used to probe membrane proteins from Detroit 562 epithelial cells via

far-western blot. We have used this technique to identify receptors for the pneumococcal adhesin PsaA (SP_1650) among others. By focusing specifically on proteins predicted to be surface-expressed and play a role in colonization, without overlooking candidates with limited immunogenicity, we will identify novel vaccine targets to reduce pneumococcal colonization.

10:05 AM "Immune evasion factors of *Haemophilus influenzae* as anti-infective targets"

Brian J. Akerley, PhD

Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS

Nontypeable *Haemophilus influenzae* (NTHi) cause a range of illnesses including otitis media, sinusitis, exacerbation of chronic obstructive pulmonary disease, and post-viral bacterial pneumonia, infections that contribute to the problem of antibiotic resistance and are themselves often intractable to standard antibiotic treatment regimens. Non-antibiotic therapies would mitigate these infections and their public health consequences. We investigated a strategy to exploit binding of the complement inhibitor Factor H (FH) to NTHi as a functional target for an immunotherapeutic containing the NTHi binding domain of FH fused to the Fc domain of IgG1. Chimeric proteins containing the regions that most FH-binding bacteria use to engage human FH, domains 6 and 7 (FH6,7/Fc) and/or 18 through 20 (FH18-20/Fc), were evaluated for binding to NTHi. FH6,7/Fc bound strongly to each of seven NTHi clinical isolates tested and efficiently promoted complement-mediated killing by normal human serum. FH18-20/Fc bound weakly to three of the strains but did not promote complement dependent killing. Outer-membrane protein P5 has been implicated in FH binding by NTHi, and FH6,7/Fc binding was greatly diminished in five of seven P5 deficient isogenic mutant strains tested, indicating that some strains possess an alternative FH binding mechanism. Binding of FH18-20/Fc was decreased in the P5 mutant of one strain. A murine model was used to evaluate potential therapeutic application of FH6,7/Fc. FH6,7/Fc efficiently promoted binding of C3 to NTHi exposed to mouse serum, and intranasal delivery of FH6,7/Fc resulted in significantly enhanced clearance of NTHi from the lung. A similarly protective effect was observed in a model of secondary pneumonia after influenza A virus infection. These results provide evidence for the potential utility of FH6,7/Fc as a therapeutic against NTHi lung infection. FH binding is a common property of many respiratory tract pathogens and FH/Fc chimeras may represent promising alternative or adjunctive therapeutics against such infections, which are often polymicrobial.

10:20 AM "Oral Administration of the Plant-derived Cannabinoid, Cannabidiol (CBD), Attenuates Experimental Autoimmune Encephalomyelitis (EAE)"

Barbara L. F. Kaplan, PhD

Center for Environmental Health Sciences, Department of Basic Sciences, College of Veterinary Medicine, Mississippi State University, Mississippi State, MS

Cannabidiol (CBD) is a plant-derived cannabinoid similar in structure to the psychoactive cannabinoid, Δ^9-tetrahydrocannabinol (THC), although CBD does not produce a high. Despite their differences in psychotropic effects, both THC and CBD are immune suppressive. We utilized the experimental autoimmune encephalomyelitis (EAE) model of multiple sclerosis to determine effects and mechanisms by which CBD suppresses immune function. EAE disease was initiated on day 0 followed by 5 days of dosing with CBD by oral gavage. CBD significantly reduced disease severity at day 18. T cell responses in the spleen, lymph nodes, spinal cord and cerebellum were assessed at day 3, 10 and 18 following disease initiation. Although it has been shown that CBD can induce T regulatory cells (Tregs) in vitro, we did not detect a significant increase in Tregs any time, at least in spleen and lymph nodes (LN). However, IFN-γ production was significantly inhibited by CBD in the spleen at day 10, which preceded robust suppression of inflammation in the spinal cord and cerebellum at day 18. Together these data demonstrate that CBD is effective in attenuating autoimmune disease and suggests that inhibition of immune responses in the periphery early might contribute to later attenuation of inflammation in the central nervous system as part of the mechanism for disease attenuation. Funded by NIH P20GM103646, T35OD010432 and MSU CVM.

Scientific Session III:

Neuroscience

9:30 AM - 10:45 AM

Session Chair:

Nicole Ashpole, PhD

University of Mississippi

9:30 AM "Opening Remarks"

Nicole Ashpole, PhD

Department of Neurobiology, University of Mississippi

9:35 AM "Modulation of Acetylcholine receptor activity by a non-canonical microRNA"

Sweta Khanal, PhD candidate

Flint Research Lab, The University of Southern Mississippi

microRNAs (miRNAs) are well-established regulators of gene expression that are generated through a variety of pathways. Mirtrons are a class of non-canonical miRNA produced via splicing that after lariat debranching become substrates for dicer and then loaded into Argonaute protein complexes. Although a large collection of mirtrons have been identified within mammalian genome, their functionality remains to be elucidated. Here we study miR-1017, a 3' tailed mirtron, which is highly expressed and conserved in *Drosophila.* Using UAS-Gal4 system we observed the expression pattern of miR-1017 in larval and the adult fly CNS and sub-esophageal region. Further, we found that miR-1017 targets acetylcholine receptors Da5 and the host transcript Da2. Ectopic expression of miR-1017 within an Alzheimer's disease fly model improved neurological function and extended lifespan of the flies. This suggest that miR-1017 functions to prolong life span by modulating acetylcholine receptors. To further elucidate the role of miR-1017 in acetylcholine signaling we will be generating the mutants using CRISPR/Cas9 system and observe if they have aberrant receptor expression pattern, and subsequent defects in lifespan. This study will validate insight into the functional significance of non-canonical miRNAs within gene regulatory networks.

9:50 AM "Glycan Regulation of Neurite Outgrowth"

Gabriella Hartman, undergraduate researcher

Ashpole Research Lab, University of Mississippi

Chondroitin sulfate proteoglycans (CSPGs) and keratan sulfate proteoglycans (KSPGs) play an important role in neural development. Aggrecan, a CSPG, operates in the neural extracellular matrix where it negatively regulates neurite outgrowth to prevent aberrant process formation. Unfortunately, this aggrecan or CSPG-rich/KSPG-rich barrier can also prevent neuronal regeneration, which contributes to the inability to repair brain and spinal cord injuries. Removal of CSPGs and KSPGs has been shown to increase neurite outgrowth. We extend these findings by testing the ability of structurally-defined glycans to outcompete aggrecan and allow neurite outgrowth. Our overall goal is to determine if there is a particular glycan structure which can overcome inhibitory CSPGs and KSPGs without inhibiting neurite outgrowth themselves. We utilized primary cultures of rat neurons and applied polydisperse structurally related mixtures of CSPGs, KSPGs and newly-isolated, novel glycans in the absence and presence of aggrecan. Several of these glycans successfully removed the aggrecan-induced blockade while not inhibiting neurite outgrowth on their own. We are currently investigating the efficacy of these compounds in concentration-response curves and are testing additional glycans with different molecular weights and varying sulfation patterns to determine the structural requirements for the glycans as modulators of neurite outgrowth. By investigating the impacts of these glycans, we will increase the understanding of proteoglycan regulation of neural structure and function, and potentially identify compounds which could be used to treat spinal cord injuries.

10:05 AM "Neural Correlates of Circadian Rhythm Dysfunction in Bipolar Disorder"

Harry Pantazopoulos, PhD

Assistant Professor, Dept. of Neurobiology and Anatomical Sciences, University of Mississippi Medical Center; NEURO Institute, University of Mississippi Medical Center, Jackson, MS

Background: Sleep and circadian rhythm dysfunction is commonly associated with mood disorders. Several genetic studies, including GWAS, have shown gene variants for several clock molecules are associated with bipolar disorder (BD) and lithium responsiveness. In turn, lithium and valproic acid, directly, modulate expression of core clock molecules and circadian period in cultured cells. Consistent with these findings, sleep dysfunction and weaker physical activity rhythms, characterized by reduced amplitude, have been reported in BD, suggesting that genetic vulnerabilities affecting clock molecules may in fact have an impact on circadian rhythms in BD. Notably, anxiety and depression in subjects with BD commonly peak in the morning, consistent with a circadian dysregulation of factors impacting these symptoms. Recent findings from our group support this possibility, showing that somatostatin (SST) expression in the healthy human amygdala varies according to circadian rhythms and is disrupted in BD. Importantly, decreased SST expression in the amygdala was selectively detected in the morning. Given the anxiolytic effects of SST in the amygdala, we speculate that this decrease may coincide with increased morning severity of anxiety and depression. Circadian rhythms in individual cells are regulated by a set of core clock molecules, including period 2 (Per2). Several studies in rodents have reported rhythms of Per2 protein expression in the amygdala. Furthermore, lithium treatment has been shown to increase expression of Per2 in rodent brain samples. Altered SST rhythms in the amygdala of subjects with BD therefore may be associated with underlying changes in Per2 expression. In addition, subjects with BD commonly exhibit co-morbidity with metabolic disorders and inflammation. We tested the hypothesis that the amount and rhythm of Per2 expression is altered in the amygdala of subjects with BD, along with expression of molecules involved in stress response, appetitive behavior, and inflammation. *Methods:* We used Western blot analysis on a separate cohort of 14 subjects with BD and 14 control subjects to test the hypothesis that Per2, GSK3beta, CRF, PAC1, DKK3, and IBA1 expression is altered in the amygdala of subjects with BD. We used time of death as a proxy for circadian time to test the hypothesis that the circadian rhythm of Per2 expression is altered in subjects with BD. *Results:* Per2 expression was significantly decreased in the amygdala of subjects with BD ($F = -2.57$, $p < 0.02$), with a significant effect of lifetime exposure to lithium ($F = 2.17$, $p = 0.04$). Lithium exposure was positively correlated with Per2 expression (R square = 0.37, $p = 0.04$). Quartic regression analysis of Per2 expression plotted by time of death demonstrated a circadian rhythm of Per2 expression in the amygdala of control subjects, with a peak of expression at 10 am, and a low point of expression at 8 PM. In comparison, subjects with BD had a peak level of expression at 8 PM, and a low point of expression at 10 AM, coinciding with our previously reported rhythm of somatostatin in the amygdala of subjects with BD. Furthermore, expression of GSK3beta, DKK3, CRF, PAC1, and IBA1 were altered in the same subjects. *Conclusion:* Our data points to altered molecular clock rhythms in the amygdala of subjects with BD, and indicates that lithium exposure may correct for decreases in Per2 expression, as suggested by reports that lithium increases Per2 expression in rodent tissues and cultured human cells. Furthermore, the observed altered rhythm of Per2 expression in subjects with BD suggests that altered clock rhythms may drive altered SST expression rhythms observed previously in this region in BD. Altered expression of stress signaling molecules, appetitive behavior regulating molecules, and the microglial marker IBA1 suggest that altered circadian rhythms in the amygdala of BD are associated with disrupted stress response and inflammation.

10:20 AM "Human visual cortical gamma reflects natural image structure"

Nicolas Brunet, PhD

Department of Psychology and Neuroscience, Millsaps College, Jackson, MS

Many studies have reported visual cortical gamma-band activity related to stimulus processing and cognition. Most respective studies used artificial stimuli, and the few studies that used natural stimuli disagree. Electrocorticographic (ECoG) recordings from awake macaque areas V1 and V4 found gamma to be abundant during free viewing of natural images. In contrast, a study using ECoG recordings from V1 of human patients reported that many natural images induce no gamma and concluded that it is not necessary for seeing. To reconcile these apparently disparate findings, we reanalyzed those same human ECoG data recorded during presentation of natural images. We find that the strength of gamma is positively correlated with different image-computable metrics of image structure. Gamma was sufficiently diagnostic of image structure to differentiate between any possible pair of images with >70% accuracy. Thus, while gamma might be weak for some natural images, the graded strength of gamma reflects the graded degree of image structure, and thereby conveys functionally relevant stimulus properties.

Scientific Session IV:

Cancer

2:45 PM - 4:00 PM

Session Chair:

Nita Maihle, PhD

University of Mississippi Medical Center

2:45 PM **"Opening Remarks"**

Nita Maihle, PhD

University of Mississippi Medical Center

2:50 PM **"Cancer Control in Mississippi: Promoting Research to Make a Difference"**

Michael Stefanek, PhD

Associate Director for Cancer Control, Epidemiology and Disparities Research, Cancer Center and Research Institute, University of Mississippi Medical Center

The presentation will include a brief introduction of myself and my work to colleagues and trainees across the state as I begin the new position of Associate Director, Cancer Control, Epidemiology and Disparities. The focus of the presentation will include the mission and vision of the Cancer Center to date, an overview of cancer control and the cancer continuum, and the importance of interdisciplinary work in cancer control. Areas of potential focus for cancer control will be presented, some data on state cancer incidence and mortality, and the role of decision making in cancer control will be addressed.

3:05 PM **"Prostate Cancer: Genes and Policy"**

Sarah Buxbaum, PhD

Assistant Professor, Department of Epidemiology and Biostatistics, School of Public Health, Jackson State University

Prostate cancer is the second leading cause of cancer death in men. The strongest risk factors for prostate cancer are age, race and family history. African American men experience the highest incidence and mortality rates of prostate cancer worldwide, likely due to differences in access to screening and treatment. In the US, African American men are at 1.4 times higher risk of being diagnosed and 2–3 times higher risk of dying from prostate cancer compared to men with European ancestry. It's unclear whether there are environmental factors that contribute to the disparity, but prostate cancer has high heritability relative to other cancers. Genetic susceptibility due to a locus at 8q24 has been demonstrated across race and ethnicity, and linkage to 17q21 has been shown in both African-descent and European-descent populations. Many other genomic susceptibilities have been implicated in the heritability of prostate cancer. In the US, screening recommendations have changed over time, and have been controversial. Perhaps science will drive the change in treatment and address disparities. Individualized risk assessment based on current and emerging prostate cancer molecular biomarkers and on genomic markers are beginning to play an important role in improving diagnosis and treatment. A personalized approach to care and treatment may go far to address the health disparities in prostate cancer. However, access to equitable care is critical, and screening is a key aspect of access.

3:20 PM **"Zebrafish as a model for lipid usage during cancer progression and therapeutics testing"**

Yann Gibert, PhD

Associate Professor, Department of Cell and Molecular Biology, Cancer Center and Research Institute, University of Mississippi Medical Center

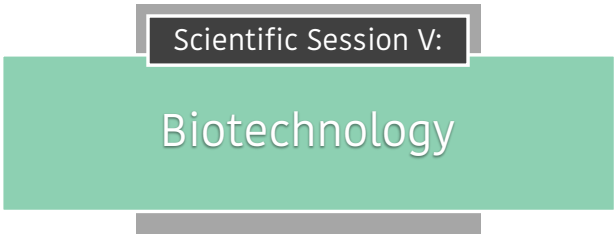
The zebrafish is becoming a popular model to study cancer progression and to identify putative therapeutics against different forms of cancers. Metabolism has a fundamental role in biological processes including embryonic development and tissue homeostasis. However, to date, little is known about the lipid metabolic networks involved during cancer progression in adult. The aim of this study is to elucidate lipid changes in hepatocyte as hepatocellular carcinoma (HCC) progresses. For this study we used the doxycycline (Dox) inducible C-myc, EGFR and K-ras oncogene under the control of the liver fatty acid binding protein (LFABP) to restrict the cancer in the liver. We induce the oncogene by Dox exposure at 3 months of age (adult zebrafish) and studied lipidomic

changes after a week or 2 weeks on Dox induction. To the end we conducted a semiquantificative analysis of lipidomic composition using LC-mass spectrometry. In this study, we analyse 375 lipid species that can be grouped into 24 categories. Our analysis revealed strong differences in lipid usage in normal hepatocytes and HCC cells after oncogene activation. Many lipid classes were strongly up-regulated in cancerous cells such as: LPC: lysophosphatidylcholine; PC: phosphatidylcholine; PC-O: alkylphosphatidylcholine; PE: phosphatidylethanolamine; PI: phosphatidylinositol. On the opposite, several lipid classes were under-represented in HCC cells compared to control hepatocytes: LPAF: Lysoplatelet activating factor (lysoalkylphosphatidylcholine); CE: cholesteryl esters; TG: triacylglycerol. Interestingly some lipid species within a given lipid class have an opposite abundance in cancer liver cells compared to control. This is true mainly for DG: diglycerides and SM: sphingomyelins. Based on the different behavior of lipid during liver cancer progression, we proposed that lipid analysis could be used as a diagnostic tool for liver cancer in humans.

3:35 PM **"Screening anticancer natural products produced by predatory myxobacteria using zebrafish"**

Kristine Willett, PhD
Chair of BioMolecular Sciences, School of Pharmacy, University of Mississippi

Our laboratory utilizes a zebrafish xenotransplantation model to screen potential chemotherapeutics for *in vivo* toxicity and efficacy for inhibiting breast cancer cell growth or metastasis. First, for each natural product extract or constituent, *in vitro* cell viability IC50s are determined using MCF-7, MDA-MB 231 and/or BT-474 breast cancer cell lines. Cancer cells are then labelled with CM-Dil so that they will fluoresce red when injected into Casper/*fli1:egfp* zebrafish larvae that are phenotypically transparent with green fluorescent vasculature. Cell growth and migration are imaged at 1 and 5 days post-injection using fluorescent microscopy. Paclitaxel (25 nM) and mertansine (10 and 200 nM) significantly reduced the proliferation of MCF-7 cell xenografts compared to controls, confirming the use of this model for MCF-7 cell xenografts. The natural product gephyronic acid has been identified as a promising anticancer therapeutic with a unique mechanism of action that inhibits eukaryotic protein translation. However, the native organism, *Archangium violaceum*, does not produce sufficient amounts for the biological testing required to determine its viability as a therapeutic or for subsequent commercialization. This project applies two techniques to generate higher quantities of gephyronic acid. Ongoing work supported by the NCI will allow us to test the hypothesis that these newly isolated eukaryotic protein translation inhibitors will inhibit breast cancer cell proliferation and metastasis in the zebrafish model. Supported by 5R03CA219320-02.



2:45 PM **"Opening Remarks"**

Gene Bidwell, PhD
University of Mississippi Medical Center

2:50 PM **"IL-17 bridges innate and adaptive immunity against West Nile virus infection"**

Fengwei Bai, PhD
Department of Cell and Molecular Biology, The University of Southern Mississippi

West Nile virus (WNV) is a mosquito-transmitted, neuroinvasive flavivirus that continues to cause significant morbidity and mortality in the United States. The signaling of Toll-like receptor 7 (TLR 7) has been shown to protect WNV infection via IL-23 mediated monocyte infiltration and homing in mice. IL-23 is essential to maintain Th17 cells that produce cytokines such as IL-17 and IL-22. We found that IL-17A deficient mice (*Il17a*$^{-/-}$) were more susceptible to WNV infection compared to wild-type (WT) controls, and $CD8^{+}$T cells purified from WNV-infected *Il17a*$^{-/-}$mice were also less cytotoxic to WNV-antigen-expressing target cells and expressed lower levels of cytotoxic mediator genes (*perforin, granzyme and fas-l*). Conversely, exogenous treatment with mouse

recombinant IL-17A (rIL-17A) increased expression of these cytotoxic mediator genes in purified $CD8^+$T cells of both WNV-infected *Il17a*$^{-/-}$and WT mice. In addition, injection of rIL-17A into WNV-infected WT mice on day 6 post-infection increased the expression of these cytotoxic mediator genes in $CD8^+$T cells, profoundly reduced viral burden in the brain and enhanced the survival, suggesting a therapeutic potential of IL-17A in treatment of WNV infection. Moreover, RNA sequencing (RNA-seq) analysis on the splenic $CD8^+$T cells purified from WNV-infected WT and IL-17A receptor gene knockout (*Il17ra*$^{-/-}$) mice indicated that IL-17A might facilitate $CD8^+$T cell effector function through activating mammalian target of rapamycin (mTOR) kinase signaling pathway. Collectively, IL-17A serves an important link bridging the innate and adaptive immunity against WNV infection.

3:05 PM "Improving the effectiveness of topical ophthalmic formulations"

Soumyajit Majumdar, PhD
University of Mississippi

3:20 PM "POSS: Not your Ordinary Bandage"

Michelle Tucci, PhD
University of Mississippi Medical Center

Up to the present, autologous skin grafts or flaps have been widely used for repairing skin and soft tissue defects. However, improved reconstruction poses greater donor site problems. To resolve these problems, skin substitutes have been developed using tissue engineering [1]. However, in order for skin substitutes to be applied to patients with full-thickness skin loss, the substitutes should function as an alternative to autologous skin, form an effective barrier against bacterial invasion, minimize inflammation and scar formation, improve fibrovascular tissue ingrowth, and have excellent reproducibility [2,3]. Polyhedral oligomeric silsesquioxane (POSS) with a distinctive nanocage structure consisting of an inner inorganic framework of silicon and oxygen atoms, and an outer shell of organic functional groups is one of the most promising nanomaterials for medical applications. Enhanced biocompatibility and physicochemical (material bulk and surface) properties have resulted in the development of a wide range of nanocomposite POSS copolymers for biomedical applications, such as the development of hemostatic agents, biomedical devices, drug delivery systems, dental applications, and tissue engineering scaffolds. The purpose of our experiment was to determine the short term effects of applying POSS to a partial thickness skin wound using the pig as a model. Biopsies were taken after 3 and 7 days to determine the short term response to the material which was compared with wounds which were treated with traditional antibiotic cream or saline alone. The data show POSS was able to induce early tissue formation and reduce inflammation and scar formation when compared to gold standard antibiotic wound coverage.

3:35 PM "Developing novel peptide-based therapeutics for obstetrical disorders"

Eric M. George, PhD
University of Mississippi Medical Center

Preeclampsia is a hypertensive disorder of pregnancy affecting ~5-7% of all pregnancies. Typically presenting in the latter half of gestation, the disorder remains a major cause of maternal and fetal morbidity and mortality. Despite intense research, the ultimate causes of the disease remain obscure. While a number of common pathological mechanisms have been identified, no effective pharmacological intervention for the disease has been forthcoming. Development of new therapeutics targeting recently identified pathogenic mechanisms has been hampered by the possibility of negative fetal exposure to proposed therapeutics. Recently we have described a version of the elastin-like polypeptide (ELP) drug carrier coupled to several therapeutics targeting the anti-angiogenic, inflammatory, and oxidative stress which hallmark the preeclampsia patient. Crucially, the described therapeutics have been shown to be maternally restricted, with little or no fetal exposure. This class of therapeutics represents a potentially powerful new approach to manage these currently underserved patients.

Scientific Session VI:

Behavior Management & Technology Supported Solutions to Address Health Disparities

2:45 PM - 4:00 PM

Session Chair:
Jennifer Lemacks, PhD, RD
The University of Southern Mississippi

Session Co-Chairs:
Sandra Melvin, DrPH
Open Arms Healthcare Clinic
June Gipson, PhD
My Brother's Keeper, Inc.

2:45 PM **"Opening Remarks"**
Jennifer Lemacks, PhD
The University of Southern Mississippi

2:50 PM **"Telenutrition Center Pilot Intervention: Developing and Testing an Intensive Behavior Therapy for Obesity Program Targeting African Americans in Mississippi"**
Jaqueline Reese-Smith, PhD
Mississippi INBRE Telenutrition Center, The University of Southern Mississippi

Factors associated with high obesity regions are reportedly southern states, rural and minority populations who also report limited financial resources. More specifically, the challenge for the state of Mississippi (MS) is to continue to reduce the impact of high levels of chronic diseases and poor health outcomes related to obesity among the Deep South minority populations. One modality of reducing obesity related health disparities is programs which are pathways for improving health education and outcomes within communities as well as bridge the gap for resources that are otherwise nonexistent within communities. Following a community-based participatory research model, the Mississippi INBRE Telenutrition Center pilot intervention aims to develop and test an Intensive Behavior Therapy (IBT) for obesity program targeting African Americans in Mississippi. The proposed intervention is modelled after the Centers for Medicaid and Medicare Services IBT for obesity benefit. Participants will meet with research staff, via telehealth or in-person, for weekly visits in the first month, biweekly in months 2–7, and once per month in months 8–12. During an abbreviated pilot study (4 months), research participants explored health promotion strategies (e.g., nutrition and physical activity) via a motivational interviewing informed approach to health counseling sessions, as as well as completing assessment of stage of change, physical, psychosocial and other factors aimed to reduce the impact of obesity and ultimately, improve health outcomes. The purpose of this study is to examine intervention development and testing processes, specifically focus group and health counselor training development, implementation, and results. To better understand recruitment and retention, physical activity, dietary habits, intervention and programming preferences focus groups (n=4) were conducted with AA adults between the ages of 18-45 years old in Jackson and Hattiesburg, MS. Discussion includes focus group themes, recommendations for the intervention, and lesson learned to increase health benefits, participant retention and satisfaction.
Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

3:05 PM **"Okla Achukma: The Development of a Multi-faceted, Culturally-Adapted Community-Based Intervention to Address Obesity-related Health Disparities in Southeastern American Indian Populations"**
Tammy Greer, PhD
Mississippi INBRE Telenutrition Center
School of Psychology, The University of Southern Mississippi

Southeastern (SE) Native Americans are disproportionately impacted by obesity and preventable chronic diseases that respond readily to diet and physical activity interventions. Participation rates are typically low in behavior modification programs that address diet and exercise for Native Americans so that rates of obesity and sequelae continue to be problematic. Psychosocial variables such as community or family support, spirituality and fatalistic views have all been identified as important determinants of health behavior change for Native Americans and corroborates our own data collected from SE Native Americans. There is a dearth of intervention studies, however, that consider how these psychosocial factors impact participation/attendance in behavior

management programs, adherence to nutrition and physical activity recommendations, and health outcomes among SE Native American populations. For this study, the first in a series of studies aimed at addressing physical, mental, spiritual and social aspects of healthy living, along with built environments that facilitate healthy living, we address mental and physical aspects and explore spiritual aspects of healthy living. Participants will be 40 (for focus groups) and 16 (for the intervention) adults who self-identify as Native American. This year, year 1 of the study, we have trained Native and non-Native college students as researchers to enroll Native participants, assess diet, physical activity and psychosocial variables, through paper and pencil measures and online surveys at outreach events including the Unity Walk, Choctaw Indian Fair and community churches. Student sub committees developed training materials prior to these events to 1) educate the other students about cultural norms and misunderstandings that might get in the way of recruitment at Native venues, 2) create educational, attractive and fun activities designed to a) increase awareness of nutrition and activity level recommendations, b) recruit participants to complete surveys, and c) entertain small children while parents complete surveys. Student researchers, also, were trained to conduct focus groups designed to elucidated culturally relevant obstacles and facilitators of healthy living. Hypotheses are that social support will be a facilitator and chronic disease fatalism a deterrent to healthy eating and activity levels in Southeastern Native populations. Results from this study will be used to culturally tailor health interventions based on native values and community strengths to leverage social support and address fatalistic attitudes to improve risk factors related to preventable chronic diseases and ultimately, reduce health disparities among Southeastern American Indians.

3:20 PM "Adopting a Holistic Approach to Healthcare: The Importance of Support Services"

Talya Straughter, PhD
Open Arms Healthcare Center

It is imperative that healthcare providers take a holistic approach to improving patient health outcomes. In a medical setting, holistic refers to addressing the whole person, including their physical, mental, and emotional health, while taking social factors into consideration. This could be specific to diagnosis, in which case a holistic approach might consider all possible symptoms; or holistic treatment, which may be very creative and empowers the patient to take charge of their own care. Integrating social support services within the traditional health care system is important to improve adherence, address gaps in services and maintain overall autonomy as it relates to a person's wellbeing. These support services include case management, transportation, emergency food assistance and mental health services. At Open Arms Health Care Center, we understand that a holistic approach to healthcare is beyond important: it is necessary.

3:35 PM "Use of Care Coordination and Home Tele-monitoring for Heart Failure Patient"

Ronald Horswell, PhD
Pennington Biomedical Research Center

Studies assessing the value of home monitoring for heart failure patients have produced mixed results. We conducted a trial randomizing heart failure patients to a home monitoring intervention group (67 patients) or to a usual care group (69 patients.) Subjects were referred to the study by physicians managing heart failure patients at five LSU Health Care Services Division clinics (often characterized as "safety-net" clinics) located in five different Louisiana cities. Home monitoring included daily weight, blood pressure, and pulse oximetry measurement, as well as several questions that varied from day to day, all automatically forwarded to a monitoring services. A coordinating nurse actively monitored results and both responded to patient requests for contact and initiated contact as needed. Intervention arm subjects each used the monitoring equipment for six months, but outcomes were gathered through 12 months. At 12 months, the relative risk (intervention / comparison) for the primary outcome (number of ED visits plus number of in-patient stays was 0.74 ($p = .084$). However, the relative risk for number of ED visits plus number of inpatient days was 0.63 ($p = .037$). Study results suggest that home monitoring, if done in conjunction with pro-active patient contact and follow-up, is feasible and potentially very effective in a relatively economically-disadvantaged patient population.

Scientific Session VII:

Integrating Omics Technologies

4:15 PM - 5:30 PM

Session Chair:

Alex Flynt, PhD

The University of Southern Mississippi

4:15 PM "Opening Remarks"

Alex Flynt, PhD

Department of Cell and Molecular Biology, The University of Southern Mississippi

4:20 PM "Physio-omics of Complex Disease"

Michael Garrett, PhD

Department of Pharmacology, UMMC Molecular and Genomics Core,
University of Mississippi Medical Center

In recent years, high-throughput -omics technologies, such as next-generation sequencing (NGS) and mass spectrometry proteomics have been increasingly useful to understand the complex interactions associated with living organisms. In addition, NGS has revolutionized our understanding of the vast microbial diversity in our environment and led to the new field of metagenomics. All of these -omics technologies have been particularly useful in developing a better understanding of molecular events that lead to complex disease, including cardiovascular and kidney disease. Using several research projects from our laboratory and the genomic capabilities available through the UMMC Molecular and Genomics Core Facility (MGCF), the utility of -omics technologies will be presented. This will involve an introduction to several genomics technologies, including RNA sequencing, targeted RNA sequencing, small RNA sequencing, microbiome sequencing and their application to the study of cardiovascular and kidney disease. In summary, the integration of different -omics technologies can provide insight into complex diseases and most importantly, many cutting-edge -omics technologies are available to IDeA funded (INBRE and COBRE) researchers and other academic researchers throughout the State of Mississippi through the MGCF. This work is supported by the NIH, including, R01 HL137673(Garrett), P20GM103476 [MS-INBRE-(Elasri)]; P20GM104357 [Cardio-Renal (Hall)]; P20GM121334 [MS-CEPR (Reckelhoff)], and USM HPC supported by the NSF (ACI1626217).

4:35 PM "Applying multiple Omics to understand Plant-virus interactions"

Ying Wang, PhD

Department of Biological Sciences, Mississippi State University

When challenged by pathogens, host cells undergo extensive changes in gene expression shifting from normal growth to defense mode. Next-generation deep sequencing technology and bioinformatics now provide great opportunity to deepen the understanding of gene expression changes during host-pathogen interactions. We applied multiple transcriptome analysis to dissect the molecular basis underlying plant-viroid interactions. Viroids are circular noncoding RNAs that infect plants. Our comprehensive transcriptomic analyses illustrated that potato spindle tuber viroid (PSTVd) along can trigger plant immune responses and alter gene splicing patterns. In line with the observations, we found that PSTVd can modulate the alternative splicing of a host gene to facilitate its replication. Our finding provides novel insights into the molecular basis of plant-viroid interactions and contributes to the understanding of noncoding RNA functional mechanisms.

4:50 PM "Determination of Transcriptome Modifications in Colorectal Cancer Cells by DCLK1 using RNA Sequencing"

Liana Li, PhD

Department of Biology, Tougaloo College, Jackson, MS

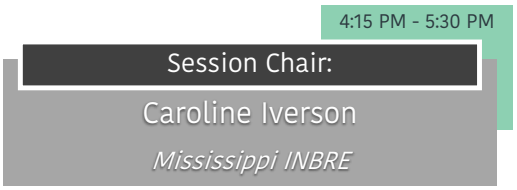
RNA sequencing (RNA Seq), a high throughput Next Generation Sequencing approach, is a revolutionary tool for transcriptomics research. Doublecortin like kinase 1 (DCLK1), a putative marker for gastrointestinal stem cells, has been proven to play critical roles in the oncogenesis, progression and metastasis of colorectal cancer (CRC). However, how DCLK1 functions is unclear. In order to explore the molecular mechanism of DCLK1, RNA Seq technology was applied to monitor transcriptome changes due to DCLK1 over-

expression in the CRC cells. Briefly, RNA from quadruplicate samples from DCLK1 stable over-expression cells and the parental wild type HCT116 cells were sent for RNA Seq. Differentially expressed (DE) genes were evaluated. Gene networks and functional analysis were carried out using the achieved DE genes. Quantitative real time PCR and cell flow cytometry were applied to confirm findings of RNA Seq. Results demonstrated that 1463 genes common to the two DCLK1 overexpression clones were differentially expressed compared to the wild type cells. Seventy-two canonical pathways were significantly modified by DCLK1 over-expression ($P<0.05$), among which 9 are involved in the cell cycle regulation. In summary, it can be concluded that DCLK1 over-expression significantly modified transcriptome profile of CRC cancer cells. Control of the cell cycle regulation might be one of the critical mechanisms for DCLK1 function. Targeting DCLK1 may be an effective treatment for colorectal cancer patients.

5:05 PM **"Omics approaches for understanding pathobiome-tick host interactions"**

Shahid Karim, PhD
Department of Cell and Molecular Biology, The University of Southern Mississippi

A dynamic, multi-directional sets of interactions between ticks, hosts, and transmitted pathogens occurs in both tick and host environment. These can be regarded as a continuous "*bellum omnium contra omnes*" or war of all against all. Microorganisms that occupy an arthropod tick vector are collectively called the tick microbiome; however, the collection of commensals, symbiotic, and pathogenic microbes associated with ticks is more specifically termed the "pathobiome". Microbes living in association with pathogens within the ticks might influence pathogen infection and transmission. It has long been recognized that the ticks harbor unknown/uncharacterized endosymbionts but the role these symbionts play in tick physiology and vector competencies largely unknown. A high-prevalence of these endosymbionts in the tick microbiome provides an example of hematophagous model to study their functional role in vector competence. Deciphering the functional role of tick microbiome in pathogen infection and transmission is crucial to how pathogen both survive and vectored by ticks. In this study, a *Rickettsia parkeri*-infected *Amblyomma maculatum* tick model was utilized to determine the simultaneous gene expression of tick and residing pathobiome by massive RNA-Seq analysis. Our analysis revealed ~1531 genes differentially regulated between infected and uninfected ticks including a range of selenium-containing novel proteins, selenoproteome-dependent redox signaling pathway factors. The functional role of selenoproteins in rickettsial and pathobiome infection was determined by using a reverse genetics approach. This study illustrates the potential of this new research model for augmenting our understanding of the pathogen interactions occurring within tick hosts, and the important roles that symbionts and various tick factors play in regulating pathogen growth.



"How to Evaluate, Build, and Highlight Transferable and Career Relevant Skills"

Lauren Celano, PhD President and CEO, Propel Careers

In this seminar, Dr. Celano will provide insight on how to evaluate transferable skills and which skills are valued in various careers. Specifically, she will highlight common non-scientific skills that scientists can apply towards their desired career for research and non-research based roles, as well as provide guidance on how to package scientific and non-scientific skills on resumes, cover letters, and during interviews.

Scientific Session VIII:

Community Engagement & Interest Group hosts "The Voice of Community-Academic Partnerships"

4:15 PM – 5:30PM

Session Chair:
Jennifer Lemacks, PhD, RD
The University of Southern Mississippi

Session Moderator:
Sandra Melvin, DrPH
Open Arms Healthcare Clinic

GOAL: To share community academic experiences and lessons learned with a professional audience.

Session Chair:

Jennifer L. Lemacks, PhD, RD
Director, Mississippi INBRE Telenutrition Center
Associate Professor and Associate Director, School of Kinesiology, The University of Southern Mississippi

Session Moderator:

Sandra Melvin, DrPH
Investigator, Mississippi INBRE Community Engagement and Training Core
Chief Operating Officer, Open Arms Healthcare Center

Academic Panelists:

Carol Connell, PhD, RD
Co-director, Community Engaged Research Core, MS Center for Clinical & Translational Research
Professor and Associate Dean of Research, College of Education and Human Sciences,
School of Kinesiology and Nutrition, The University of Southern Mississippi

Carol Connell is Professor of Kinesiology and Nutrition, and Associate Dean of Research and Graduate Education in the College of Education and Human Sciences at USM where she has conducted research on food insecurity, food access, and theory-based community engaged research studies related to nutrition and obesity since 1996. She is currently the co-director of the Community Engaged Research Core of the Mississippi Center for Clinical and Translational Research (MCCTR). The mission of MCCTR is "to develop a powerful and sustainable research enterprise that will have an important public health impact by reducing obesity and its complications as well as health disparities in Mississippi."

Mauda Monger, MPH
My Brother's Keeper, Inc.

Mauda Monger is a native of Jackson, Mississippi; she has a Bachelor of Arts in Economics/Business Administrations from Tougaloo College, and a Master's degree in Public Health, Health Policy & Management from Jackson State University. Currently, Ms. Monger is finalizing her research for her doctoral degree at Jackson State University.

Mauda Monger serves as Chief Operating Officer and Clinical Manager for the CDC Capacity Building Assistance (CBA) for High Impact HIV Prevention Program Integration at My Brother's Keeper, Inc. With more than 16 years of experience in HIV/AIDS, Monger is charged with strategic planning, implementing and evaluating reactive and proactive technical assistance for CDC funded health departments and community-based organizations. As COO, her goal is to ensure that MBK continues to be innovative with a structure that is focused towards eliminating health disparities. She is author and co-author on numerous papers, abstracts and has presented extensively on HIV prevention, social determinants of health, special populations, HIV stigma.

Jaqueline Reese-Smith, PhD

Investigator, Mississippi INBRE Telenutrition Center

Jacqueline Reese-Smith is a psychologist at the Veterans Health Administration. She graduated with a Ph.D. in Counseling Psychology with an emphasis in Health from the University of Kansas in Lawrence, Kansas. Dr.Reese-Smith's research has included health disparities using counseling interventions to increase health promotion and cancer prevention among minority populations. Dr. Reese-Smith is currently conducting behavior change research to reduce risk factors for obesity, and obesity related cancers.

Community Panelists:

Jackie Hawkins, MS

Chief Executive Officer/Owner, Delta Community Solutions, LLC

Jackie Hawkins is the Chief Executive Officer and Founder of Delta Community Solutions, LLC. Ms. Hawkins recently retired from the Mississippi State Department of Health with 32 years of state services and over two decades of public health in which she was the Community Bureau Director of Mississippi Delta Health Collaborative. Her work included developing and implementing policy systems and environmental changes in settings such as faith-based organizations, communities, barbershops, and local municipalities. Ms. Hawkins holds a master's degree in Rural Public Policy and Planning with emphasis on Rural Health. She has gained much notoriety and co-authored presentations and publications for her work in policy systems and environmental change strategies. She has a vast list of community experience including coordinating, facilitating community programs, projects, workshops and focus groups. Ms. Hawkins other experience includes social determinants of health, community engagement, utilizing evidence based public health strategies, faith-based interventions, public health infrastructure and improvement coalition development, mobilization and much more. Ms. Hawkins is a two-time recipient as a Rural Health Champion Award. She's married to Dewayne Hawkins and they have two children, Darrius and Kaithlyn. Ms. Hawkins passion lies in serving the community.

Tammy Fordham Bell, BBA, MS

Health Educator, Mercy Delta Express Project
MCCTR Community Advisory Board, The University of MS Medical Center

Tammy Fordham Bell is a community advocate, professional health education specialist, and former project manager for several community-based organizations. She works in the MS Delta and rural sites in MS. She has been teaching abstinence to teens around the Mississippi Delta for over 15 years. While employed at Cary Christian Center, she had the opportunity to speak with young girls throughout the community focusing on teenage pregnancy, STI's, HIV/AIDs, which influenced her current passion for working with youth. Also, she is the former project manager for Families First Resources Center servicing Washington, Sharkey, Issaquena, Humphreys, and Holmes Counties in Mississippi.

Ms. Bell is a professional health educator at the University of Mississippi Medical Center's Mercy Delta Express Project in Sharkey County, where they have four school-based clinics in the Sharkey/Issaquena area.

Also a member of the Mississippi Center for Clinical and Translational Research Community Advisory Board (CAB), she works to improve the health of Mississippians by providing the infrastructure needed to support obesity-related research. CAB members meet quarterly, have representation on the internal advisory board for the entire study, and advise Community-Engaged Researchers on key issues such as key stakeholders in the communities and recruitment of participants for individual studies.

She understands the importance of working with rural and medically underserved populations and has a passion for teaching and bringing health awareness to communities. Making a difference in the lives of others is vital and achieved through sharing knowledge and helping them apply that knowledge to improve their health. She is also a life coach, a motivational speaker, and a mentor for all ages.

Erica Thompson, MD

Magnolia Medical Foundation

Dr. Erica Q. Thompson is the Founder and Executive Director of Magnolia Medical Foundation. Magnolia Medical Foundation mission is to: (1) assure accessible, affordable, contiguous, responsive, culturally competent, family-centered and gender-sensitive preventive health and social services/resources that meet the needs of families and (2) advocate for family health, stability, and well-being through mechanisms that encourage and support healthy physical and social environments and healthy behaviors.
Dr. Thompson through her organization addresses complex public health issues, such as diabetes, sexually transmitted infections, teen pregnancy, tobacco use, homelessness and financial empowerment throughout the State of Mississippi through the three locations of Magnolia Medical Foundation in Natchez, Jackson and Biloxi. She has more than a decade of experience in health program services, management, training, and evaluation.

She earned a Bachelor of Science degree from Tougaloo College in Tougaloo, MS, a Doctorate of Medicine from Brown University Medical School in Providence RI and a Masters of Public Health degree from the University of Southern Mississippi in Hattiesburg, MS.

CEIG Committee Members:

Carol Connell, PhD, RD

Co-director, Community Engaged Research Core, MS Center for Clinical & Translational Research
Professor and Associate Dean of Research, College of Education and Human Sciences, School of Kinesiology and Nutrition, The University of Southern Mississippi

LaShaundrea Crook, MS, RD

Assistant Director, Office of Vice President for Research & Mississippi INBRE Telenutrition Center, The University of Southern Mississippi

June Gipson, PhD, EdS

Director, Mississippi INBRE Community Engagement and Training Core
President/CEO, My Brother's Keeper, Inc.

Sandra Melvin, DrPH

Investigator, Mississippi INBRE Community Engagement and Training Core
Chief Operating Officer, Open Arms Healthcare Center

Jennifer C. Robinson, PhD, RN, CNE, FAHA

Co-director, Community Engaged Research Core, MS Center for Clinical & Translational Research
Professor and Associate Dean of Research of Research, School of Nursing, University of MS Medical Center

Judging Information

Judges are assigned to either Poster Session A or Poster Session B as either a Graduate Judge or an Undergraduate Judge.

Judging packets are available for pickup at the "Judges Information" Table next to the Registration Table. Assigned students' judging forms are pre-labeled for your convenience.

Please make sure of the following:

1. Place your name on each Judging form.
2. Each student **must be present** to complete their judged score and to be considered for award consideration, as their overall verbal delivery of their presentation must be considered.
3. Co-presentations by a team of students will receive one score per rubric category based on their combined presentation.

Once all posters are scored, please return your packet to the Judges Information Table so that we can input and calculate all student scores for awards.

Poster Session Info

Each student must be present for their poster to be judged for award consideration.

There are two divisions for awards:

Graduate Division:

- 1st Place - $500 + Certificate
- 2nd Place - $250 + Certificate
- 3rd Place - $150 + Certificate

Undergraduate Division:

- 1st Place - $500 + Certificate
- 2nd Place - $250 + Certificate
- 3rd Place - $150 + Certificate

Co-presentations by a team of students will receive one team score and will be judged in the division based on the highest degree seeking team member. If a co-presentation wins placement in a division, the award will be split among co-presenters.

Poster Session A Setup – on your assigned board anytime before the start of the poster session at 11:00 AM. **Poster Session B Setup –** you may place your poster below your assigned poster number easel until Lunch, when you will then put up your poster!

ALL POSTERS MUST BE REMOVED IMMEDIATELY FOLLOWING YOUR PRESENTATION IN YOUR POSTER SESSION!

Poster Session A

A01	Yetunde	Adewunmi
A02	Isaiah	Adkins
A03	Tolulope	Ayo
A04	Arlencia	Barnes
A05	Sierra	Barnes
A06	Austin	Barnett
A07	DeQuarius	Bonds
A08	Tynai	Bridges
A09	Normanda	Brown
A10	Jeff	Bruni
A11	Stephanie	Burr
A12	Derrick	Burt, II
A13	Kristen	Carter
A14	Shaloam	Dasari
A15	Chyna-Rae	Dearman
A16	Likhitha	Duggirala
A17	Precious Patrick	Edet
A18	Brooke	Francisco
A19	Tatum	Freeman
A20	Gabriel	Gardner
A21	Kelvin	Gardner
A22	Jessica	Graham
A23	Ashley	Griffin
A24	Ian	Halbert
A25	Hannah	Harris
A26	Taylor	Harris
A27	Jania	Hines
A28	Sharkiesha	Jackson
A29	Jalisa	Jones
A30	Amber	Kennon
A31	Amir	Khadivi
A32	Arun Kumar	Kotha
A33	Marjorie	Lam
A34	Madison	Land
A35	Marianne	Lee
A36	Joseph	Luttrell IV
A37	Khalid	Manzoul
A38	Lawrence	Mason
A39	Jasmine	Meeks
A40	Desiree-Gift	Mills
A41	Ahmed	Mohamed
A42	Biswas	Neupane
A43	Jay	Nguyen
A44	Kennedy	Nies
A45	Daniel	Oyugi
A46	Niki	Patel
A47	Tramari	Poole
A48	Benjamin	Onyeagucha
A49	Jervia	Powell
A50	Teryn	Railey
A51	Erin	Riggins
A52	Rob	Rockhold
A53	Benjamin	Rushing
A54	Jhinuk	Saha
A55	Juliana	Sitta
A56	Kristen	Smith
A57	Lauryn	Smith
A58	Corinne	Sweeney
A59	Reneisha	Sweet
A60	Anna	Thigpen
A61	E. Ashley	Thomson
A62	Dylan	Tran
A63	Nga	Truong
A64	Morgan	Vincent
A65	La Shon	Webb
A66	Carey	Williams
A67	Vernaldo	Wilson
A68	Shan	Yang
A69	Rama	Gadepalli

Poster Session B

B01	Abdulsalam	Adegoke
B02	Sophia	Ali
B03	Rasaki	Aranmolate
B04	Moses	Ayoola
B05	Charmion	Bell
B06	Bridget	Boehm
B07	Teylor	Bowles
B08	Diamond	Boyd
B09	Valeria	Brown
B10	Damayanti	Chakravarty
B11	Chelsea	Cheatham
B12	Olive	Cooper
B13	Kelly	Corley
B14	Sara	Crosby
B15	Rachael	Curtis
B16	Latoyia	Downs
B17	John	Dumas
B18	Stephanie	Floyd
B19	Alison	Fullilove
B20	Bibek	GC
B21	Rana	Gordji
B22	Jaylan	Green
B23	Jhanel	Greene
B24	Natalie	Hampton
B25	Kennadi	Johnson
B26	Clayton	Johnson
B27	Kiviyon	Jones
B28	Parneet	Kang
B29	Lauren	Kennedy
B30	Jacques	Kessl
B31	Michael	Koko
B32	Amy	Krecker
B33	Thuy Hien	Le
B34	Lucie	LeBlanc
B35	Mona	Fendereski
B36	J'Mone	McClenty
B37	Sarah	Miller
B38	Makayla	Minton
B39	Nisha	Mishra
B40	Stephanie	Mohmed
B41	Mary	Nakamya
B42	Ihunanaya	Okorie
B43	Shanti	Pandey
B44	Jooyoun	Park
B45	Parth	Patel
B46	Thomas	Pegoda
B47	Jason	Price
B48	Reanna	Robinson
B49	James	Shaffery
B50	Surendra	Sharma
B51	Jordon	Simmons
B52	Kaliq	Sims
B53	Evan	Smith
B54	Meng	Song
B55	Sarah	Spence
B56	Sharon	Suffern
B57	Faizan	Tahir
B58	Kordillia	Thompson
B59	Timothy	Thompson
B60	Kaelin	Travis
B61	Kimberly	Travis
B62	Elliot	Varney
B63	Jason	Wafosoh
B64	Faren	White
B65	Beniria	White
B66	Gerri	Wilson
B67	Chaoyang	Zhang
B68	Yongfeng	Zhao
B69	Farid	Zia
B70	Chandan	Gurung

Conference Abstracts

Poster Session A 11:00 AM – 12:15 PM

A01 The antimicrobial activity and cellular targets of 4-methoxybenzaldehyde and epigallocatechin gallate in the opportunistic human pathogen *Pseudomonas aeruginosa*

Yetunde Adewunmi[1], Sanchirmaa Namjilsuren[1], Dahlia Amato[2], Douglas Amato[2], William Walker[2], Olga Mavrodi[1], Derek Patton[2], and Dmitri Mavrodi[1]

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[2]School of Polymer Science and Engineering, The University of Southern Mississippi, Hattiesburg, MS

Plant-derived aldehydes are constituents of essential oils (EOs) that possess broad range antimicrobial activity and kill microorganisms without promoting resistance. However, their widespread use is hampered by chemical instability and knowledge gaps in their mode of action (MOA). To circumvent these issues, we incorporated 4-methoxybenzaldehyde from star anise into a polymer network via acetal linkages called PANDAs (Pro-Antimicrobial Networks via Degradable Acetals). The resultant antimicrobial polymer released 4-methoxybenzaldehyde upon a change in pH and humidity and controlled growth of the multi-drug resistant pathogen *Pseudomonas aeruginosa* PAO1. To identify cellular pathways targeted by PANDAs, we generated 10,000 transposon mutants of PAO1 and screened them for hypersensitivity to 4-methoxybenzaldehyde. The screen yielded 27 unique mutants defective in components of RND efflux pumps, membrane transporters, porins, enzymes of the molybdenum cofactor biosynthesis complex, and hypothetical proteins. To further improve the antimicrobial efficacy of PANDAs, we combined 4-methoxybenzaldehyde with epigallocatechin gallate (EGCG), a green tea polyphenol that inhibits efflux in gram-positive and -negative bacteria. We found that EGCG acted synergistically with 4-methoxybenzaldehyde and significantly reduced its minimal inhibitory concentration. We then used RNA-seq to profile transcriptomic responses of *P. aeruginosa* to 4-methoxybenzaldehyde, EGCG, and their combination thereof. The response to 4-methoxybenzaldehyde involved a total of 256 genes, some of which encoded nitrate reductase, energy metabolism enzymes, transporters, and components of efflux pumps and type III secretion machinery. The exposure to EGCG altered expression of 28 genes involved in signal transduction, antioxidant defense, and carbohydrate metabolism. Finally, the synergistic interaction between 4-methoxybenzaldehyde and EGCG differentially affected components of efflux, membrane transport, stress response, and nitrate reductase pathways. Results of this study will help to elucidate cellular pathways targeted by EO constituents and produce novel phytoaldehyde-containing polymer materials that effectively kill pathogenic microorganisms.

A02 Subcloning R-SNARES Vamp2 and Vamp3 into Expression Vector to Study Mast Cell Degranulation

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[2]Department of Cell and Molecular Biology, The University of Southern Mississippi, Hattiesburg, MS

Mast cells are known to play a role in many different immune responses in the body, and this is due to several chemical mediates that reside in cytoplasmic granules (histamine, serotonin, TNF-α, etc). It is known that the binding of SNARE proteins, which are the membrane proteins located on mast cell plasma membrane and granule membrane, mediate the fusion of granular and plasma membrane, which leads to the release of the granules in response to allergic and inflammatory reactions. Mast cells have many SNARE proteins, yet the reasoning for having different SNARE proteins is unknown. It is also not known if these SNARE proteins are specific to which mediator is released, and this study involves the process of answering this question. I am focusing on two R-SNARE proteins in particular, VAMP2 and VAMP3. To determine if VAMP2 and VAMP3 (SNARE proteins present on granule membranes) have a specific effect on mediator release, these genes have first been knocked out in RBL-2H3 (rat Basophilic Leukemia) mast cell line. I am developing four constructs that will be used to re-introduce genes that were previously knocked out of mast cell line and rescue these knockout cells. The VAMP2 and VAMP3 genes were cloned into PLVX-IRES-Blast vector, with GFP tag and without GFP tag. To do so, the VAMP genes were first amplified via PCR. EcoRI and BamHI were used to double digest both VAMP genes and expression vector. These products were gel purified and ligated together, then transformed into competent

Novablue E. coli cells. The results in which I gathered show the ligation of insert and vector was successful, and the construct was successfully transformed in to the competent bacterial cells. To conclude, once these bacterial cells are shown to grow with the correct construct via plating on selective media, they can be amplified, verified by DNA sequencing, and then re-introduced to mammalian mast cell line and are hypothesized to recover the wild type phenotype and rescue any loss of mediator release.

A03 TNF Production in Activated RBL-2H3 Cells Requires Munc13-4

Tolulope E. Ayo[1], Pratikshya Adhikari[1], Shuzo Sugita[2,3] and Hao Xu[1]

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The stimulation of mast cells leads to the release of vast amount of mediators that various studies have shown to be of great medical importance. One of these mediators is Tumor Necrosis Factor (TNFα). The purpose of this study is to show the connection that exists between TNF production and secretion in stimulated mast cells using a tumor homolog of mucosal mast cells, RBL-2H3(Rat basophilic leukemia cells). Munc13-4(an important regulatory protein in mast cell exocytosis) knock-out RBL-2H3 cells were created and IgE/antigen dependent stimulation produced high amount of TNF in wild type but not in munc13-4 knock-out cells. The production of TNF was rescued upon re-introduction of Munc13-4 indicating our knock-out procedure was target specific. Also, pre-incubation of cells with R-7050, an inhibitor of TNF receptor signaling pathway before stimulation blocked TNF production without affecting TNF release. Therefore, we proposed that there is a feedback loop in which TNF released upon mast cell stimulation binds to TNF receptor to boost TNF production.

A04 The Therapeutic Effects of *Vernonia amgdalina* on the Inhibition of Growth of Cervical Cancer (HELA) Cells Through a Molecular Pathway

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[2]Department of Biology, Jackson State University, Jackson, MS

Cancer is the second leading cause of death in the United States. Cervical cancer is a malignant tumor of the cervix, the lowermost part of the uterus. Cervical cancer is the second leading cause of deaths in the US for women in the US after breast cancer. Estimates for the United States for 2019 are about 13,170 new cases of invasive cervical cancer will be diagnosed and about 32 percent of those women will die from cervical cancer (American Cancer Society, 2019). Based on previous studies with prostate cancer, breast cancer, and colon cancer *Vernonia amygdalina* extracts (V.A. Extracts) is a very helpful novel treatment aside from traditional treatments such as chemotherapy. V.A. is a common edible vegetable in Cameroon/South Africa that has been used as a traditional medicine for some human diseases. V.A. also known as bitter leaf is a medicinal herb that is mostly used to decrease illnesses such as diabetes, hypertension, etc. and prevent cancer. Currently there are no previous reports that have explored the therapeutic efficacy of V.A. extracts against cervical cancer. Our objective is to determine if V.A. will work in synergy with the current standard of care cisplatin as an herbal therapeutic for the treatment for cervical cancer. Depending on cell type and concentration, cisplatin induces cytotoxicity, by interference with transcription and/or DNA replication mechanisms. Additionally, cisplatin damages tumors via induction of apoptosis, mediated by the activation of various signal transduction pathways, including calcium signaling, death receptor signaling, and the activation of mitochondrial pathways (Florea, Busselburg, 2011). Nevertheless, cisplatin is so strong that it kills the cancer along with the healthy cells in the patient. V.A. Extracts are native to Africa in which people ingest the bitter leaf in a variety of ways. In this area where the bitter leaf is ingested cancer rates, disease rates, and sickness is little to nonexistent. We hypothesized that V.A. extracts will attenuate cervical cancer growth in synergy with the current standard of care, cisplatin. To achieve our objective, HeLa NR1 cell culture assays will be treated with varying doses of cisplatin, V.A. extracts alone, and cisplatin with varying doses of V.A. extracts for 72 hours. We plan to determine which molecular pathway V.A. extracts work with attenuate the proliferation of cervical cancer cells and best triggers cell apoptosis.

A05 A Comparative Analysis of Sexual Reproductive Education Retention Among African American Teens Aged 13-18 and Their Caregivers in the Jackson MSA

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[1]Mississippi INBRE Service Scholar, Jackson State University, Jackson, MS

[2]My Brother's Keeper, Inc., Jackson, MS

The My Brother's Keeper, Inc. ICAN Project, Future Ready, engages teens aged 13-18 and their respective caregivers in a multi-modal, interactive sexual and reproductive health intervention. Sexual and reproductive health priorities include safer sex education options and public health sexual health disparity awareness and reduction including disparities such as the human immunodeficiency virus (HIV), sexually transmitted infections (STI), and unplanned pregnancies. In Mississippi, social and clinical trends associated with sexual and reproductive health practices are alarming. For instance, Mississippi ranks 3rd in teen pregnancy rates, 3rd in chlamydia rates, 1st in the US in HIV-related deaths, 6th in new HIV diagnoses per 100,000 people (CDC, 2009), while the capitol, Jackson, MS, has the 4th highest rate of HIV in the US among metropolitan cities. MBK's Future Ready training program aims to decrease these disparities by increasing evidence-based knowledge about sexual and reproductive health among teens and their caregivers in Mississippi. The training requires teens and their caregivers participate separately, yet simultaneously, in a 4-hour educational session that includes pre- and post-tests. The data analyzed for the purpose of this study was collected between 2016-2018 to evaluate the varied increases in knowledge between the two Future Ready training groups: teens and their caregivers. Secondary quantitative data analysis method was exercised for the study by comparing means between the pre- and post-test. The results show that teens retained more information than their caregivers in the 4-hour time frame. Thus, the study hypothesis was confirmed. Because the range in knowledge gain between the two groups was not substantial, training modifications to increase knowledge retention for one group is not recommended. However, it has been suggested, for future research purposes, that the pre- and post-tests include demographic indicators to allow researchers to gauge specific gains within subgroups based on gender, age, zip code, etc.

A06 The Relationship Between Built Environment Infrastructure and Physical Activity Levels of African American Adults in Mississippi

Austin Barnett, MS[1], Craig Hughes[2], Jennifer L. Lemacks, PhD, RD[3], Tammy Greer, PhD[3], Sermin Aras, MS, RD[3]

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[3]Mississippi INBRE Telenutrition Center, The University of Southern Mississippi, Hattiesburg, MS

According to the Mississippi Department of Health, 45.2% of African American adults in Mississippi are classified as obese and, relatedly, 61.1% do not meet physical activity (PA) recommendations. Access to and condition of built environment infrastructure (BEI), such as parks and sidewalks, can potentially increase PA levels and lower rates of obesity in health disparate groups, especially those with lower income. The purpose of this study is to determine the relationship between BEI and PA levels in African Americans in Mississippi and whether that relationship is moderated by income. Data collected from paper and pencil surveys and electronic surveys were analyzed using SPSS 20. Eligible participants included 108 African American adults (27 male and 81 female) who were recruited from outreach events conducted at a university and in Mississippi minority communities. The dependent variable in this study was PA and the independent variables were income and BEI computed as the mean of three variables (sidewalk condition, park proximity, and park condition). A simple correlation and moderated multiple regression were used to determine the relationship between these variables. Multiple regression showed BEI and income were not significant predictors of PA levels. However, the simple correlations provide some evidence of PA levels being related to BEI, with condition of sidewalks (r=.250, p=<.05), and proximity of parks (r=.269, p=<.05), but not condition of parks (r=.190 p=>.05) being associated with PA levels. Further research is needed to elaborate on how BEI can increase PA and whether income influences this relationship.

A07 Integrating Social Media with Smartphone Applications to Prevent Adolescent Sexually Transmitted Infections

Marcus Cannon[1], DeQuarius Bonds[1] MS, Antwan Nicholson[2]

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[2]My Brother's Keeper, Inc., Ridgeland, MS

The use of technology and the case of transmitted infections in the adolescent population has been on the rise in the twentieth century. Research shows that preventing sexually transmitted infections among adolescents has proven to be difficult in recent years. According to Pew Research Center, 95% of adolescents have access to smart phones and 45% are frequently online. Upon review of all programed applications that were uniquely specified for sexually transmitted infection, it was discovered that no applications were specifically designed for adolescents (including those that were sharable on social media sites). A total of 55 applications were identified and research showed that 15% of those applications were designed for individuals who have already encountered sexually transmitted infections (Journal of Medical Research, 2013). Research did not reflect any applications that pertained specifically to sexually transmitted infections in adolescents. However, there was significant evidence of application that targeted individuals that were currently infected with an STI. As a result of the research, it is concluded that there is a need for applications to be created and promoted through social medial and other digital technology outlets.

A08 Photochemical Key Steps in Cyclization Reactions: Synthesis of Isoindolone Piperidines As Kinase Inhibitors

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Cancer cell are the result of disruption of tightly regulated metabolic pathways. This leads to uncontrolled proliferation of cells as seen in invasive tumors. Inhibition of certain metabolic enzymes thus might provide a tool to minimize the harmful effects of excessive cell growth. Two key phosphorylating enzymes, glycogen synthase kinase-3 (GSK3) and cyclin-dependent kinases (CDKs) are the target of researchers to interfere with cancer metabolism. Valmerins are isoindolone piperidines that have been shown to inhibit GSK3/CDK enzymes during cell proliferation. In this project, we are using the photodecarboxylative cyclization as a key step in the synthesis of GSK3/CDK inhibitors. The syntheses are initiated from affordable building blocks and culminate in the stereocontrolled synthesis of the target molecules.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

A09 Risky Early Life Environment and Increased Vulnerability to HIV/AIDS Among Black MSM

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[2]My Brother's Keeper, Inc., Jackson, MS

Adverse childhood experiences are traumatic events that can result in the form of physical, emotional, or sexual violence that can increase health risks for HIV and STD transmission. African American Men who have Sex with Men (MSM) are disproportionately affected by HIV in Mississippi, where there has been a 38% rise in newly diagnosed HIV infections among this demographic. Therefore, the purpose of this research is to understand the factors that put African American MSM at an increased risk for acquiring HIV. An analysis of the Minority HIV/AIDS Research Initiative (MARI) was conducted in SPSS to understand the underlying factors that can contribute to an increased vulnerability to HIV. Questions analyzed the characteristics of home life, specifically regarding the presence of sexual abuse, and then cross tabulated with current HIV status to indicate whether environment was a contributor to an increase in vulnerability. Results show that MSM who were HIV positive experienced lesser forms of sexual abuse than those who were negative. The study reveals that most of the participants were hesitant to report these incidents with 59.2 percent not reporting the incident, 36.7 being HIV positive. The study and results reveal that sexual abuse was heavily prevalent in their homes. The study done on "Risky Early Life Environment" highlighted the underlying issue of all HIV positive participants-sexual abuse was heavily present in the home. Future research should focus on public health professionals developing more services for those affected by sexual abuse, specifically treating trauma from the environmental exposure. Acknowledgment: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

A10 Expression and Purification of Hepatitis B Capsid Proteins for Cancer Therapeutics

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[2]Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson MS

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Glioblastoma (GB) is a very common, aggressive malignant brain tumor that arises from astrocytes found in the adult brain. Although there are many types of treatment that are effective in the short term, the long-term prognosis still remains problematic. Since cancer cells arise from normal cells in the body, there needs to be a way of differentiating cancer cells from normal cells. Hepatitis B virus (HBV) capsid proteins (Cp) are capable of self-assembly, and have previously been shown to be able to bind cargo such as metal ions (SJ Stray, P Ceres, and A Zlotnick, *Biochemistry* 43: 9989-98), and thus have the potential to allow them to become a type of "shipping envelope" by assembling a virus-like particle (VLP) that can be used to package toxic particles to deliver them to GB cells. There are two forms of the HBV Cp that are under study: the 149 amino acid assembly domain (Cp149), and the 183 amino acid full-length sequence that includes the assembly domain and the sequences responsible for the interaction with RNA (Cp183). We have introduced the RGD peptide sequence into both Cp!49 and Cp183 in the hope that this will allow more specific targeting of GB cells. Both sequences are expected to be able to self-assemble and be able to deliver toxic cargo such as platinum (Cp149) or RNA encoding toxic products (Cp183). We will evaluate different methods for expressing and purifying these Cp proteins.

A11 Extracellular Matrix Components Isolated from Diabetic Mice Alters Cardiac Fibroblast Function through the AGE/RAGE Signaling Cascade

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Roughly 30 million Americans suffer from diabetes and these individuals are at an increased risk of developing cardiovascular complications. A common complication is heart failure which occurs due to the stiffening of the left ventricle brought on by cardiac fibroblast "activation" that results in the remodeling the extracellular matrix (ECM). Fibroblast "activation" can be triggered by the AGE/RAGE signaling cascade. Advanced Glycated End products (AGEs) are produced and accumulate in the ECM overtime, but under hyperglycemic conditions this process is accelerated. We aim to investigate how the presence of AGEs in the either diabetic or non-diabetic ECM can affect fibroblast ECM remodeling as well as determine the role of AGE/RAGE signaling during this process. In order to assess this question diabetic and non-diabetic fibroblasts were embedded in 3D matrices composed of collagen isolated from either diabetic or non-diabetic mice. Non-diabetic fibroblasts displayed similar matrix contraction and α-SMA expression to diabetic fibroblasts when embedded in diabetic collagen. In addition, increasing the AGE/RAGE cascade leads to increase gel contraction indicating increase in fibroblast "activation". These results indicate 1) the ECM from diabetic and non-diabetic mice differ from one another, 2) diabetic ECM can impact fibroblast function and shift them towards an "active" state, and 3) that fibroblasts can modify the ECM through activation of the AGE/RAGE signaling cascade. These results suggest the importance of understanding the impact diabetes has on the ECM and fibroblast function.

A12 Molecular Beacon Signaling of Trichomonas vaginalis virus

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Trichomanias is the most common sexually transmitted infection worldwide and is caused by the protozoan parasite *Trichomonas vaginalis*. The parasite itself may be infected with *Trichomonas vaginalis virus* (TVV), a double-stranded RNA virus from the Totiviridae family. There are four known distinct subspecies of TVV, (TVV1-TVV4). Molecular beacons are oligonucleotides with a target-specific loop bookended by complementary sequences that complete the hairpin. Attached to the ends of the beacon are a fluorescence quencher on one end and a fluorophore on the other. The stability is such that in the absence of target sequences, molecular beacons remain in hairpin structure and the quencher prevents the fluorophore from emitting detectable fluorescence. In the presence of target sequence, the beacon will bind to the target and, now in linear form, begin to fluoresce upon excitation. This leads to molecular beacons' high signal to background ratio, relative to more traditional linear probes. Another notable ability of molecular beacons is their capacity to perform at physiological temperature and conditions, allowing for real-time *in vivo* experimentation. We will take advantage of this feature and use molecular beacons targeted to TVV1. After first determining an *in*

vitro affinity for TVV1 genetic sequences, we will use molecular beacons in living *Trichomonas vaginalis* cells, determining specificity between infected and uninfected cells. Among the infected cells, fluorescence of TVV1-bound beacons will allow for determination of real-time double-stranded RNA virus localization.

A13 Circulating Cell-Free Nuclear DNA Is Associated with Fibrinolytic Shutdown after Injury

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[2]Department of Surgery, University of South Alabama Medical Center, Mobile, AL

Circulating cell free nuclear DNA (cfDNA) is an emerging link between the innate immune, coagulation, and inflammation systems. The presence of circulating cfDNA has been shown to augment thrombin generation and platelet activation, but its effects on fibrinolysis are less clear. Critically injured patients meeting highest-level trauma activation criteria were prospectively enrolled under waiver of consent, and blood sampled within 6h of arrival. Citrated kaolin thromboelastography (TEG) was used to divide fibrinolysis into shutdown, normal, and hyperfibrinolytic ranges based on Lysis Index at 30min (LY30). Real-time quantitative PCR for the 18s nuclear DNA sequence was performed and correlated with fluorometric cfDNA quantitation. In 35 injured patients, circulating 18s cfDNA levels were elevated 2.8-fold compared to 21 healthy volunteers ($p<0.01$), and were 4.2-fold higher in blunt compared to penetrating injury ($p=0.02$). On arrival, 29% of injured patients demonstrated fibrinolytic shutdown, 68% had normal-range fibrinolysis, and 3% had hyperfibrinolysis. Median cfDNA concentration was 5.6ng/mL (interquartile range 0.3 – 11.8) in patients with shutdown, compared to 0.3 (0.1 – 0.6) in those with normal or hyperfibrinolysis (Kruskal-Wallis $p=0.029$; see figure). When adjusted for age and injury severity, 18s cfDNA level remained a significant predictor of admission fibrinolytic shutdown (odds ratio 1.30, $p=0.045$, model area under the curve 0.717). Circulating cell free nuclear DNA is a biomarker of injury severity after trauma and is specifically associated with early fibrinolytic shutdown. Inadequate fibrinolysis and resultant microvascular thrombosis may be a potential driver of multiple organ failure after severe injury.

A14 Socio-Economic Factors in Disease Rates: A Longitudinal Study of Obesity, Diabetes and Heart Disease in Mississippi

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Obesity is among the leading causes of many chronic medical conditions such as diabetes and elevated mortality from heart disease. In this longitudinal study, associations between obesity, diabetes, and heart disease in the state of Mississippi in 2005 - 2017 are examined using regression analysis. The study collected data from the Behavioral Risk Factor Surveillance System (BRFSS) published by the Centers for Disease Control (CDC). Data of individuals of different socio-economic status were collected for the state of Mississippi from 2005 to 2017. Socio-economic factors such as age, race, level of education, and household income are found to affect chronic disease rates in obesity, diabetes, and heart disease considerably with many significant associations. Data analysis of the disease rates showed that obesity and cardiovascular disease are highly related. Risk of the cardiovascular condition is higher for low income, less educated population, and certain ethnic groups. The proportion of people affected by obesity, heart disease, and diabetes is increasing and this finding highlights certain issues in oncology. Keywords— Obesity, Heart Disease, Diabetes, Socio Economic factors.

A15 No Sex Differences in Spatial Memory Ability or Response to Aromatase Inhibition after Cerebellar Lesion in Zebra Finches

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Steroid hormones are produced *de novo* within the brain through a series of enzymatic reactions. After a brain injury, mRNA for all such steroidogenic enzymes are upregulated in glial cells. The largest increase is seen in aromatase which converts testosterone

into estradiol-17β (E_2). E_2 is a neuroprotective agent capable of reducing apoptosis, neuronal degeneration, and inflammation. However, little is known about how these protective effects on cells translate into recovery of function at the level of behavior. The zebra finch cerebellum serves as an excellent model for this process since the songbird brain is highly plastic and can recover rapidly from injury. Previously, we found that lesioned zebra finches with inhibited aromatase activity were impaired on a spatial memory task but not a motor task. However, these two tasks were evaluated in different sexes. While E_2 levels are similar between sexes, males have higher testosterone and therefore more aromatizable substrate. Females upregulate aromatase more rapidly and maintain upregulation for longer than males. Therefore, we expect males to be more negatively affected by aromatase inhibition. Finally, there is conflicting evidence about sex differences in spatial memory in zebra finches, necessitating further study. Our purpose was to determine sex differences on spatial memory ability and response to aromatase inhibition after cerebellar lesions in both a spatial and a motor task. We administered puncture lesions to the deep cerebellar nuclei of adult male and female zebra finches. Birds received one of three treatments: sham lesion, lesion with vehicle, lesion with aromatase inhibitor. Birds were evaluated on a spatial memory task designed by our lab as a dry analog to the Morris water maze and a motor task that measured ability to balance on an unstable perch. We found no sex difference in response to aromatase inhibition following cerebellar lesions. Birds with lesions and aromatase inhibition performed significantly worse on the spatial task than birds with sham lesions. There was no overall sex difference in spatial memory which is in line with our previous work but conflicts with results from a different lab. Differences between treatment groups but not sexes suggest that females may show greater amounts of aromatase upregulation as a compensation for lower testosterone levels. Analysis of the motor task requires manual counting of behavior through slow-motion viewing of video recordings and will therefore take several weeks to complete.

A16 Factors associated with Loneliness and Depression among the Mississippi Gulf Coast Residents

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To identify the risk factors associated with loneliness and depression among the residents of Mississippi Gulf Coast. Background: The World Health Organization (WHO) organization describes health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” Sometimes it would be easier to ignore the later part – mental and social well-being. At least 1 in 5 adults are known to live with a mental health condition. Among the mental health conditions, loneliness and depression have been highly prevalent and are the etiological factors for many other health conditions. Loneliness is currently known to be a “silent epidemic” among the adults in Unites States and at least 7.1% of United States adults experience a major episode of depression. Substance Abuse and Mental Health Services Administration (SAMHSA) estimated that 4.7% of adults in Mississippi are living with at least one serious mental health condition. Although providing accessible health services for the treatment of loneliness and depression is important, it is even important to prevent it in the first place. So, we would like to identify the risk factors associated with loneliness and depression among the residents of Mississippi Gulf Coast. Data Source and Study Design: The data is collected from randomly selected household which is located in south of Mississippi Gulf shore. A total of 310 responded to the survey questionnaire which measured resilience and adaptation among Gulf Coast residents, both in their everyday lives and during times of personal crisis or disaster. The loneliness is assessed using UCLA loneliness scale 3, and depression using 20-item CES-D scale. The data is analyzed using Chi-Square independent tests and ANOVA at the significance level, 0.05. Results: A significant relation was found between loneliness and income levels ($\chi^2(5) = 36.957$, $p<0.05$), loneliness and health insurance ($\chi^2(1) = 15.58$, $p<0.05$), depression and income levels ($F(5, 267) = 5.198$, $p<0.05$), depression and health insurance ($F(1, 299) = 5.469$, $p<0.05$). A significant relation was also found between the income levels and race groups ($\chi^2(30) = 52.394$, $p<0.05$). Conclusion: Income – one of the most important factor of Socio-Economic Status (SES) and health insurance are both strongly associated with loneliness and depression. It is important to address these risk factors to further prevent this condition. Even though the data was limited with south Mississippi, implications from this study can be important in developing new policies and advancing community supportive infrastructure in Mississippi.

A17 The Impact of Self-Efficacy for Diet on Fruits and Vegetables Intake Among Adults in Mississippi

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According to the Center for Disease Control and Prevention, Mississippi adults consume among the lowest daily recommended amounts of fruits (8.7%) and vegetables (6.2%) compared to the national averages of 12.2% and 9.3%, respectively. Fruits and vegetables are highly beneficial to health because they reduce the risks of obesity and diabetes as well as other preventable health conditions. In young adults, a greater intake of fruits and vegetables correlates with a higher intellect and minimizes the occurrences of chronic illnesses later in life. Self-efficacy for diet, including fruits and vegetables intake, has been shown to serve as a motivational factor in the consumption of fruits and vegetables among adolescents. However, the relationship between self-efficacy for diet and fruit and vegetable intake and its link to dietary behaviors, has not been well researched in more general populations, especially those with higher incidences of preventable chronic diseases. The specific objective of this research is to determine the impact of self-efficacy for diet on fruits and vegetables intake in a sample of young adult residents of Mississippi. Participants were adult Mississippi residents ranging in age from 18-30 years and recruited from university and minority community outreach events. Data were collected from eligible participants by the use of paper and pens as well as electronic surveys. A Pearson correlation analysis was conducted between self-efficacy and fruits and vegetables intake using SPSS 20.0. There was a significant, positive correlation between self-efficacy for diet and fruits ($r = 0.428$, $p = 0.01$, $N = 80$) and vegetables ($r = 0.275$, $p = 0.01$, $N = 81$) intake. This research shows that self-efficacy for diet is directly related to fruits and vegetables intake, and this knowledge will be beneficial in improving dietary choices among young Mississippi adults, alongside it being vital to disease prevention and dietary programs.

A18 *In vitro* evolution of influenza B virus under selection with human antibodies

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Each year, the human population is significantly affected by a major human pathogen, Influenza. Influenza is a viral disease that attacks the respiratory system. There are two main types: A and B. They both cause seasonal epidemics, but Influenza A is more common and has been more extensively studied. We have previously shown that neutralizing anti-influenza B antibodies were common among a collection of discarded, de-identified patient sera obtained from the University of Mississippi Medical Center Hematology Lab (Mariah Prather, LMS, and SJS, unpublished). We hypothesize that, the antibodies will allow us to select variant influenza B strains. To test our hypothesis, we will do this in two parts. The first part is to serially passage the influenza B virus B/Shanghai/(361/2002) in the presence of four different human antisera. The second part is to use 22 different primers to amplify and sequence the eight segments of the influenza B virus genome (E Hoffmann, K Mahmood, C-F Yang, RG Webster, HB Greenberg, and G Kemble. Proc Nat'l Acad Sci USA 99: 11411-6, 2002). In contrast to previous findings, which showed rapid adaptation of influenza A virus to growth in the presence of a neutralizing polyclonal chicken antiserum (RR Thangavel, A Reed, EW Norcross, SN Dixon, ME Marquart, and SJ Stray, Virol J. 18:8, 2011), our data for part 1 suggests minimal virus growth in the presence of each of the 4 antisera tested. Our preliminary data for part 2 suggests that there is a mixture of sequences in both the HA and NA gene sequences of the input virus stock. All eight gene segments will be sequenced after five passages of selection to determine what adaptations, if any, have occurred.

A19 Factors that Influence Interest in Nutrition Counseling in a Sample of Mississippi Adults

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Obesity and related chronic diseases are prevalent health concerns in Mississippi; for example, Mississippi has both the second highest adult obesity and diabetes rate in the nation. Past research suggests that nutrition counseling can prevent and treat various chronic diseases and simultaneously improve health outcomes. Yet, few Mississippians (only 13%) have actually attended nutrition counseling. Previous research has shown that both socioeconomic status (SES) and self-efficacy for diet are positively related to dietary quality and that disease diagnosis may motivate participation in behavior management programs. While SES, self-efficacy for diet, and chronic disease status may promote healthy behavior, these variables' influence on interest in nutrition counseling has not been explored. Therefore, the purpose of this study is to determine the impact of yearly income, chronic disease

status, and self-efficacy for diet on interest in nutrition counseling in a sample of Mississippi White, Black and Native American adults (18+). These relationships may also vary by race, as Whites are more engaged in the healthcare system than minorities. Participants were recruited from university outreach events and community settings. Linear regressions were computed using SPSS 20.0 with interest in nutrition counseling regressed onto yearly income, chronic disease status, and self-efficacy for diet. Chronic disease status predicted interest in nutrition counseling for White individuals while self-efficacy for diet predicted interest in nutrition counseling for Black individuals. No significant predictors were found for interest in nutrition counseling in American Indians. These results highlight the importance of race in the discussion of nutrition and healthcare services in Mississippi. Implications and future directions are discussed.

A20 Recombinant expression and purification of α-synuclein

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Parkinson disease (PD) is a progressive neurodegenerative disease that movements balance and posture among elderly patients. The cause of the disease is mainly attributed to the aberrant deposits of the protein, α-synuclein (αS). This protein is found throughout nerve cells in presynaptic terminals, which release neurotransmitters from synaptic vesicles. In PD, the αS protein aggerates to form intracellular deposits celled, 'Lewy bodies'. In order to understand the properties of aS and how they affect the neurons, the summer work in the lab involved recombinant expression and purification of αS protein in E. coli. The protein was purified using chitin affinity column followed by HFIP treatment and fractionation via size exclusion chromatography. The protein was purified and characterized for purity and used in biophysical experiments. The results and findings are presented in the poster.

A21 Apparent Binding Constants for DNA Interactions of Bifunctional Heteroaromatic Salts

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N-substituted heteroaromatic salts are photoactivatable compounds that are investigated for their impact on DNA. The compounds contain a DNA binding moiety which consists of the intercalator 1,8-naphthalimide. The separate DNA cleaving part can be activated by light and is producing two transient, reactive species: a heteroaromatic radical cation and an oxygen centered radical. Both of those species can damage DNA, each by a separate mechanism. To effectively cleave DNA, sufficient ground-state association is desired. DNA binding is measured by spectroscopic titrations (UV/Vis, fluorescence and CD). To determine DNA cleavage, gel electrophoresis is employed for analysis of cleavage fragments of pUC DNA. Supercoiled pUC migrates fastest. Double-strand cleavage produces linear DNA of that size which migrates slower. Single strand cleavage will relax the supercoils and produces circular DNA which migrates even slower. Time and concentration studies are performed to determine cleavage type. Addition of quenchers assists in the elucidation of the cleaving mechanism.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

A22 Effects of plant products and nicotine in colon cancer cells

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Nicotine (NIC) is a tobacco alkaloid and a major component of E-cigarettes. NIC causes injury of various organs which include prostate, kidney, as well as colon. Our earlier in vitro studies confirmed that NIC stimulates mitochondrial ROS production, which leads to a mitochondrial depolarization- dependent injury of renal proximal tubule cells. Since the popularity of E-cigarettes is on the rise, it may further increase risk in the relevant population. In this study we are aiming to find out a dose dependence of nicotine exposure on the human colon cells. We chose HCT-116 colon cancer cells. 0.1, 1, 10, 100, 200, 400 and 800µM nicotine in ethanol were used to dose the cell. Flavonols and related phenolic compounds of the flavonoid group are ubiquitous in plants of higher genera and are abundant in common plant-based foods and beverages such as citrus fruits, apple, strawberry, soy products, onion, broccoli, tea and red wine. Flavonoids protect various cell types from oxidative stress via different mechanisms. The most recognized mechanism is their direct antioxidant activity, which involves scavenging of reactive oxygen species (ROS) and peroxynitrite. Additionally, flavonoids elicit indirect antioxidant activity through transcriptional induction of genes with antioxidant properties such as heme oxygenase-1 (HO-1) or the mitochondrial manganese superoxide dismutase (MnSOD. Our hypothesis is that

the position of the hydroxyl group plays crucial role in imparting antioxidant activity against oxidative stress induced by nicotine. We used a flavonolmorin and banana peel extract (BE) for this study. Phase contrast imaging and cell viability assays are performed, where we noticed no significant change in cell morphology and viability with nicotine. However, at higher concentrations of morin and BE, cell viability is reduced. Further biochemical assays are underway. This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476. BS also likes to thank NSF-RIA award 1800732 and TIP award 1818528 for research support.

A23 Renal Injury and Blood Pressure persists into the postpartum period in rats with Severe Preeclampsia/HELLP Syndrome and Acute Kidney Injury during Pregnancy

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Women with HELLP syndrome are more likely to develop acute kidney injury (AKI) compared to women without HELLP. AKI during pregnancy is associated with rates of maternal mortality and fetal loss that range from 30-60%. New data indicates that in addition to an increase in cardiovascular events such as increased blood pressure, women with a history of HELLP are also reported to have higher incidences of chronic kidney disease and end stage renal failure compared to women with histories of normal pregnancies. We tested the hypothesis that rats with sPE/HELLP+AKI during pregnancy would have more severe renal injury compared to NP and NP+AKI rats. There was a significant difference ($p<0.0001$) in pup weight between NP, HELLP and NP+AKI pups; none of the HELLP+AKI dams delivered any live pups. HELLP rats had a significantly higher plasma creatinine (pCr) level compared to NP rats (1 ± 0.06 vs 1.8 ± 0.3; $P=0.05$). When rats were subjected to AKI surgery, pCr significantly increased in NP+AKI (2.9 ± 0.4; $P=0.03$) and in HP+AKI (3.8 ± 0.3; $P=0.01$) relative to NP and HELLP control rats. Mean arterial pressure was found to be significantly different among the groups with all groups being significantly increased relative to NP rats (100.5 ± 1.32mmHg) and each other ($P<0.01$) with the exception of HELLP vs NP+AKI rats which were not significantly different when compared to each other (121 ± 3.5 vs 119.3 ± 2.2mmHg; $P=0.71$).Studies are currently being conducted in our lab to determine the full extent of oxidative stress, inflammation and progression to chronic kidney disease. These results suggest that the cardiovascular and renal affects that occur during the post-partum period in response to HELLP and/or AKI may occur through different physiological mechanisms.

A24 How Perceived Social and Emotional Support Impacts Healthy Dietary Behaviors Among Adults in Mississippi

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Mississippi has one of the largest obesity rates in the United States at 37.3%. Research indicates that healthy eating behaviors reduce the risk for obesity. In addition, perceived social and emotional support relates to the prevalence of healthy dietary behaviors. This research focused on the relationship between Mississippi adult's general social support, social support for diet, and their dietary behaviors. Data was collected from Mississippi residents, 18 years or older, using paper and pencil surveys. These participants were recruited at outreach events conducted at university and community events. The variables studied included dietary behavior measured by fruit and vegetable intake, general perceived social support, and social support for diet. Demographic variables such as gender, marital status, and race were analyzed to determine differences in fruit and vegetable intake between groups. Variables were measured using survey response data. Correlations were run to examine the relationship between general social support and fruit and vegetable intake, as well as social support for diet and fruit and vegetable intake. The relationship between demographic variables and fruit and vegetable intake were analyzed using a split correlation. Results indicated there was no significant correlation for general social support and fruit and vegetable intake. However, there was a significant correlation for dietary social support and fruit and vegetable intake. There were significant differences in fruit and vegetable intake for demographic variables such as race, gender, and marital status. Social support for diet was significantly correlated with greater fruit and vegetable intake for both African Americans and American Indians but not Caucasians. A z prime test indicated correlations were significantly different ($z=1.776$, $p=0.038$) between Caucasians ($n=105$, $r=0.183$) versus African Americans ($n=108$, $r=0.407$) but not between Caucasians and American Indians ($z=-1.004$, $p=0.158$). Significant correlations between dietary social support and fruit and vegetable intake were noted despite marital status (married, divorced, separated, or single groups). Results can be used to promote strategies for healthier eating that consider the role of social support, especially among Mississippi's minority populations.

A25 In Vivo Neuropharmacology Core

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The University of Mississippi Neuropharmacology Core facility is dedicated to testing the effects of natural products and other potential neuromodulators in vitro and in vivo. Our in vivo assays include rodent models of pain/nociception, anxiety, locomotion, abuse liability, depression, and measurements of learning and memory. We also have fish assays for genetic and PTZ-induced epilepsy as well as developmental toxicity. This fee-for-service core is funded by the COBRE-Natural Products Neuroscience P30-GM122733.

A26 Analyzing Higher Prevalence Of Depression In Association With Obesity And Health Outcomes: The MS Delta

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Studies have shown that poor success with weight loss can be predicted by higher depression rates whereas successful weight loss is associated with a reduction in depression. While obesity and depression often coexist, the relationship between these conditions is ineffectively seen, particularly among African Americans in the South, who obesity rates are the highest in the country. MBK's Project CHANGE 3.0 hopes to improves the quality of life and the stability of food among residents across the state of Mississippi. Qualitative surveys were distributed through various cities and county events within the Mississippi Delta. Questions consisted of demographic as well as food access and mental health. Responses were analyzed using SPSS to determine descriptive statistics, crosstabs, and frequencies. Research shows that financial hardships are not limited to mental and emotional problems. In addition, 77.6% families who eat at fast food restaurants are satisfied with their life. However, it can be argued that these individuals may eat fast food as a coping mechanism because they are not being properly diagnosed by a health professional with having a depressive disorder. In addition, the data also showed that most children who are being bullied have an unhealthy diet (60.8%). Studies show that obesity and mental illness, such as depression, regularly coincide especially among African Americans in the South. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

A27 DNA-Binding Efficiency of Bifunctional Heteroaromatic Salts

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N-substituted heteroaromatic salts are photoactivatable compounds that are investigated for their impact on DNA. The compounds contain a DNA binding moiety which consists of the intercalator 1,8-naphthalimide. The separate DNA cleaving part can be activated by light and is producing two transient, reactive species: a heteroaromatic radical cation and an oxygen centered radical. Both of those species can damage DNA, each by a separate mechanism. To effectively cleave DNA, sufficient ground-state association is desired. DNA binding is measured by spectroscopic titrations (UV/Vis, fluorescence and CD). To determine DNA cleavage, gel electrophoresis is employed for analysis of cleavage fragments of pUC DNA. Supercoiled pUC migrates fastest. Double-strand cleavage produces linear DNA of that size which migrates slower. Single strand cleavage will relax the supercoils and produces circular DNA which migrates even slower. Time and concentration studies are performed to determine cleavage type. Addition of quenchers assists in the elucidation of the cleaving mechanism.
Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

A28 Introducing Mutations in the GB3 Protein to Understand Gold Nanoparticle Interactions

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Understanding protein-gold nanoparticle (AuNP) interactions, especially understanding the binding competition among multiple proteins in the same solution, is a significant challenge. These interactions are vital when designing functionalized AuNPs, where nanoparticles are used as biological sensors and drug delivery vectors. In these applications, proteins in the biological environment can compete with the AuNP surface, interfering with the nanoparticle's intended function. Various techniques have been employed to study this behavior, yet the biophysics of protein-surface binding remains insufficiently understood. We hypothesize that, using the right model system, it is possible to develop a predictive model for an amino acid's contribution to AuNP binding. Therefore, the introduction of point mutations is being explored through polymerase chain reaction (PCR) based site-directed mutagenesis in the third IgG binding domain of Streptococcal protein G (GB3). Previous studies have suggested that GB3 is appropriate for mutagenesis because changing a particular residue, K13, can dramatically alter AuNP binding. Primers were designed, and PCR was performed to vary the residue at position 13. Agarose gel analysis was used to confirm PCR product formation, and after transformation into *E. coli,* the DNA sequence was determined to ensure successful mutagenesis. Using this approach, we have successfully developed a library of K13 GB3 variants, namely K13H, K13Q, and K13S. We have also optimized the primer sequence, and this sequence is being used to generate additional variants. Future work will study the binding of K13X relative to K13G on AuNPs, and this will reveal a numerical trend for each residue's intrinsic binding affinity.

A29 Progesterone induced blocking Factor attenuates hypertension and placental mitochondrial dysfunction and reactive oxygen species in response to sFlt-1 during pregnancy

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Preeclampsia (PE) is characterized by new onset hypertension in association with placental ischemia, reduced fetal weight, elevated soluble fms-like tyrosine kinase-1 (sFlt-1) and placental mitochondrial (mt) dysfunction and oxidative stress (ROS) during pregnancy. However, a role for sFlt-1 in causing mt dysfunction and ROS is unknown. Progesterone induced blocking factor (PIBF), is a product of progesterone signaling that we have shown to lower blood pressure in a rat model of PE. This study was designed to examine the role of mt mediated ROS in sFlt-1 induced hypertension during pregnancy as well as to determine the therapeutic effect of PIBF. sFlt-1 was infused into normal pregnant (NP) rats (3.7 $\mu g \cdot kg^{-1} \cdot day^{-1}$ on gestation days 13-19*)* in the presence or absence of PIBF (2.0 µg/mL) administered intraperitoneal on gestation day 15. Mean arterial blood pressure (MAP) and placental mt ROS were measured on gestation day 19. sFlt-1 increased MAP to 112 $\pm$2 (n=11) compared with NP rats 98$\pm$2 mmHg (n=15, $p<0.05$) which was reduced to 100$\pm$1 mmHg with PIBF (n=5, $p<0.05$). Mt ROS in placenta was 108$\pm$6 in NP (n=4), 429$\pm$32 in NP+ sFlt-1(n=3) and reduced to 234$\pm$15 in NP+ sFlt-1+ PIBF (n=3). Our study indicates placental mt dysfunction in sFlt-1 induced hypertension during pregnancy. Supplementation of PIBF improved placental mt function and blood pressures, indicating the importance of progesterone signaling as potential therapeutics for PE.

A30 Diabetes-Mediated Vascular Calcification is RAGE-dependent

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Type II diabetes mellitus (DM) is characterized by chronic hyperglycemia, and medial vascular calcification is a common cardiovascular complication of DM. This leads to aortic stiffening, which can leave patients at an increased risk for heart attack or stroke. Advanced Glycation End-Products (AGEs)/Receptor for AGEs (RAGE) signaling cascade has been implicated as a potentiator of diabetes-mediated vascular calcification, but it is not well understood. AGE/RAGE signaling influences both cellular and systemic responses to increase bone matrix proteins in hyperglycemic and calcification conditions and has also been shown to increase oxidative stress by promoting diabetes-mediated vascular calcification. This causes a phenotypic switch of vascular smooth muscle cells (VSMCs) to osteoblast-like cells and the hypothesized activation of adventitial fibroblasts (AFBs) to a myofibroblast phenotype. The purpose of this research is to understand AGE/RAGE mediated vascular calcification as a complication of diabetes. Calcification was induced for 7 days in primary mouse VSMCs and AFBs of non-diabetic, diabetic, non-

diabetic RAGE knockout (RKO), and diabetic RKO, and then treated with AGEs to activate RAGE. Alizarin Red S staining was utilized to visualize calcification. Intracellular calcium levels were quantified and normalized to cell number (DAPI). Pronounced calcification was observed in non-diabetic VSMCs with the addition of AGEs and the loss of RAGE resulted in decreased calcification in the non-diabetic RKO VSMCs. AFBs were exposed to the same experimental conditions as the VSMCs and calcification was increased in the diabetic AFBs while calcification was significantly decreased in the diabetic RKO AFBs. These data demonstrated that diabetes-mediated vascular calcification was RAGE-dependent in both cell types. Literature has cited the VSMC as the primary mediator for vascular calcification, but we have shown that the AFBs in the outer layer of the aorta have the ability to calcify and this is mediated by RAGE signaling, which elucidates a role for RAGE in diabetes-mediated vascular calcification. Understanding the role of AGE/RAGE signaling in diabetes-mediated vascular calcification will allow for possible targets for pharmacological intervention.

A31 CT Delta-Radiomics Algorithm Predicts Progression-Free Survival (PFS) in Metastatic Renal Cell Carcinoma (RCC) Treated with Anti-Angiogenic (AAG) Therapy

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A multi-institutional prospective phase III trial evaluating sunitinib as first-line agent in patients with metastatic RCC was conducted on 275 patients with digital CT images in an effort to develop a CT delta-radiomics algorithm to predict progression-free survival (PFS) in patients with metastatic RCC treated with AAG therapy. CT radiomic features (R_{CT}=250) were measured on baseline and initial post-therapy CT images using a quantitative software. Tumor length and CT radiomic features with high inter-observer agreement (ICC>0.60; R_{IO}=14 candidate parameters) among 11 readers who evaluated 20 random patients were incorporated into a statistical model (CT delta-radiomics algorithm) and associated with PFS using Cox-proportional hazards ratio and log-rank test. The final CT delta-radiomics algorithm included: change in both target lesion length and tumor area, gray level non-uniformity, and run length non-uniformity. CT delta-radiomics algorithm non-responders (N_{NR}=135) on the initial post-therapy CT exam were 2.6 times more likely to progress than responders (N_R=140; HR=2.6, p<0.001). The median PFS of 0.7 years for non-responders was significantly different than the median PFS of 1.6 years for responders (p<0.001). Delta-radiomics analysis in CT images has the ability to measure changes in tumor heterogeneity. Two radiomic features had both high inter-observer agreement and a statistically significant association with PFS.

A32 Development and Evaluation of Chemodrug-Loaded Albumin Polymeric Nanocarriers for the Treatment of Neuroblastoma

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Neuroblastoma is a most common type of extracranial solid tumor in children. Poor survival rates and adverse side effects of existing therapies necessitates the need for novel and target specific delivery systems. Nanocarriers can provide a means for delivery of drugs by taking advantage of the EPR effect, with decreased dose and reduced toxicity. Sulfasalazine has recently been identified to inhibit the cell growth in neuroblastoma cells. Therefore, the objective of our study was to formulate the sulfasalazine loaded albumin-chitosan hybrid nanocarriers with particle size less than 100 nm and evaluate them against neuroblastoma cells which can be administered systemically to effectively overcome the challenges posed by the drug. In this study, we developed a nano-precipitation method to produce the self-assembling Sulfasalazine-loaded Bovine Serum Albumin (BSA) nanocarriers. The experiments were designed using the Taguchi orthogonal array. The nanocarriers were PEGylated using the activated mPEG-SPA. The nanocarriers were characterized by using dynamic light scattering particle size analysis and zeta potential analysis. The drug release study in a simulated body fluid of pH 7.4 was performed to evaluate the release profile of the drug from the nanocarriers. Results showed that the Sulfasalazine-loaded PEGylated nanocarriers had an average particle size of 80.556 ± 3.119 nm with an

average PDI of 0.120 ± 0.037 and zeta potential of the formulation was found to be 5.593 ± 0.583mV. The entrapment efficiency of the formulation was found to be 98.65%. The achieved drug loading for the final formulation was about 6.78% (w/w). In the release study, the developed nanocarriers showed the controlled release of the drug up to 48 h in a simulated body fluid of pH 7.4. The nanocarriers were found to be stable in the presence of PBS 7.4 and 55% FBS solution for more than 72 h. Currently, the developed nanocarriers are being tested for dose-dependent anticancer effects against neuroblastoma cell lines. We produced **s**table Sulfasalazine-loaded nanocarriers which showed controlled release of the loaded drug. This investigation infers that albumin-chitosan polymer-based nanocarriers are useful for the delivery of anticancer drugs. The results for the prepared formulation are encouraging and suggest further analysis of these nanocarriers by *in vitro* studies in cancer cells and *in vivo* studies using neuroblastoma tumor-bearing mice.

A33 Expression and Purification of MsaB Protein in *Staphylococcus aureus*

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The *msaABCR* operon is a four gene operon that plays an important role in biofilm development, controlled cell death, antibiotic resistance, and persister cell formation. MsaB is the only protein produced from this operon; it functions as a DNA-binding protein that can directly regulate other genes based on nutrient availability. We have shown that MsaB binds to the promoter of the capsule operon and to the protease genes, functioning as a transcriptional activator and repressor respectively. Other studies have shown that MsaB is the RNA chaperone. In this study, we cloned the MsaB protein with 6X-his tags either at 3' end or 5' ends in pCN51 cadmium inducible vector. The MsaB expression construct was cloned in USA300 LAC *msaABCR* deletion mutant. Conditions were optimized for the MsaB expression using different concentrations of cadmium chloride before purifying the protein using Ni-NTA column. We then determined the protein size and purity using SDS-PAGE and confirmed using western blot with anti-his antibody. Lastly, we confirmed the protein activity by electrophoretic mobility shift assay (EMSA) with biotin labelled capsule operon promoter. Our future aim is to use homogenous time-resolved fluorescence (HTRF) to determine the binding constant (Kd) of MsaB to the promoter regions of the cap operon and protease. Furthermore, we will measure the affinity of MsaB protein to their targets in the presence of GTP, ATP, AMP, Valine, Leucine, and Isoleucine. At the completion of these experiments, we expect to develop a model for the mechanism of regulation of cap and proteases by MsaB protein in response to nutrient availability.

A34 Progressive Changes in Microglial Morphology in SCA1 and Calbindin-SCA1 Double Mutant Mice

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Spinocerebellar ataxia type 1 (SCA1) is a dominantly inherited neurological disorder caused by the expansion of a polyglutamine tract in the mutant protein ataxin-1. Progressive ataxia in SCA1 disease results in the loss of Purkinje cells (PCs) in the cerebellum. The mechanism of PC death in SCA1 is not known; however, our previous work indicates that targeted deprivation of PC specific calcium binding protein calbindin-D28k (CaB) exacerbates ataxin-1 mediated toxicity in SCA1 transgenic (Tg) mice. Microglia are resident immune cells of the Central Nervous System (CNS) and are acutely sensitive to homeostatic perturbations and actively participate in CNS disease processes and injury resolution. The objective of this study was to determine if the cerebellar microglia in SCA1 are early indicators of neuronal stress and exhibit altered morphology. Further, this study was to understand if these morphologic alterations are more pronounced in calbindin (CaB) knockout: SCA1 Tg double mutants than SCA1 mice. Paraffin embedded mouse cerebellar tissue from wild type (WT), SCA1, and CaB: SCA1 double mutant (DM) mice at postnatal week 2 and 4 were cut into 6 um sections. Sections were de-paraffinized, rehydrated and processed for immunohistochemistry using IBA1 antibody, a microglial marker. The immunostained sections were observed by Olympus Epi-fluorescence microscope and sections photographed by a high resolution digital camera. Changes in morphology were measured in the digitized images by Image J software and further subjected to statistical analysis. Results showed that the DM mice had a markedly larger microglial cell size than both SCA1 and WT at both ages. SCA1 and DM mice do not show behavior or immunohistochemical abnormalities at 2 weeks of age; however, in the present study, microglia showed early signs of activation in SCA1, the activated cells with enlarged cell bodies and processes were markedly higher in DMs, which increased with age. These data indicate that microglia may get sensitized to PC stress early on in SCA1 and could be used as markers in chronic neurodegenerative diseases.

A35 Inflammation During Pregnancy Increases Reduced Uterine Perfusion Pressure-induced Hyperalgesia and Spinal Cord Inflammation in Dam Rats

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Emerging epidemiological and experimental studies suggest that systemic inflammation induced by preeclampsia during pregnancy may affect CNS functions including pain signal processing. Our previous studies in rats with reduced uterine perfusion pressure (RUPP) demonstrated that systemic inflammation during pregnancy induced CNS inflammation of rat dams, which has shown to increase pain sensitivity in other pathological conditions. This study was designed to further examine whether maternal inflammation via lipopolysaccharide (LPS) exposure enhances pain sensitivity associated with RUPP in dams. LPS (100 µg/kg) was administered intraperitoneally into pregnant rats on day 13 of gestation (G13) and RUPP surgery was performed on G14. The dams were subjected to tail flick testing via thermal stimuli and von Frey filament testing via mechanical stimuli. Spinal inflammation and unmyelinated c-fiber projections were examined on day 21 after delivery. All induced inflammation groups (Saline+RUPP, LPS+Sham, and LPS+RUPP) showed significant increases in thermal sensitivity across postnatal days, but only the LPS+RUPP group showed significantly increased sensitivity to mechanical stimuli across postnatal days. Additional LPS exposure enhanced the RUPP-induced microglia and astrocyte activation and unmyelinated c-fiber projections in the lumbar spinal cords of dams on day 21 after delivery. Collectively, LPS-induced systemic inflammation during pregnancy exacerbates RUPP-induced nociceptive afferent plasticity, altering spinal pain signal processing, and contributes to the development of nociceptive hypersensitivity in rat dams.
Keywords: Lipopolysaccharide, reduced uterine perfusion pressure, nociceptive hypersensitivity, unmyelinated c-fiber projections, microglia. Supported by Mississippi INBRE Research Scholars Program, NIH grant NH/NINDS R01NS080844, and Newborn Medicine Funds from the Department of Pediatrics, University of Mississippi Medical Center.

A36 RFcon: A Web-Based Software Package for Sequence-Based Residue-Residue Contact Prediction

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Predicting contacting residue pairs in proteins is a challenging problem that has great potential to advance many areas of protein research. For example, contact prediction can provide assistance in identifying important functional regions of proteins and in reducing the search space of possible contacts when predicting the structure of complex proteins. Considering the growing gap between the large number of available protein sequences and the relatively low number of experimentally determined protein structures, these predictions are becoming increasingly important. Here, we have developed and benchmarked a set of machine learning methods for performing residue-residue contact prediction using only the amino acid sequence of the target protein as input. These methods were based on random forests, deep networks (stacked denoising autoencoders), support vector machines, and direct-coupling analysis. According to our own evaluations performed on targets from the CASP11 dataset at a resolution of +/− two residues, our random forest models were our top performing predictors and achieved average top 10 prediction accuracy scores of 85.13% (short range), 74.49% (medium range), and 54.49% (long range). Our best performing deep network predictors were our ensemble models which achieved average top 10 prediction accuracy scores of 75.51% (short range), 60.26% (medium range), and 43.85% (long range) using the same evaluation. These results suggested that our models achieved comparable performance to methods developed by other CASP11 groups. Due to the complexity of contact prediction problems, the community can benefit from exploring a variety of different contact prediction methods. Therefore, we have released our C++ implementation of our direct-coupling analysis method as a standalone software package along with the source code for the prediction methods used by our RFcon webserver. Furthermore, our work has produced a useful tool with a simple web interface that delivers contact predictions to users without requiring a lengthy installation process. All of this is freely available to the public at http://dna.cs.miami.edu/RFcon/.

A37 Prospective Validation of Colored Non-Enhanced Head CT Images for Detecting Acute Stroke in the Setting of a Code Gray

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Non-enhanced CT imaging has a very important diagnostic role in the setting of a Code-Gray, and rapid assessment and diagnosis is crucial for optimal patient outcome. For this prospective observational study, 100 consecutive Code Gray adult patients from 2/1/2018 to 3/17/2018 with a gold-standard confirmatory MRI were included in an effort to decrease time and maintain diagnostic accuracy of acute ischemic stroke detection. Grayscale NECT were collected and colorized NECT images were generated using a previously established method. All images were de-identified, and two randomized reading sets (100 grayscale NECT and 100 grayscale+colored NECT images) were generated. Four experienced readers independently assessed each reading set. Reading sessions were separated by >2weeks to minimize recall bias. The mean accuracy, sensitivity, specificity and time of assessment were compared between grayscale and grayscale+color images in a multivariate model. Among the 4 readers, the mean accuracy/sensitivity/specificity for correctly diagnosing acute ischemic stroke were 72%/46%/87% using only grayscale images and 69%/36%/86% using grayscale images+color NECT images (p=0.08/p=0.006/p=0.858). Mean time of interpretation of 59 seconds using grayscale only images decreased by 19 seconds for interpretation using grayscale+color images (p<0.001). Significantly decreasing the time of assessment without degrading diagnostic accuracy could widely applicable among general radiologists with no additional patient expense or radiation potentially improve stroke outcomes.

A38 Femoral histomorphometric analysis of C57Bl6 mice treated with anti-activin A and anti-myostatin monoclonal antibodies

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Osteoporosis is a disease of reduced bone quality and quantitative loss in bone mineral density (BMD) that results in skeletal fractures. Peak bone mass is a critical determinant of one's bone health and hence the risk of osteoporosis in later life and is influenced by genetic and environmental factors. In this study, we investigated the possibility of improving peak bone mass in male C57Bl6 mice via pharmacological inhibition of activin A and myostatin. Activin A and myostatin are known regulators of muscle mass in primates as well as mice. Previous studies have demonstrated that the combined inhibition of myostatin and activin A in mice results in increased muscle mass. Additionally, in mouse models of musculoskeletal disorders such as osteogenesis imperfecta (OI) and duchenne muscular dystrophy, inhibition of activin A and myostatin resulted in improved bone strength due to the mechanotransductive response of bone to increased muscle load. In this study, the individual effects of anti-myostatin and anti-activin A antibody treatment will be delineated. In this experiment, male C57Bl6 mice were treated with 10mg/Kg of body weight of either therapeutic agent (anti-activin A or anti-myostatin antibodies) or a control antibody twice per week beginning at 5 weeks of age. At 16 weeks of age, mice were sacrificed, and their bones harvested. To determine the effects of anti-activin A and anti-myostatin treatment on wild-type mice, femoral histomorphometry was performed to quantify mineralized bone area, osteoclast and osteoblast cell numbers, and cell surface area of mineralized bone. In future studies, we will examine femoral histomorphometry of OI mice treated with these specific agents to determine their therapeutic potential of enhancing OI bone formation and quality. Successful increases in peak muscle and bone mass with treatment has potential application of the treatments to future human trials.

A39 Socioeconomic Impact on Gardasil Rates in the South

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In the southern region of the United States there is a lower rate of individuals receiving the Gardasil vaccine. Gardasil is a vaccine approved in 2006 by the Food and Drug Administration (FDA) used for the prevention of certain strains the human papillomavirus (HPV), more specifically HPV types 6, 11, 16, and 18. HPV types 16 and 18 cause an estimated 70% of cervical cancers and are responsible for most HPV-associated vaginal, anal, penile, and vulvar related cancer cases. Typically, the vaccine is administered to children, male and female, ages 11-12 but may be given as early as age 9. According to a study done by the Henry J Kaiser Family Foundation, the HPV vaccination rate is the lowest in Mississippi at 29% compared to the highest in D.C. at 78%. Approximately 12,000 cases of cervical cancer occur annually in the United States and majority occur in southern states. Utilizing secondary data, southern states also have the lowest overall HPV vaccination rate due to lack of information, concerns related to sexual activity, religious beliefs, and lack of health insurance. Data from the 2015 Prevent Cancer Foundation survey indicated 92% of respondents believed that there is a need for more information regarding the dangers of HPV. It was concluded that barriers to get the Gardasil vaccine consist of perceptions, fear of side effects, its relatively new, fear patient is too young, lack of time, cost, acceptability, and discomfort discussing sex with young patients.

A40 The Role of Matrix Metalloproteinases In The Metabolism Of ATXN1 Protein Aggregates

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Spinocerebellar Ataxia Type 1 (SCA1) is a fatal neurodegenerative disease caused by a mutation in the poly-glutamine stretch of the ATXN1 protein. ATXN1 proteins form nuclear inclusion bodies in vivo and in vitro. It is speculated that accumulation of the mutated ATXN1 causes a gain-of-function resulting in neuronal death in the cerebellum and brainstem of SCA1 patients. Matrix metalloproteinase (MMPs) are zinc-dependent endopeptidases that have gained popularity as possible therapeutic targets in neurodegenerative disease. Recent studies have shown that MMPs can degrade toxic poly-glutamine aggregates in Huntington's disease contributing to its' disease pathology. We hypothesize that MMPs will also degrade the toxic poly-glutamine aggregates in the SCA1 diseases. To test our hypothesis, we generated GFP-dMMP constructs and mCherry-ATXN1 constructs to express in SHSH5Y neuroblastoma cell lines. We speculated that co-expression of dMMPs with the ATXN1 constructs will reduce nuclear inclusion body formation. Here, we have transiently expressed our GFP-dMMP and mCherry constructs in neuroblastoma. We found that dMMPs can localize to the nucleus, where they may interact with ATXN1. This is the first time that nuclear localization of MMPs have been demonstrated. This paves the way for future co-expression studies. This work is critical to supporting our long-term goal, which is to test the efficiency of MMP inhibitors as SCA1 therapeutics using the drosophila SCA1 animal model. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of General Medical Sciences or the National Institutes of Health.

A41 Functional Role of Tick α-D-galactosidase in Carbohydrate Metabolism and Red Meat Allergy

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Tick-borne red meat allergy is an IgE-mediated delayed hypersensitivity reaction, increasing widespread in tick endemic areas in the United States of America, and worldwide. Bites from the lone-star tick (*Amblyomma americanum)* are believed to be involved as the source of the sensitization of humans to the oligosaccharide galactose-α-1,3-galactose (alpha-gal or α-gal), which is found in most mammalian derived food products, including gelatin, broths, and red meat. The purpose of this study is to functionally characterize the lone-star tick α-D-galactosidase (AGS) enzyme and assess its role in α-gal synthesis. This enzyme cleaves terminal α-galactose moieties from glycoproteins and glycolipids. Hence, we hypothesized that silencing of AGS in the lone-star tick will impair the tick's ability to synthesize α-gal and overall carbohydrate metabolism. A reverse genetic approach was utilized to characterize the functional role of α-D-galactosidase in carbohydrate metabolism, and to discover its link to red meat allergy. Our

results from AGS gene silencing revealed a significant increase in tick weight, supporting a critical functional role in energy utilization. The silencing of AGS had deleterious effects on the downstream genes in the tick galactose metabolism pathway and AGS-silenced ticks ultimately expressed less α-gal due to the reduction of available UDP-galactose. Furthermore, we are currently conducting experiments in order to further elucidate the role of α-D-galactosidase in tick-host interactions and the possible involvement in the newly described "Red Meat Allergy".

A42 IL17A signaling facilitates Chikungunya virus-induced footpad swelling in mice

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Chikungunya virus (CHIKV) is a mosquito-borne alphavirus that has been associated with arthritis and arthralgia, which can cause long-term effects in patients. There is no approved vaccine and specific therapeutics against CHIKV-caused diseases in humans and its pathogenesis is not completely understood. We studied the roles of an inflammatory cytokine interleukin 17A (IL17A) in the pathogenesis of CHIKV in mouse models. Our results indicate that mice that are deficient in IL17A (*Il17a*$^{-/-}$) and in IL17A receptor (*Il17ra*$^{-/-}$) are relatively resistant to CHIKV-induced symptoms including lower levels of viral burden in blood and footpad swelling compared to wild-type control mice. Further, IL17A supported CHIKV replication in the cells. These results suggest that IL17A signaling contributes CHIKV-induced diseases in mice.

A43 Invasion of Human Middle Ear Epithelial Cells by Nonencapsulated *Streptococcus pneumoniae* Expressing Green Fluorescent Protein

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Streptococcus pneumoniae (pneumococcus) colonizes the human nasopharynx and causes human infections including pneumonia, conjunctivitis, and otitis media (OM). Currently licensed pneumococcal vaccines have reduced the incidence of invasive pneumococcal disease but have not effectively reduced mucosal infections such as OM. Nonecapsulated *Streptococcus pneumoniae* (NESp) have been isolated from up to 8% of OM cases, and the incidence of NESp-associated OM has increased over the past decade. In a chinchilla model of OM, we have shown that NESp MNZ41 causes high bacterial burden resulting in invasive disease. However, the mechanism by which MNZ41 is able to invade middle ear epithelial cells (MEECs) to cause invasive disease is unknown. To determine the host-pathogen interactions between MNZ41 and MEECs, we aimed to isolate human MEECs containing intracellular bacteria. We hypothesized NESp expression of green fluorescent protein (GFP) will allow detection of hMEEC containing intracellular NESp. To test this hypothesis, we transformed MNZ41 into GFP-expressing bacterium and verified the presence of the *gfp* cassette using PCR. Expression of GFP in MNZ41 was confirmed by fluorescent microscopy and flow cytometry. Then GFP-expressing MNZ41 cells were allowed for adhesion and invasion to hMEEC before removing extracellular bacteria. We were able to detect hMEEC containing intracellular GFP-expressing MNZ41. These cells were collected for downstream dual-RNA sequencing of both hMEEC and intracellular MNZ41 to reveal interactions between NESp and the host. Overall, this study will allow for a better understanding of NESp virulence mechanisms during OM.

A44 Relation of Physical Activity to Perceived Body Image in Young to Middle Aged Adults in Mississippi

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According to America's Health Ranking, Mississippi adults have higher rates of physical inactivity (42%) and body mass (38.2%) in relation to the national averages (35.6% and 28.6%, respectively). Most research focuses on women and college students and dissatisfaction of body image in relation to physical activity. This purpose of this study was to determine the relationship between physical activity levels and current body image among young to middle age Mississippi adults. Participants were adult residents of Mississippi between 25 to 50 years of age. Participants were recruited from outreach events at university and community

settings. Data were collected using paper and pencil and electronic surveys and analyzed using SPSS 20.0. Those who completed the survey were entered into a drawing for a $50 gift card. Demographic variables, physical activity levels (based on number of days per week engaged in 30 minutes or more of physical activity) and current body weight (using Pulver's body image scale, a self-selected image that best depicted their current body weight). A Pearson correlation showed a significant, negative association between physical activity levels and current body weight. Thus, individuals who engaged in more physical activity per week selected images that represented smaller body weights. This study examined how physical activity levels impact perceived current body weight.

A45 Vernonia amygdalina Extracts Inhibit Cancer Cell Growth by Disrupting Microtubule Assembly

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Vernonia amaygdalina (VA), one of the medicinally-important plants of Africa is considered the most used plant in the genus Vernonia. Previously we reported the *in-vitro* growth inhibition and anti-proliferative activities of VA extracts on cancer cells. In the present study, we examine whether VA elicits the aforementioned effects by targeting and disrupting cellular microtubule. Using immunocytochemical and fluorescence analyses, we probed the effects of VA fractions on microtubule assembly, disassembly and apoptosis in prostate (DU-145) and breast (MCF-7) cancer cell lines. Cell viability was tested using Calcein-AM Red Orange. Apoptosis was measured using Double Stain Apoptosis Detection Kit (Hoechst 33342 and Propidium Iodide (PI)). Our results indicate that organic and aqueous fractions of VA extracts abrogated the steady state-microtubule pattern into a disassembled form in DU-145. In MCF-7 cells, the fractions caused retraction, condensation and clustering of tubulin protofilaments into aggregates within the cytoplasm. Examination of cell structure and morphology revealed marked cell shrinkage, nuclear fragmentation, chromatin condensation, DNA fragmentation and formation of membrane blebs and apoptotic bodies. Further analysis of cell death by fluorescence staining indicated manifestation of condensed chromatin and nuclear fragmentation, confirming an apoptotic death, with greater quantities of apoptotic phenotypes observed in MCF-7 than in DU-145.Viability assay showed a dose-dependent reduction in viable cells, with petroleum ether and aqueous fractions exhibiting a higher reduction effect (IC_{50} 61.02 µg/mL; 65.82 µg/mL) than methanol fraction (IC_{50} 80.77 µg/mL) in MCF-7 cells. In DU-145 cells, methanol fraction exerted highest viability reduction (IC_{50} 44.21µg/mL) than aqueous (IC_{50} 131.7 µg/mL) and petroleum ether fractions (IC_{50} 130.5 µg/mL). VA fractions induce microtubule disassembly in a fashion similar to Nocodazole, but different to Taxol. Taken together, these observations demonstrate that VA contains biologically active components capable of inhibiting growth and proliferation of cancer cells, exerting their properties via mechanisms that target and trigger disruption of microtubule organization, effectively causing apoptotic death. Key words: Vernonia amygdalina; anti-microtubule; apoptosis; cancer cells.

A46 Can Anthropometric Measures of Obesity Predict Liver Surface Nodularity in a Diverse NAFLD Population?

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For this retrospective observational study, adult patients with various degrees of non-alcoholic fatty liver disease (NAFLD) and non-enhanced CT images of the abdomen and pelvis obtained (N=367) to assess how specific anthropometric measures of obesity correspond to liver surface nodularity and NAFLD clinical index in patients diagnosed with NAFLD. Abdominal diameters (SAD) were measured and two readers independently assessed liver surface nodularity (LSN) scores of the 367 patients. LSN scores were obtained using a previously validated quantitative technique. LSN scores were analyzed and correlated with SAD, NAFLD clinical index, body weight, and liver and spleen attenuation using a regression model and the coefficients of determination were calculated. Intraclass correlation coefficient (ICC) with 95% confidence intervals (95%CI) and coefficient of variation (CV) were used to assess inter-observer agreement among the two readers assessing LSN scores. In patients with NAFLD, SAD showed a direct correlation with weight, LSN score, and NAFLD index and an inverse correlation to spleen and liver attenuation. SAD correlated best with patient weight (R^2=0.64, p <0.001) and LSN score (R^2=0.38, p<0.001). Correlations between SAD and liver attenuation/spleen attenuation/NAFLD were present but were of minimal clinical significance (R^2=0.07/0.11/0.05, respectively, p<0.001) without the support of other clinical data.

A47 If They Build It, They Will Come: Associations Between Infrastructure & Physical Activity

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Obesity rates in America have steadily remained around 39.8 percent, or roughly 93.3 million people. Comparatively the rates are similar in the Mississippi where 35.5% of adults and 15.4% of adolescents are dealing with obesity. Physical activity is important for obesity prevention because it can burn and/or help maintain body fat. However, for many residents of Mississippi, access remains an impediment in achieving physical activity for obesity prevention. The purpose of the research is to examine the access to spaces for physical activity across the state of Mississippi. Data was extracted from Project Change 3.0 which aim to investigate food and physical activity access among residence in Mississippi. Five cities were chosen based on their population size in Mississippi. Questions selected link the role that physical activity has with obesity prevention. Statistical analysis included descriptive statistics and completed in SPSS. Data shows that counties with greater access to physical activity infrastructure also had a greater percentage of residents engaging in physically active lifestyles. One limitation is that the survey does not provide respondents' definition of "active"; therefore, the data could be skew regarding participants' perception of "active lifestyle". These results were enhanced by secondary data which showed that counties with greater access had better county health rankings. Overall, the research found that access to physical infrastructure does increase the likelihood of residents engaging in physical activity. Future recommendations are to work with counties that lack these spaces in effort to create them and promote a healthier lifestyle for its residents.

A48 SCUBE3 Inhibition Combined with Doxorubicin Improves Mouse Orthotopic Breast Cancer Model

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The development of novel targeted therapies is urgently required for improving the treatment outcome of breast cancer patients. Chemotherapy is a common treatment option for malignant breast cancer. However, resistance and toxicity remain the major obstacles hindering the effectiveness of chemotherapeutic agents in cancer patients. Therefore, identifying genes that sensitize breast cancer cells to chemotherapeutic agents could improve treatment outcome in patients. Using an unbiased high throughput screen, we identified Signal peptide CUB domain EGF-like 3 (SCUBE3) genes as a novel therapeutic adjuvant that can improve the efficacy of doxorubicin, a chemotherapeutic agent commonly used in treating breast cancer patients. Silencing of SCUBE3 expression acts as a potent suppressor of cell viability, tumor cells growth and improves doxorubicin outcome in a pre-clinical mouse model. Interestingly, we observed a dose-dependent nuclear translocation of SCUBE3 protein in doxorubicin treated-cells suggesting that nuclear localization of SCUBE3 may be important for SCUBE3 protection effects against doxorubicin treatment. Furthermore, our results demonstrated that SCUBE3 mediates its pro-tumor effects by regulating genes involved in growth and survival in the MAP-Kinase pathway, DNA damage repair pathway including RAD51 and FOXM1, and apoptotic pathway including Mcl-1. Using interaction studies, we demonstrated that EGFR is a true receptor of SCUBE3 as EGFR and SCUBE3 interact and this interaction mediated pro-growth signaling of SCUBE3. These findings highlight the importance of SCUBE3 as a potent therapeutic target for treating and predicting treatment outcomes in breast cancer patients.

A49 Sex differences in role of estradiol in recovery of function after cerebellar damage

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Estradiol is neuroprotective. In the brain, estradiol can be synthesized from testosterone via aromatase provisioning glia cells. Previously, we found that cerebellar lesions produced deficits in coordination and procedural learning in zebra finches, as they do in mammals. Further, we found that aromatase inhibition enhanced, and estradiol reduced cerebellar induced deficits in spatial

learning, but had no effect on coordination deficits. Given that zebra finch females upregulate aromatase more than males after cerebellar lesions and have more circulating estradiol, we predicted that females would recover better than males after cerebellar lesions. We lesioned the cerebellum of male and female zebra finches, with or without simultaneous injection of the aromatase inhibitor, letrozole. As found previously, only birds with cerebellar lesions and aromatase inhibition, not those injected with the saline vehicle, had impairments in our spatial task compared to sham lesioned birds. However, sexes performed similarly. These results support our hypothesis that aromatase improves spatial memory deficits after cerebellar lesions, and together with our prior work suggests this is due to estradiol synthesis. The lack of sex differences is quizzical and could imply that local conversion of testosterone to estradiol is as important as circulating estradiol for neuroprotection and that the greater level of aromatase upregulation in females may be a compensation for their lower level of aromatizable substrate (testosterone). More work is needed to understand the roles of neurosteroidogenesis and brain steroid receptor regulation in neuroplasticity. Analysis of the motor task is still in progress

A50 Regional Neuroinflammation During Pregnancy Complicated with Hypertension

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Hypertension, or high blood pressure, can lead to neuroinflammation and vascular damage. During pregnancy, the maternal vasculature becomes more susceptible to injury which is especially true in pregnancies complicated with high blood pressure such as HELLP syndrome (hemolysis, elevated liver enzymes, low platelets) and preeclampsia (PE). Several studies have suggested that neuroinflammation in response to hypertension occurs in women with HELLP syndrome or PE, however the cell types and brain regions that may be affected have not been fully identified. The objective of the current study was to determine if certain brain regions were more susceptible to neuroinflammation in an experimental animal model of HELLP syndrome.

A51 A Pound of CURE: A Case for A Course-Based Undergraduate Research Experience (CURE) at a Community College

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There is a STEM degree deficit in the US, especially in states such as Mississippi, Louisiana, and Arkansas. Current challenges for young researchers center on the lack of early access to undergraduate research. It is believed that if young researchers are provided early access to mentors and training in research methods, they will be more successful due to the early development of collaborations, interpersonal skills, and the ability to balance stresses of school, work, and everyday life. This mentored research setting was meant to prevent the fragmented knowledge between concepts and research topics often seen with undergraduate researchers. The approach was a Course-based Undergraduate Research Experience (CURE) to integrate the teaching-learning dynamic while also allowing employment of scientific processes to complete unique investigations. A two-part series of Biomedical Research courses were implemented at Mississippi Gulf Coast Community College. The target population was freshman and sophomore students with little science background. Each course, Biomedical Research I and Biomedical Research II, spanned an entire semester and was offered as a 1-hr credit course. Biomedical Research I provides instructor-centered training for biomedical research techniques, while Biomedical Research II offers a student-centered opportunity for an independent scientific investigation. This early access supported success and motivation of these young scientists and encouraged them to apply for research fellowships and opportunities at their transfer institutions. The increased interest in these courses has encouraged the College to offer these courses again, thereby increasing and diversifying the future pipeline of biomedical and health science researchers.

A52 Assessment of High School Teachers' Competencies in the Management of Flipped Classroom Lessons on Healthcare Disparities

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At the University of Mississippi Medical Center, Science Teaching Excites Medical Interest (STEMI) engages basic science faculty and Clinical Anatomy graduate students to provide professional development to high school teachers on how to develop and implement active learning activities in their classrooms through flipped classroom modules. STEMI collaborations incorporate exposure to laboratory and simulation activities, multimedia equipment and learning platforms, and flipped learning practices and techniques. STEMI investigators utilize a modified version of a validated instrument (Reformed Teaching Observation Protocol, RTOP) that includes STEMI-specific competencies to objectively assess implementation of flipped learning modules. The data gathered from an initial assessment of one such module are presented. The use of observations to examine the efficacy of the learning modules provides a measure for ensuring the sustainability of STEMI and for providing quantitative data of the quality of the learning modules. These learning modules will be available for dissemination to target multiple cohorts of secondary education students in Mississippi. The goal is to increase their understanding of the impact of health disparities and spark their interest in pursuing health science careers in order to address these disparities and improve the health of their fellow Mississippians. This project was supported by the National Institute of General Medical Sciences under Award Number 8 R2 5GM129212-03. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

A53 Effect of Liver Surface Nodularity, Sarcopenia and Visceral Obesity as Risk Factors in African Americans Adults

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This retrospective observational study was designed to assess the association between Liver Surface Nodularity, muscle mass and visceral fat depots in a high-risk population of African Americans (AAs). Non-enhanced abdominal CT images from AAs were analyzed (N=2006). Waist circumference (WC) and sagittal abdominal diameter (SAD) were measured. Muscle volumes (paraspinal, abdominal wall, psoas) and regional abdominal fat volumes, including visceral adipose tissue (VAT) and superficial adipose tissue (SAT), were quantified using a multi-layer segmentation software. Liver surface nodularity (LSN) scores were measured by two readers using a validated quantitative software. Linear regression models were used to associate LSN scores with body composition. Intraclass correlation coefficients (ICC) were used to assess inter-observer agreement. LSN scores showed direct proportionality with WC (R^2=0.18, 0.42, p<0.001), SAD (R^2=0.20, 0.45, p<0.001), and all fat compartments. There was no statistically supported relationship between WC, SAD and LSN when WC <100cm (ß=0.0, p=0.707) and SAD <25cm (ß=0.01, p=0.267). However, for SAD ≥25cm, each 1cm increase in SAD was associated with a 0.07 unit increase in LSN score (ß=0.07, p<0.001). WC ≥100cm also correlated with an increase in LSN (ß=0.02, p<0.001). Finally, interobserver agreement was excellent (ICC>0.89, N=300). Anthropomorphic measurements above a certain cut-off point (SAD ≥25cm; WC ≥100cm), were linked to increased LSN scores.

A54 Deciphering the dynamics of amyloid-β aggregation pathways by game theoretic approach

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Low molecular weight Aβ oligomers have evolved as the primary toxic species involved in Alzheimer disease (AD). Upon generation, Aβ peptides can self-assemble into different aggregate forms along different pathways. Broadly categorized as on- or off-pathways, the two generate structurally different aggregate forms. In our laboratory, we have observed that Aβ, in presence of fatty acid micelles, generate distinct strains of low molecular weight oligomers. Based on their half-lives and conformation, these oligomers were found to form along an "off-pathway". Using the fundamental aspects of 'game theory' based on Nash equilibrium, our labs sought to determine the dynamics of on- and off-pathway kinetics based on a 'win' or 'lose' model. Biophysical experiments and detailed simulation with mathematical modelling indicate that the preference of on- or off-pathway aggregation depend upon a narrow set of constant parameters and a species of oligomer can be populated by alteration of these parameters. Here, we present that steady-state switching dynamics between on pathway and off pathway aggregates of Aβ that can be modeled with the game

theory approach. The models predict the preferred pathway of aggregation as a function of fatty-acid parameters and level of dilution. Experimental data and simulations support the role of fatty acid to modulate temporal parameter in Aβ aggregation pathway. Anticipating spatiotemporal landscapes is crucial for simulating physiological framework for generation of different conformeric strains of Aβ oligomers due to heterotypic interactions. This approach can be significant in understanding the underlying mechanism of oligomer generation and strain formation in AD and other neurodegenerative diseases.

A55 Liver Surface Nodularity Score as a Predictor of Liver and Cardiovascular Events in NAFLD

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For this IRB-approved HIPAA-compliant retrospective study, non-enhanced CT images from adult patients with NAFLD were obtained to evaluate the liver surface nodularity (LSN) score as a predictor of future liver and cardiovascular events in patients with NAFLD (N=621). The LSN score was measured using a previously validated quantitative software. Cox-proportional hazard model analysis was used to determine the association between the LSN score and subsequent development of the first liver or cardiovascular events. In patients with NAFLD, 12% (75/618) had a liver or cardiovascular event during a median follow up of 1.1 years, and 30% (184/618) of patients had a LSN ≥3. Patients with a LSN score ≥3 were 2.1 times more likely to develop a liver or cardiovascular event than patients with a LSN score <3 (HR=2.14, 95%CI 1.03, 4.46, p<0.043). Time to the first liver or cardiovascular event for 10% of patients with a LSN score ≥3 was 1.9 years vs. 4.4 years for patients with a LSN score <3 (p<0.038). The LSN score is predictive of future liver and cardiovascular events in patients with NAFLD and could be used as a prognostic tool to identify high-risk patients and guide clinical management.

A56 Interrogating the Angiotensin Peptidome in Rodent Models of Illness and Disease

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Angiotensin II (Ang II) is a regulatory peptide hormone that is essential in regulating blood pressure and fluid balance. Ang II binds to and activates the AT1 receptor through a signal transduction pathway resulting in vasoconstriction, trophic and fibrotic effects, sodium reabsorption, and inflammation. Human diseases such as hypertension, diabetes, and chronic kidney disease can be caused or exacerbated by excessive levels of Ang II. In contrast, other Angiotensin I-derived peptides serve different functions. For example, Ang 1-7 causes vasodilation; is anti-inflammatory, and has several other beneficial effects. The levels of Ang II, Ang 1-7 and other Angiotensin-derived peptides are difficult to measure in plasma for a number of reasons including low abundance, contaminating peptides/proteins, and instability. This makes the Angiotensin Peptidome very difficult to quantify. We used Liquid Chromatography/Mass Spectrometry (LC/MS) to characterize the Angiotensin Peptidome of plasma samples from an acute kidney injury rodent model. Our results suggest that even though levels of the Ang I-derived peptides are very low, LC/MS provides the sensitivity to quantify the Angiotensin Peptidome. Preliminary results indicated that acute kidney injury results in elevated levels of Ang II while levels of Ang 1-7 are not significantly different in the injury state compared to controls. These experiments provide "proof in principle" that by utilizing plasma samples from rodent models of illness and disease, we can quantify differences in the Angiotensin Peptidome and that these differences will suggest pathways to target in order to predict disease state and evaluate the success of different drug treatment therapies.

A57 Discrimination of Black MSM and its Effects on Community Stigma

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Currently, there are around 1.1 million people living with HIV (PLWH) in the United States, with black southern men who have sex with men (MSM) disproportionately affected by the epidemic. Stigma serves as a serious psychosocial factor that can affect PLWH, in healthcare, social, professional, and other settings. The purpose of this research was to examine the effect of stigma on rates of HIV infection in order to determine whether discrimination leads to a greater impact on Black MSM living with HIV. The Minority

HIV/AIDS Research Initiative (MARI) is a survey-based study given to African-American MSM which features a variety of questions geared toward understanding psychosocial factors including stigma (discrimination) pertaining to race and sexual orientation. Certain questions pertaining to discrimination were selected for analysis, which includes descriptive statistics and correlation analysis in SPSS. Descriptive analysis of the data showed that 25% of participants reported being avoided because of their sexuality. Significant results from correlation analysis include a particularly strong positive correlation between discrimination at work due to either sexuality and/or perceived HIV status. Similar correlations were found in settings outside of the work environment. There was also a strong negative correlation between participant's perceived sexuality and the amount of respect one received from others. From the results, it can be concluded that sexuality-based discrimination can lead to assumptions about HIV status, which can then lead to major life influences, such as losing a job. Future research should focus on community perceptions regarding sexual orientation and perceived HIV transmission.

A58 Sterilization of Δ^9–Tetrahydrocannabinol Valine Hemisuccinate (THC-VHS) loaded nanoemulsions for topical ophthalmic applications

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Glaucoma is a sight-threatening disease that damages the optic nerve, through the buildup of aqueous humor which results in increased intraocular pressure (IOP), that can lead to vision loss. We have recently shown, using the rabbit model, that Δ^9–Tetrahydrocannabinol Valine Hemisuccinate **(**THC-VHS) effectively lowers the IOP following topical instillation. The initial formulations studied were more effective than the marketed formulations of Timolol and Pilocarpine in the reduction of IOP. Although our optimized formulation were very effective, ophthalmic formulations need to be sterile. Thus, a key objective was to study the effect of the sterilization process on the physical and chemical stability of the formulations. THC-VHS was incorporated into the previously optimized nanoemulsion (NE), or Carbopol containing NE (NEC), formulations following hot homogenization followed by probe sonication protocols. The NE and NEC formulations were subjected to two sterilization techniques: filtration using a stainless steel 13 mm filter housing and filter membrane, or, steam sterilization (autoclaving). NE THC-VHS was successfully sterilized by filtration, whereas NEC THC-VHS could be autoclaved after a slight modification to the original formulation. IOP lowering activity, in normotensive rabbits, of the pre- and post-sterilization NE and NEC formulations, did not show any significant difference ($p<0.05$) in terms of duration of activity or maximum drop in intensity (E_{max}) or time to E_{max} (T_{max}).

A59 Acetazolamide Pretreatment Restores the Blood Pressure-Lowering Effect of Tempol in Female Spontaneously-Hypertensive Rats

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Oxidative stress is thought to be one of the mechanisms responsible for the regulation of blood pressure (BP). However, the role of oxidative stress in hypertension in females is controversial. Our lab has previously shown that Tempol (superoxide dismutase mimetic, antioxidant) failed to reduce BP in both adult and aged female spontaneously-hypertensive rats (SHR). Acetazolamide (AZT), a carbonic anhydrase inhibitor, inhibits Na^+ reabsorption in the proximal tubules thus mediating an increased sodium reabsorption at the distal nephron, an effect that might promote distal oxidative stress. AZT was used in the current study to test the hypothesis that under conditions of distal oxidative stress, the BP-lowering effect of Tempol would be restored. Female SHR rats (9 months-old, n = 13) were implanted with radio-telemetry transmitters in the abdominal aortas and allowed 2 weeks to recover while placed in pairs. After recovery, rats were single-housed and cages were placed on receivers and blood pressure was recorded using Ponemah software (v6.3). BP was recorded for a baseline period (B) of 3 days, then the rats were given subcutaneous injections of AZT (100mg/kg/day) for a total of 27 days. After 16 days of starting AZT treatment, rats were divided into 2 groups; AZT (received regular drinking water, n = 6) and AZT + Tempol (received Tempol 30 mg/kg/d in drinking water, n = 7). Both

groups continued to receive AZT injections daily. After 11 days of Tempol treatment, the rats were placed in metabolic cages for urine collection over 24 h. Urine samples were used for the estimation of urinary excretion of nitrates/nitrites (measure of systemic NO). Body weights were monitored twice a week and water intake was monitored daily to allow accurate determinations of the doses of administered drugs. MAP decreased gradually during the first 3 days of AZT treatment to comparable values in both groups (146 ± 3 in B to 135 ± 2 in AZT group vs 144 ± 3 in B to 133 ± 3 in AZT + Tempol group). Tempol treatment for 11 days caused 7 mmHg decrease in MAP compared to the MAP before starting Tempol (140 ± 1 to 138 ± 2 in AZT group vs 139 ± 2 to 132 ± 3 in AZT + Tempol group) which was significantly different compared to the baseline at days 3-11 of Tempol treatment (22-30 of the whole experiment). Additionally, Tempol caused a moderate increase in nitrate/nitrite levels (4.5 ± 1 in AZT vs 11.9 ± 4, n = 3-4, p = 0.08). Our data suggests that the blood pressure-lowering effects of antioxidants (Tempol) in females is dependent on renal sodium handling and distal oxidative stress.

A60 Conjugation to ELPs: Chromophors for Hydrodynamic Property Determination and Improved Drug Delivery

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ELPs (Elastin-like Polypeptides) are synthetic biopolymers that have unique properties. They are known to undergo liquid-liquid phase separation reversibly above a concentration-dependent transition temperature. Thus, they are thermo-responsive and can be equipped with cell-penetrating peptides and loaded with other molecules via cysteine-maleimide crosslinking. Consequently, compounds such as cancer drugs like doxorubicin, can be delivered with ELPs by hyperthermia to target cancer cells. The transition-temperature is influenced by the conjugated drug and this study aims to investigate the effect of various parameters on the thermodynamic functions responsible for the phase separation. The influence of the connective spacer and the chromophore is investigated in this study. For this, various amino acids are converted into their maleimides and *p*-nitroaniline amides. p-Nitroaniline absorbs at 365 nm as a free amine, while the amide absorbs at 325 nm. The conjugation to ELP is determined by the ratio of the 280 nm and 325 nm absorptions. Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

A61 The Effects of Coinfection of ZIKV, DENV, and CHIKV with dual host insect specific flaviviruses (dISFs)

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It has been shown recently that insect specific flaviviruses (ISFs) have inhibitory and inductory activities in the presence of other arboviruses such as West Nile Virus (WNV), Chikungunya Virus (CHIKV), Zika Virus (ZIKV), and Dengue Virus (DENV). ISFs replicate in the mosquito but either do not replicate in mammalian hosts, called classical ISFs (cISFs), or can replicate in mammals but do not cause disease, called dual host ISFs (dISFs). It is theorized that dISFs either interfere or enhance virial replication of secondary infects of arboviruses depending on the secondary virus in question. In this project, mosquito larval cells (C6/36) were infected with the following dISFs: La Tina Virus (LTNV), Kampung Karu Virus (KPKV), and Long Pine Key Virus (LPKV). After three days of infection, either DENV, ZIKV, or CHIKV were then coinfected into the C6/36 cells and allowed to grow until cytopathic effect (CPE) was observed. The cells were then collected in Trizol for qRT-PCR, and the supernatant was collected for later secondary infection. The presence of the coinfected virus was measured and calibrated against mosquito beta actin. Hopefully, this research will lead to a better understanding of how coinfection affects the ability of severe public health viruses such as ZIKV, DENV, and CHIKV to replicate inside the mammalian host, as well as possibly provide a platform for future vaccine research.

A62 Recombinant expression and purification of cysteine-rich Granulin-7 from *E. coli*

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Granulins (GRNs 1-7) are cysteine-rich, ~ 6 kDa repeat domains proteins that are generated by the cleavage of the precursor, progranulin (PGRN). These proteins possess multiple biological roles within normal physiology such as neurotrophic factors, immunomodulators, growth regulators etc. Pathologically, they have been implicated in neurodegenerative diseases such as Alzheimer disease (AD), frontotemporal dementia (FTD) and amyotrophic lateral sclerosis (ALS). Despite these links there is a dearth of information on the structure-function relation of the individuals GRNs. The goal of this study is to successfully standardize the recombinant expression and purification protocol for one of the GRNs; GRN-7 within *E. coli* to allow a complete biophysical and biochemical characterization. In our lab, we have previously established a purification protocol for GRNs-3 and 5 based on immobilized metal-affinity chromatography. For GRN-7, however, we observed the presence of proteolytic cleavage products along with the purified protein. To overcome the issue of proteolytic digestion by endogenous proteases, we changed the expression system from Origami 2 to BL21 *E. coli* cells. The results of this project have been presented here and discussed.

A63 Generation of VAMP7 and Syntaxin 4 Expression Plasmids for Mast Cell Degranulation

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Mast cells contribute to innate and adaptive immunities, however they can also cause allergy and autoimmunity through the release of various mediators e.g. histamine, serotonin, TNF-α through a process known as degranulation. The mast cell plasma membrane fuses with granule membranes through interactions between SNARE (soluble NEM sensitive factor attachment protein receptors) proteins anchored on both membranes, forming a trans-SNARE complex. Studies have suggested a correlation between specific SNAREs and the release of specific mediators, however we are uncertain about the specificity of different SNAREs in different types of mediator release. To test our hypothesis that different SNAREs are involved in differential release of mediators, first the SNAREs (VAMP7 and Syntaxin 4) will be knocked out from Rat Basophilic Leukemia (RBL-2H3) cell lines using CRISPR technology. To rescue the knocked out cells and reintroduce the genes, we subcloned R-SNARE VAMP7 and Q-SNARE Syntaxin4(STX4) into two pLVX-IRES-BLAST Vectors (one with Green Fluorescent Protein (GFP) and one without GFP). The vectors were double digested with EcoR1-HF and BamH1-HF and extracted and purified from agarose gel. VAMP7 and Stx4 were PCR amplified using self-designed primers with incorporation of EcoR1 and BamH1 sites then double digested and then extracted and purified from the gel. The purified inserts and vector were ligated and then transformed into Novablue competent cells. The plasmid isolated from the transformed colonies was sequenced, confirming the correctly made constructs. This connection between certain mediators released through SNAREs will allow stabilizer drugs to target and suppress SNAREs that create harmful mediators.

A64 Comparison of MLST Genotype and Presence of Trichomonas vaginalis virus in *Trichomonas vaginalis* isolates

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Trichomoniasis, the most common nonviral sexually transmitted disease in the world, is caused by the protozoan parasite *Trichomonas vaginalis* (TV), which exists in two populations as shown by a multilocus sequence typing (MLST) analysis based on seven single-copy housekeeping genes. Parasites can harbor up to four different strains of a double-stranded RNA virus called Trichomonas vaginalis virus (TVV1-4). Here, we compare MLST and TVV data for twenty-six *T. vaginalis* isolates from the American Type Culture Collection (ATCC), five long-term cultures, and six Mississippi isolates in addition to data from six literature reports. MLST, microsatellite and single-gene analyses agree that *T. vaginalis* exists as two major populations. TVV-type distributions seem to be consistent across all samples.

A65 Community Connectedness & Its Association with Overall Health among Black MSM

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The LGBT population has experienced stigma within the healthcare field which has formed a vicious cycle that turns them away, particularly black gay men. Studies show that two common themes affirm patients' distrust: 1) provider bias and 2) provider discomfort with this population. However, it has been shown that the efforts of social networking among black MSM's can ensure better health outcomes. We extracted data from the My Brother's Keeper's *Connect With Us* program, who's goal was to improve

sexual health outcomes and social networks for black gay men. Preliminary data analysis included frequency and crosstab analysis, which was followed by correlation analysis. Using our preliminary data from the Post-Intervention surveys, which was collected from 391 participants, two key themes emerged: (1) Healthcare providers are not asking the proper questions in relation to the health status of Black MSM, and (2) Black MSM like and believe that creating a social network is important and helps curate better health outcomes. These two common themes help to affirm the need for proper training on aiding MSM for healthcare providers. Findings from the studies indicate a relationship between Black MSM sexual health behaviors and highlights the importance of developing a social network to address health concerns holistically for Black MSM. Future research should continue to focus on the relationship between Black MSM and healthcare providers and how social networks help to provide better health outcomes to Black MSM. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

A66 Insect Juvenile Hormone Signaling May Shed Light on Mechanisms of Longevity and Obesity

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Today, human aging and obesity are areas of considerable health concern and the primary focus of much biomedical research. Many scientists suggest that insects may help decipher the mechanisms of aging and obesity. Here, we examine a juvenile hormone analog and its impact on the darkling beetle *tenebtio molitor*. Darkling beetles or commonly known as mealworms, are often used in many branches of biological research. The darkling beetle life stages include egg, larva, pupa, and adult. Juvenile hormone analogues, such as methoprene, acts like hormones present during the juvenile stage of certain insect's development and are commonly used alongside insecticides. Methoprene does not serve to kill insects that it affects, it only acts as a hormone controlling insect growth. Based on previous studies, it has been observed that methoprene interferes with the metamorphosis of insects, such as darkling beetles, by preventing the insect's exit of the larva stage. Previous research has indicated that methoprene also modulates insect insulin-signaling pathways in *drosophila*. In this study, we assessed the effect of methoprene treatment on the developmental life stages of the darkling beetle *tenebtio molitor*. We hypothesized that methoprene treatment would slow the progression of metamorphosis through the beetle life cycle. Interestingly, we found that methoprene treatment inhibits adult development, keeping the insects in the larval mealworm stage indefinitely. Furthermore, methoprene increased insect longevity as compared to untreated control groups. Methoprene treatment significantly increased darkling beetle larval lifespan as compared to untreated groups. Also, methoprene treatment resulted in larger and heavier darkling beetle larva as compared to untreated groups. Our preliminary data suggest that juvenile hormone signaling pathways may be important modulators of longevity, body size, and obesity. Our future studies are to determine how methoprene impacts insulin-signaling pathways in darkling beetles and to determine how those pathways contribute to longevity, increased body size and obesity, which may be translatable to humans. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of General Medical Sciences or the National Institutes of Health.

A67 The Intent to Seek Mental Health Services Among BMSM in Jackson, MS

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A reported 44 million, 18%, of American adults have a mental health condition. However, no demographic is more affected by mental health than black men who have sex with men (BMSM). It is hypothesized that when educational conversations about mental health issues and services are initiated, there can be an increase in intent to seek mental health services among BMSM in Jackson, MS. Data was obtained using reports from baseline, pre, and post intervention surveys in 8 sessions of year three, quarter three of the Connect with Us - ManDate program in Jackson, MS. There was a total of 67 participants identifying as BMSM ranging from 18-58 years of age. The Baseline survey measured ways to understand the current state of mental health, and mental health seeking behaviors. In the Pre and Post-Intervention surveys, the intent to seek mental health services every 3 months was reported by participants and measured. The Pre-Intervention survey ascertained initial intent and the Post-Intervention survey evaluated intent after the ManDate sessions. In the Baseline survey, 60.7% of participants reported having not considered speaking with a mental health professional. The Pre and Post-Intervention surveys revealed 27% (pre) and 37.3% (post) reported the intent to seek

mental health services every 3 months. Participants' intent to seek mental health services every 3 months increased by 10.3%. Therefore, these findings show an increase in the intent of BMSM seeking mental health services due to educational conversations on mental health through the ManDate Intervention program. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

A68 A Pilot Study on Hydrogen Bonding Analysis in Human Dental Tissues

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Water plays a critical role in dental tissues including enamel and dentin. The characterization of water structure analysis was primarily conducted by nuclear magnetic resonance (NMR). Raman spectroscopy is a powerful analytic technology with capability for structure analysis in materials. However, acquiring high wavenumber Raman signals from dental tissues was challenging due to either the fluorescence interference under laser illumination or reduced sensitivity of CCD detectors. In this study, we demonstrated a pilot research on high wavenumber hydrogen bonding detection in dentin tissues using a customized Raman spectrometer based on InGaAs detector. The results suggest that particle size hydroxyapatite crystals in enamel is larger than those in dentin. In addition, the variation of Raman profile of water between surface enamel and inner enamel suggests that the technology has the potential for probing water structure in dental tissues. In the future, such studies may lead to the understanding the role of water in the process of tooth degrading or caries development.

A69 Characterization of innate immunity in mouse embryonic stem cells, trophoblast stem cells, and their differentiated cells

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Innate immunity is an evolutionarily conserved defense mechanism presumably developed in all cell types. Innate immune system can be activated by various immune stimuli, leading to the expression of interferons (IFNs) and inflammatory cytokines that participate in different aspects of immune and inflammatory responses. Surprisingly, our recent studies demonstrated that mouse embryonic stem cells (ESCs) are deficient in innate immune responses. In particular, they are deficient in expressing IFNs and lack responses to bacterial endotoxin and inflammatory cytokines. This finding challenges the concept of innate immunity as an inborn defense mechanism. ESCs are derived from inner cell mass of the blastocyst, the early embryo which is surrounded by trophectoderm that gives raise to placenta. In this study, we extended our investigation to determine the immunoproperties of mouse trophoblast stem cells (TSCs), the progenitors of placental cells. Through in vitro differentiation, we are able to differentiate TSCs into trophoblast giant cells (TGCs), the primitive placental cells. We tested the responses of TSCs and TGCs to LPS and TNFα, two inflammatory agents that strongly induce inflammatory responses in embryonic fibroblasts. Both TSCs and TGCs failed to respond to LPS and TNFα as assessed by inflammatory gene induction and the lack of NFκB activation, the transcription factor that mediates the effects of LPS and TNFα. Surprisingly, TSCs can express IFNβ, suggesting that they have a functional IFN antiviral mechanism. Our data suggest that the immunologic properties of TSCs and ESCs are developmentally different, therefore may have important implications during early embryogenesis.

Conference Abstracts

Poster Session B 1:15 PM – 2:30 PM

B01 The Impact of Tick-Borne Pathogens Infection on the Microbiome Composition of the Tick Vector

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The competent tick vector is capable of transmitting several groups of bacterial, viral and protozoan pathogens to both humans and animals as a whole. Of significant importance in tropical and sub-tropical regions are Theileriosis, Babesiosis, and Anaplasmosis which poses significant deleterious effects on various livestock animals by drastically reducing production and making them life carriers. Some of these pathogens also pose significant zoonotic challenges and thus pose a risk of being introduced to new environments in the face of human and animal movement and ongoing climate change. Recently, studies have shown that ticks like in other arthropods and insects harbor several non-pathogenic microbes which have either obligate or facultative relationships with the tick by conferring reproductive, physiologic and immune support to the tick. This microbial community has also been observed to play a significant role in interacting with the different pathogens transmitted by the ticks. This study seeks to understand bacterial communities in Spotted Fever Group Rickettsia, *Theileria annulata*, *Babesia microti* and *Anaplasma marginale* infected tick belonging to the Genus Hyalomma and Rhipicephalus. To achieve this, a total number of 311 hard ticks including *Hyalomma dromedarii, Hyalomma anatolicum anatolicum,* and *Rhipicephalus microplus* were collected from areas with high livestock activity from Pakistan. Single tick genomic DNA was isolated with subsequent PCR amplification using primers specific for the outer membrane proteinA (OmpA) of the Spotted Fever Group Rickettsia, 18S rRNA gene of Theileria genus and the 16S rRNA gene of Anaplasma marginale which were used to detect for the presence of single or co-infection in individual ticks. The bacterial diversity across the clean and pathogen-infected tick species was examined by bacterial 16S rRNA gene sequencing using Illumina sequencing platform. The results of pathogen diversity and microbiome composition will be presented.

B02 Phosphodiesterase D is Involved in Bile Resistance in *Listeria monocytogenes*

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Listeria monocytogenes is a deadly foodborne pathogenic bacterium that is responsible for almost 20% of food related deaths in the United States. *Listeria monocytogenes* contaminates ready-to-eat products such as cheese and ice cream. Once ingested, it invades the intestinal lining and can enter the bloodstream, causing listeriosis. There is a gap in the knowledge of the pathogenesis of *L. monocytogenes* and how it is able to survive in the gastrointestinal tract in the presence of bile, which has bactericidal properties. Previous studies have suggested that the second messenger cyclic-di-GMP may be involved in the regulation of virulence factors of this bacteria. This nucleotide is produced by diguanylate cyclase and degraded by phosphodiesterase D (PdeD). The purpose of this investigation is to determine how the PdeD mutant survives in the presence of bile under aerobic and anaerobic conditions in neutral and acidic pH. Survival of the wild-type strain and a *pdeD* mutant was analyzed in aerobic and anaerobic conditions in neutral and acidic pH with and without 1% bile to mimic locations within the body where bile would be present (i.e. duodenum and gall bladder). Preliminary results show that the *pdeD* mutant is more sensitive to bile in aerobic and neutral conditions than the wild type. In order to better understand the relationship between PdeD and bile, future directions include studying the gene expression of bile resistance genes, such as BilE and BSH, using timepoints based on the data from this study.

B03 Smoking, Alcohol Consumption, and Illicit Drug Use Among Adolescents in the U.S.

Rasaki Aranmolate[1], Michael Rutalia[2], Stanley Akubue[3], Obafemi Sanni[4], Theresa Aranmolate[5]

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Adolescents have a higher risk for the onset of cigarettes, alcohol and illicit drug consumption. The purpose of this study was to examine alcohol, tobacco, and illicit drug use among adolescents in the U.S. We obtained data from high school youth risk behavior surveillance system (YRBSS) and a cross-sectional survey of 38,887 participants aged 13–17 years old were conducted. The number of questionnaires analyzed was 14,407 in case of smoking, 10,874 used illicit drugs, and 13,606 consumed alcohol. The percentage of self-reported smoking, alcohol consumption and illicit drug use was analyzed using descriptive statistics and linear regression. The prevalence of tobacco, alcohol and illicit drugs was examined according to gender, age group, and race/ethnicity. Analyses were performed using SAS 9.4. The use of alcohol was 15.5%, cigarette smoking was 9.5%, and illicit drugs use was 6.6%. The average age of onset was 11–13 years old. Alcohol use in male was 18.2% and 12.8% in female, smoking in male (10.9%) and female (8.0%), hence the use of illicit drug was 16.0% in male and 9.8% in female. Blacks have higher rates of alcohol (10.8%), smoking (14.9%), and illicit drug (8.1%) consumption compared to white (8.9%, 14.0% & 10.2% respectively). More than 28% of participants smoked in school, and 29.8% used alcohol and 14.8% accessed illicit drugs at school. More adolescents are consuming alcohol, tobacco, and illicit drugs despite several preventive programs. Increased awareness, enforcement of existing and implementation of preventive programs.

B04 Agmatine Regulates Capsule Expression in *Streptococcus pneumoniae*

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The global burden of invasive pneumococcal disease, including pneumococcal pneumonia and sepsis, caused by *Streptococcus pneumoniae* (Spn), a gram-positive pathogen, remains a major health risk. The available capsule polysaccharide (CPS) based vaccines have limited serotype coverage. Emergence of drug-resistance and lack of development of novel antibiotics mandate discovery of novel therapeutics for controlling this versatile pathogen. The success of Spn as a pathogen can be attributed to its ability to regulate CPS in the host, to prevent antibody deposition and resist opsonophagocytosis. Polyamines are ubiquitous polycationic hydrocarbons, and we previously reported that impaired polyamine synthesis and transport results in attenuation in vivo. Our preliminary data indicates that polyamine mediated attenuation could be due to impaired CPS synthesis. In this study, using targeted metabolomics, we characterize the impact of the impaired cadaverine synthesis (*ΔcadA/ΔSP_0916*), and polyamine transport (*ΔpotABCD*) on intracellular concentrations of polyamines and their precursors for synthesis, compared to the wild type Spn TIGR4. Spermidine and putrescine, putative substrates for PotABCD transporter were significantly lower in *ΔpotABCD* that has reduced CPS in vitro. There was no significant reduction in the levels of cadaverine in *ΔcadA*. However, we observed significantly lower agmatine in *ΔcadA*, indicating that SP_0916 is indeed an arginine decarboxylase. Furthermore, agmatine levels are lower in *ΔpotABCD*. Taken together, these results clearly demonstrate the critical role of agmatine in CPS synthesis in pneumococci. Further investigation of polyamine synthesis has the potential for the discovery of novel therapeutics that target these pathways.

B05 Healthy Food Purchase Comparison Between Welfare Participants and Non-Welfare Participants

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Food security can be defined as a measure of the availability of food, affordability and accessibility. Approximately 20% of the population has been defined as being food insecure. Out of Mississippi's 82 counties, 34 have a food insecurity rate higher than 22%. Within this state's capitol, 61,000 residents lack access to fresh, affordable foods. While Supplemental Nutrition Assistance Program can provide some help to individuals, many believe the aid is minimal. The purpose of this research is to examine the differences in food spending among individuals who are on government assistance. Using data from MBK's Jump Start Jackson program, individuals were surveyed to determine the places they shop and their food choices. Data was extracted and entered into

SPSS for analysis. Statistical analysis consisted of descriptive statistics, including frequencies and crosstabs analysis to compare those who are enrolled in government assistance programs to those who are not by examining the variety of foods they selected as common purchases in their homes. Using the snowball sample technique, it was determined, that of the 138 surveys completed for analysis, only 14%of the participants surveyed were enrolled in SNAP or WIC. However, participants enrolled in SNAP/WIC demonstrated healthier food choices than those who were not enrolled in the programs. Results concluded the government assisted participants in Jackson, MS were more likely to select healthier foods option compared to other participants. Future research should continue to examine the relationship between food access and healthy food knowledge among those on government assistance.

B06 *MsaABCR* Operon and TCA Cycle Genes Form Persister Cells in ATP Dependent Manner in *Staphylococcus aureus*

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Persister cell formation is a significant virulence factor to overcome when treating bacterial infections. Without going through genetic modification, this sub-group of the bacterial population shows extreme antibiotic resistance. The presence of persister cells during S*taphylococcus aureus* infection contributes to treatment failures by becoming dormant under environmental stress, making antibiotic treatment ineffective against them. When the stress is removed, they resume growth, causing recurring infections. Previously, we showed *msaABCR* operon regulation of virulence factors such as biofilm formation, capsule production, and persister cell formation against antibiotic stress in *S. aureus*. Furthermore, we found *msaABCR* mutant defective in persister formation in gentamycin stress. We observed that ATP content is higher in *msaABCR* mutant cells as compared to wild type USA300 LAC in stationary growth phase. In this study, we attempt to study the role of TCA cycle genes in formation of persister cells. We measured the growth pattern of mutants of TCA cycle genes with wild-type USA300 LAC strain and found similar growth patterns in tryptic-soy-broth medium. On inactivation of TCA cycle genes, we observed increased persister formation in the presence of gentamycin. Since persister cell formation is associated with the depletion of ATP, we further plan to study whether ATP content plays a role in persister formation in TCA genes mutants and the role of *msaABCR* in TCA cycle activity in persister formation.

B07 Acute Kidney Injury During Pregnancy Decreases Pup Size and Sensorimotor Development

Teylor Bowles, Sellena Dixon, Jamie Szczepanski, Shauna-Kay Spencer and Kedra Wallace

University of Mississippi Medical Center, Jackson, MS

Acute kidney injury during pregnancy (NP+AKI) leads to growth restriction and a delay in neurodevelopment in the resulting babies. As the incidence of AKI during pregnancy has been increasing over the last few years it is important to examine the consequences of this disorder during pregnancy. We hypothesize that similar to what is seen in humans with intrauterine growth restriction, there will be a sex difference in sensorimotor development between NP and NP+AKI rat pups. Rat pups born to NP+AKI dams weighed significantly less compared to NP pups ($p<0.0001$). AKI pups were significantly smaller compared to NP pups ($p<0.0001$). This trend remained true for female AKI pups through PND9 ($p<0.05$); after which time both NP and NP+AKI females were significantly smaller than male pups. On PND3 NP+AKI females took longer to complete surface righting (23.5±12.7sec) compared to rat pups in the groups. Similar results were seen in cliff avoidance between groups (30.5±16.5 vs. 48.7±11.3sec; respectively). On PND5 NP+AKI pups (55.7±4.3sec) take longer to complete the negative geotaxis task compared to NP pups (17±1sec). There was a statistically significant difference in kidney size between female and male NP rats ($p=0.02$). There was not a statistically significant sex differences between groups in brain size ($p=0.06$), however NP+AKI pups had significantly smaller brains compared to NP pups ($p=0.03$). NP+AKI pups are smaller compared to NP pups and have delays in surface righting. AKI during pregnancy did not affect kidney size in offspring, however both male and female NP+AKI pups had smaller brains more than 30 days post-birth compared to NP pups. The results from this study suggest that AKI during pregnancy leads to a significant delay in growth and sensorimotor development. Research reported in this publication was supported by the National Institute of General Medical Sciences of the National Institutes of Health under Award Number P20GM121334. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

B08 Social support and the effect it has on HIV positive patients at OAHCC

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Social support, as well as social services, both are imperative to the well-being of HIV-positive individuals and is also impacted by the individual's demographics. The purpose of this research is to analyze the relationship of social support with self-management and quality of life among people living with HIV; examining those who have fallen out of care versus those who have remained in care. This research examined nine case studies that covered the impact and importance of social support along with how demographics affect people diagnosed with HIV. We also pulled data from the Careware system from January 2017 to December 2018, containing overall demographic information of HIV-positive patients in care at Open Arms Health Care Center. Preliminary findings suggest that social support is positively correlated with a better quality of life among people living with HIV. They also show that there is no correlation between social support and people who have better self-management and viral load suppression versus those who do not. Further research should compare patients with a lower viral load in comparison to those who do not to determine if the results are in fact valid. There should also be more programs implemented to further support those people living with HIV. Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

B09 Establishment of Human DCLK1 Isoform 2 Isogenic Cells Using HCT116 Cells

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Double Cortin-like Kinase (1) (DCLK1) is a cancer stem cell (CSC) marker that is over-expressed in CSCs and epithelial-mesenchymal transition (EMT) cells of many cancers. Due to its expression in the therapy-resistant, tumorigenic subpopulation in cancer tissue, DCLK1 plays critical roles in indefinite cell proliferation, tumorigenesis, tumor metastasis, and recurrence of cancer. Further evidence has shown that the de-regulation or inhibition of DCLK1 directly causes a decrease in cancer succession and reduces the possibility of relapse. Since DCLK1 is so crucial to overall cancer progression, it's important to better understand how its over-expression specifically impacts the stages and development of human colorectal cancer (hCRC). However, DCLK1 has five isoforms and association of each isoform with hCRC is unclear. For the current project, we aim to establish the DCLK1 isoform 2 (DCLK1-S) isogenic cell clone to further investigate how DCLK1-S affects tumorigenesis of hCRC. In order to achieve our goal, we transformed the Myc-DDK-tagged human DCLK1-S cDNA into the TOP10 competent cells and plated onto the Kanamycin-selection LB agar plate. Four colonies were selected for DNA plasmid extraction and the extracted DNA were sent for DNA sequencing. The DNA with correct sequencing were transfected into the HCT116 cells using the Lipo3000. Forty-eight hours after transfection, cells were selected using neomycin for two weeks. Afterwards, neomycin-resistant cells were trypsinized into single cell suspension and plated into 96-well plate with 1 cell per well in the neomycin-selection medium. After isogenic cells were transferred into T-25 flask, whole cell lysate was prepared to confirm DCLK1-S expression using Western Blot. Our results demonstrated that of the 30 neomycin-resistant isogenic cell clones, DCLK1-S expression was significantly increased in 3 of them. These three clones will be used to further evaluate effect of DCLK1-S on the tumorigenesis of hCRC.

B10 Transcriptomic analysis of *Listeria monocytogenes* in response to bile under aerobic and anaerobic conditions

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Listeria monocytogenes is a dangerous food borne bacterium that is the third leading cause of death from food borne pathogens in the USA. Typically acquired through consumption of contaminated ready to eat products, such as cantaloupes and ice cream, *L. monocytogenes* must be able to sense and respond to bile encountered within the small intestine. *Listeria monocytogenes* possesses response mechanisms that allow it to survive the bacteridical effect of bile. Though these mechanisms have been identified, it is not known how this response occurs under physiologically relevant anaerobic conditions. Our hypothesis was genes involving pathogenesis are differentially regulated under conditions mimicking different parts of the gastrointestinal tract. Our

investigation involved analyzing the transcriptome of *L. monocytogenes* following exposure to bile under aerobic or anaerobic conditions at a pH of either 7.5 or 5, mimicking different parts of the GI tract. After obtaining the raw RNA sequencing reads, data was analyzed using several softwares packaged into a bioinformatics pipeline. At the end of pipeline, differentially expressed genes were obtained and genes greater than ± 3-fold were selected for further study. Genes responsible for adhesion and intracellular survival were upregulated under anaerobic conditions. Genes responsible for two component system were also upregulated, which could indicate a potential novel stress recognition and response system. Interestingly, the *pdeD* gene, which codes for a known oxygen sensor and regulator of cyclic-di-GMP concentrations, was also upregulated at certain mimicking conditions. Expression of pdeD gene also increased under anaerobic conditions when measured in vitro. A *pdeD* mutant was constructed and was found to be sensitive to bile, as well as to intracellular growth. Concentration of c-di-GMP increased when the pdeD mutant was exposed to anaerobic environment compared to aerobic. These data indicate that c-di-GMP may be regulated in response to oxygen availability. This needs to be further analyzed in future directions.

B11 In or Out of Control: Hormonal Contraception and Mental Health

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Women across the United States have complained about a decrease in mental stability after using hormonal birth control. From sterilization by way of female tubal ligation or occlusion to hormonal implants such as intrauterine devices to the most common and least invasive measures known informally as "the pill", "the patch", "the shot", and "the ring", women have used birth control to control more than just pregnancy for years. Birth control has been prescribed as a treatment for complicated cycles, acne prevention, endometriosis, Primary Ovarian Insufficiency (POI), and Polycystic Ovarian Syndrome (PCOS) amongst many other conditions. Though birth controls have successfully worked to control and limit unintended pregnancies and other complications and disorders, a very common side effect has been reported after usage of all types of hormonal birth controls -- an increase in anxiety and depression. As reported by the Centers for Disease Control and Prevention in 2018, 65.9% of reproductive aged women use some type of birth control. Of those women, over 22% use hormonal contraceptives, and many have reported some sort of decline in mental stability. Data from various scholarly articles and scientific sources were collected, analyzed, and included providing fact that highlighted a correlation between declines in mental stability in women that use hormonal birth control. This research supports the inference that hormonal birth controls result in a higher risk of mental instability such as depression and anxiety.

B12 Assessment of Water Quality at Ross Barnett Reservoir

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Deterioration of the water quality around us is a warning sign of possible pollution in water sources that may pose health risks. Some important factors that affects water quality are temperature, pH, turbidity, conductivity, dissolved oxygen, chemical oxygen (COD) demand and biochemical oxygen demand. This project is conducted by student participants of the 2019 Summer Science and Engineering at Tougaloo College. The goal is to assess the water quality at the Ross Barnet Reservoir while teaching students the real-life application of chemistry. The Ross Barnett Reservoir is a reservoir of the Pearl River between Madison and Rankin counties in MS. Water samples are collected from 4 locations at Ross Barnett reservoir. Temperature, turbidity, conductivity, dissolved oxygen (DO), chemical oxygen demand (COD) were measured. We have found that the dissolved oxygen, chemical oxygen demand, turbidity and conductivity are also in the permissible range despite slight fluctuations from location to location. The pHs are mainly in permissible range except one location which may need further study and confirmation. The data from the current year is also compared with that from the previous year. We found that water quality in a previously polluted location which showed high conductivity from last year's data was back to normal range. Effects of water-flow, precipitation, and human activity on the measured data are discussed. Through this project students learned techniques such as sample collection and preservation, principle of basic stoichiometry and titration, spectroscopy and electrochemistry. This project is supported by National Science Foundation HBCU-UP Implementation Project Award (#1912191).

B13 Early-Life Rem Sleep Deprivation Alters Learning and Social Behavior in Young Adult Rats

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Our earlier studies demonstrated that early life REMS-deprivation negatively impacts the maturation of hippocampal Long Term Potentiation (LTP) stability. The purpose of this study is to determine if there is an association between early life REMS-deprivation and behavioral changes in young female adult rats. We used Novel Object Recognition (NOR) and Novel Placement Recognition (NPR) to examine different aspects of learning behavior. An Open Field Test (OPT) was conducted to measure anxiety levels, and, social behavior was examined through play behavior videos. Our previous data in male rats showed that the deprived rats had less interest in the novel object during the NOR testing than rats in the control group. Instances of play behavior were significantly lower as well in the deprived rats. Results from the males also demonstrated that there were no significant differences between the REMS-deprived group of rats and the control group in the NPR and OF testing. However, hippocampal LTP in female REMS-deprived rats was shown to be reduced compared to controls less than what was observed in males. Thus, we may find disparate behavioral results in the females. We expect our data to show that postnatal REMS-deprivation will alter normal learning and social behaviors when the rats become young adults and have lifelong consequences on brain maturation.

B14 From the Mirror to the Mind: Are Race and Gender Moderators of the Relationship Between Mental Health and Body Image Disparity?

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Along with the second highest adult obesity prevalence, Mississippi ranks as the fifth highest state in the nation reporting frequent mental distress. Even though research suggests being overweight negatively impacts mental health, body perception seems to be an important mediator of the relationship between obesity and depression. Additionally, the difference between current and ideal body image (referred to as body image disparity, BID) appears to be variable among men and women as well as between different races. Thus, it seems warranted to explore the association between BID and mental health among Mississippians, a population with unique cultural values and largest proportion of African-Americans compared to the nation. This research explores the association between different racial populations (African-American and Caucasian) and males and females in Mississippi adults. We hypothesized that individuals who viewed their current body weight as lower or higher than ideal would have lower mental health scores for all populations with potential differences based on gender and race. Data was collected via outreach events and surveys where participants (incentivized with a chance to win $50 gift cards) rated their overall mental health and selected an image that best described their current and ideal weight; BID was calculated based on the difference between current and ideal responses. Out of 405 participants, 73.6% were female, 25.9% were white, and 26.7% were black. Two-way ANOVAS were computed with self-rated mental health as the dependent variable and BID and gender as independent variables for one analysis, and BID and race as independent variables for a second analysis. A Tukey's test, to follow up a significant main effect observed, determined individuals who viewed their current body weight as lower or higher than ideal had lower mental health scores than those with smaller discrepancies between current and ideal weight; no significant differences were found based on gender or race. Our findings suggest that large discrepancies between current and ideal body weight was related to mental health outcomes among Mississippi adults. Future research should confirm these findings in samples with greater male representation and determine practice implications for addressing body image discrepancies in practice.

B15 Monosodium Glutamate Enhances the Mitogenic and Tumorigenic Potential of Glioblastoma Cells through the Stimulation of Membrane-Bound Complement Regulatory Proteins

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Brain cancers make up approximately 1.4% of all cancer cases and 2.6% of all cancer deaths in the United States and among these cancers, Gliobastoma multiforme (GBM) is the fastest growing, most aggressive. Ranked fourth among cancer deaths in the middle-aged man, GBM is extremely lethal and treatment is often difficult. In fact, patients with GBM usually have a poor prognosis with survival rates lower than 15 months following diagnosis. Although not well-documented, the association between poor diet and GBM has been surmised. Monosodium glutamate (MSG) is a popular flavor enhancer used in the diet. Studies have shown that repeated exposure to MSG is associated with neurotoxicity, however, the specific role of MSG in GBM has not yet been unveiled. Membrane-bound complement regulatory proteins (mCRPs) are over-expressed on the surface of many cancer cells to assist in the evasion of complement-mediated cytotoxicity (CMC). The functional role of mCRPs in MSG-exposed glioblastoma cells has not been investigated. Therefore, the overall goal of this study was to determine the relationship between MSG and mCRPs in glioblastoma cells. This study hypothesized that mCRPs modulate MSG toxicity and enhance the mitogenic and tumorigenic potential of glioblastoma cells. The specific aims of this study were targeted by: (1) assessing the endogenous levels of mCRPs in GBM cell lines through western blot, (2) determining the effect of MSG on the proliferation of GBM cells, using MTS assay, (3) quantifying the levels of mCRP expression in GBM cells exposed to MSG using western blot and densitometry, (4) assessing the proportion of cells in each stage of the cell cycle before and after exposure to MSG using propidium iodine staining and flow cytometry, (5) determining the role of mCRPs and MSG in migration in GBM cell lines using a wound healing assay. Proliferation studies concluded that MSG increases the proliferation of GBM, independent of concentration. Western blot analysis revealed an upregulated level of mCRPs in GBM and an increased expression of mCRPs in MSG-exposed cells. Cell cycle analysis showed an increase in mitotic cells in all GBM, upon MSG stimulation, however, the percentage of cells undergoing apoptosis varied between cell lines and mCRPs. Taken together, these results suggest that MSG exposure stimulates mCRP production in glioblastoma cells, as a mechanism to evade complement mediated cytotoxicity.

B16 Uncovering the Impact of *B. miyamotoi* Infection on *Ixodes scapularis* ER Homeostasis

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Tick-borne diseases are a public health issue and they affect people every day. A new tick-borne pathogen, *Borrelia miyamotoi*, has emerged. It is a relapsing fever spirochete that is considered a distant cousin to Lyme Disease agent and has recently been found to cause disease in humans. This pathogen has been found in Ixodid ticks such as *Ixodes ricinus* (Sheep Tick) and *Ixodes scapularis* (Black-legged Tick). In humans, *Borrelia miyamotoi* causes recurrent fever, flu-like symptoms, and can also cause more severe illnesses such as meningoencephalitis. Unlike other Borrelia spirochetes, this pathogen can be vertically transmitted, passed from mother to offspring, which allows for the survival of the pathogen for many generations. There is very little to no research on *B. miyamotoi* infection within the tick vector that contribute to the understanding of its molecular mechanism to survive within the tick host before transmission to the mammalian host. To study the molecular determinants of *B. miyamotoi* infection in *Ixodes scapularis*, we used an *Ixodes scapularis* embryonic cell line (ISE6) to study the gene expression of select genes involved in Endoplasmic Reticulum stress. Confluent ISE6 cells were infected with *B. miyamotoi.* The cells were harvested at 2, 4, and 6 days post infection (dpi). RNA was extracted and multiple ERAD genes were analyzed using qRT-PCR. Our results show that *Borrelia miyamoti* causes upregulation of endoplasmic reticulum-associated degradation (ERAD) and Unfolded Protein Response (UPR) genes. During *B. miyamotoi* infection there is significant upregulation of up to a 100-fold increase of ERAD component selenoprotein genes, SelenoK, SelenoM, SelenoN, and SelenoS, and UPR genes, IRE1 and Derlin. Studies are still ongoing.

B17 Decreased placental tumor necrosis factor-alpha in response to neutralization of FAS ligand during pregnancy complicated with HELLP syndrome

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The Fas ligand (FasL) system has an impact on inflammation and hypertension during pregnancy and is dysregulated in women with severe preeclampsia and HELLP syndrome. We have recently reported that endothelin antagonism impacted the Fas/FasL system, therefore in the current study we tested the hypothesis that FasL blockade in an animal model of HELLP syndrome decreases inflammation, improves endothelial damage and in turn improves hypertension. Mini-osmotic pumps infusing anti-angiogenic factors sFlt-1 and sEng were placed into normal pregnant (NP) rats on gestational day (GD) 12 to induce HELLP syndrome (n=15). On GD13, 7 of these HELLP rats were infused with 500ng/kg of MFL4 via the jugular vein to inhibit FasL. Untreated NP rats (n=5) served as controls. On GD19 mean arterial pressure (MAP) was measured and all rats were euthanized, and maternal tissues

were collected. Administration of FasL to HP rats significantly decreased MAP (p=0.03) compared to untreated HP rats. Circulating FasL was significantly increased in HELLP rats compared to NP rats (p=0.0006) but was attenuated with infusion of MFL4 (p=0.0005). Placental protein expression of TNF-alpha, measured via ELISA, was significantly reduced due to MFL4 infusion in HELLP rats (p=0.0009). These data suggest that neutralization of FasL decreases MAP and improves placental inflammation in an animal model of HELLP syndrome.

B18 The Relationship Between Mobile Health Application Use and Perceived Health Improvement of Mississippi Adults

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There are currently over 259,000 mobile health applications (apps) available to consumers. Many of these apps are designed to make health information more accessible and to promote positive health outcomes, such as an increase in regular physical activity or a reduction of the risk of chronic disease in order to create a greater sense of well-being. However, more research is necessary to verify if these apps improve user physical health perception. Application usage can affect its perceived helpfulness, thus altering the perception of health benefits experienced by the user. Thus, the purpose of this research is to determine if the use of mobile health apps improve the physical health of adult app users in Mississippi and whether they perceived health improvements. Participants (n=210) that reportedly used mobile health apps included in our study were Mississippi residents above the age of 18 years old with mean age of 43.88 (SD=15.6). A vast majority of the participants were female (81.9%), 42.4% identified as American Indian, and 44.4% identified as single. 70.5% of participants received a 2-year or vocational degree or less, and 58.3% had a yearly income below $30,000. Recruitment of these participants occurred during multiple outreach events held in the community and at a Mississippi university. All participants had a chance to win a $50 gift card and received a giveaway incentive upon survey completion (whether handwritten or electronic). Pearson correlation analyses were conducted using SPSS 20.0 to determine the association between participant identified purpose for use of health apps and their perception of health improvement related to health app use. Of the 14 reasons for the use of health apps, the were five specific purposes ("Help me with what I eat/improve what I eat," p= 0.003; "Show/teach me exercises," p=0.010; "Track how much I sleep," p=0.004; "Access health information on symptoms, treatments, diagnoses, etc.," p=0.025; and "I want to kill time when bored," p=0.048) that were significantly and positively associated with perceived overall health improvement; nine showed no relationship. Thus, there seems to be some evidence to suggest that a relationship may exist between the purpose of health app use and perceived improvement in overall health. Future research is needed to determine the influence of health app use on health behaviors and outcomes. Health app usage may facilitate motivation and support for health improvement.

B19 Investigating the Formation of Hydrogen Bonds in Gamma-Aminobutryic Acid

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Gamma-Aminobutyric Acid, commonly referred to as GABA, serves as an inhibitory neurotransmitter in the central nervous system. Produced from glutamic acid, GABA is responsible for sending chemical messages from the brain to the nervous system, which helps to reduce anxiety and depression, in addition to stimulating sleep. GABA utilizes hydrogen bonding, allowing it to bind to $GABA_A$ and $GABA_B$ receptors. Here, Raman Spectroscopy is used to analyze the hydrogen bond network created by GABA and water. The spectrum of solid GABA was compared to solution state spectra in order to analyze the effects of hydrogen bonding on the vibrational normal modes. Moreover, solutions of GABA and water were acidified to a pH of 6 using HCl and analyzed to probe any potential changes in hydrogen bonding that arise from changing the pH. Theoretical calculations were run with the B3LYP hybrid functional and the 6-311++g(*2df,2pd*) basis set on a single GABA molecule in isolation. Calculations were also run on GABA with the addition of up to three water molecules to investigate possible hydrogen bonding sites. Additionally, the relative energies of each system were compared to determine which configuration possessed the lowest energy. Simulated Raman Spectra was compared to the experimental Raman spectra to analyze GABA's hydrogen bonding capabilities.

B20 *msaABCR* Operon Regulates *Staphylococcal* Metabolism to Promote Virulence Expression and Biofilm Formation

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Key problem with *Staphylococcus aureus* as a pathogen is the acquisition of antibiotic resistance and their ability to produce biofilm formation. They are also equipped with robust mechanism against several host responses including oxidative stresses. Bacteria can take up and utilize sugars and amino sugars in the cytoplasm for ATP production through glycolysis and the synthesis of bacterial components (e.g., peptidoglycan, lipoteichoic acid, WTA) and virulence factors (capsule, carotenoid pigment, toxins). Thus, allocation of sugar into different pathways is critical for virulence regulation and survival of bacteria. Our studies show that *msaABCR* regulates tightly regulated programmed cell death (PCD) phenomenon via *cidABC* pathway during biofilm development in USA300 LAC strain. *msaABCR* mutant consumed glucose and produced acetate at a higher rate compared to wild type in biofilm microenvironment leading to increased cell death. We also measured glucose consumption and acetate production rate during exponential growth phase, and acetate reutilization rate at stationary growth phase in *msaABCR* mutant cells. Results shows that *msaABCR* consumes glucose, generate acetate and reutilize acetate at faster rate compared to wild type. Aconitase activity measurement in *msaABCR* mutant showed increased TCA activity in mutant cells in stationary growth phase. Furthermore, *msaABCR* mutant's growth yield and acetate generation significantly increased when grown in TSB plus 1% pyruvate compared to wild type. Expression of *msaABCR* operon was increased when grown in TSB with 1% pyruvate compared to TSB only. Thus, increased oxidative energy metabolism (increased acetate production, acetate reutilization, TCA activity), decreased cell wall thickness, teichoic acid content, capsule and carotenoid production in *msaABCR*-mutant cells suggests that *msaABCR* operon regulates *staphylococcal* metabolism to promote cell envelope synthesis, virulence factor synthesis and biofilm formation. Furthermore, *msaABCR* operon is induced by pyruvate which is central metabolites of *staphylococcal* metabolism.

B21 Multiparametric MR Brain Tumor Imaging through Radiomic Features as a Metric for Guided Radiation Treatment Planning

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We propose the use of multiparametric MRI combined with radiomic features to improve the differentiation of tumor from edema for GTV definition and to differentiate vasogenic from tumor cell infiltration edema. Twenty-five patients with brain tumor and peritumoral edema were assessed: 17 were diagnosed with glioblastoma multiforme (GBM) and 8 with meningioma. After the acquisition process using a 3T-MRI scanner, two neuroradiologists independently used an in-house algorithm to segment two regions of interest (ROI; edema and tumor) in all patients using functional and anatomical MRI sequences. Radiomic features were extracted from all ROIs through different approaches with and without normalization, leading to the calculation of around 300 different parameters for each ROI. Next, a least absolute shrinkage and selection operator (LASSO) analysis was used to isolate the parameters that best differentiated edema from tumors while irrelevant parameters were discarded. Finally, statistical assessment was performed. Receiver operating characteristic results showcase both the best single discriminator to differentiate tumor from edema and the discriminant capacity of the model using all variables selected by LASSO. T1-weighted sequence postcontrast with normalization offered the best tumor classification (AUC>0.97) for patients with GBM with all MRI sequences. For patients with meningioma, a good model of tumor classification was obtained through the T1-weighted sequence without normalization (AUC>0.71). A small subset of radiomic features showed an excellent ability to distinguish edema from tumor tissue through its most discriminating features.

B22 The Daily Bread: Examining the Relationship Between Church Attendance and Dietary Behaviors in Mississippi Adults

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Mississippi is in the center of the 'Bible Belt' and notorious for unhealthy lifestyles. According to the Pew Foundation, Mississippi tied for first place with Alabama as the most religious state in the nation with 83% of the population identifying as Christian and 49% attending church at least once a week. The Center for Disease Control lists Mississippi as having a high obesity rate of over 35% which is the same rate for the nation. Many of the chronic diseases (ie., diabetes and hypertension) that plague Mississippi adults are linked to obesity and prevented by healthy dietary behaviors. Previous global studies have shown that religious teachings, for example viewing the human body as a sacred temple, have positively impacted health behaviors that have the potential to influence obesity rates and result in reduced chronic diseases. Religious organizations, therefore, especially in highly religious areas, have the potential to be part of the solution to Mississippi's health crisis. The purpose of this study is to examine the relation between church attendance, level of religiosity and dietary behaviors such as fruit and vegetable intake in Mississippi adults. Survey data were collected from Mississippi adults and analyzed using SPSS 20.0 software. Demographic variables including gender, income, race, and level of education were also described. The relation between church attendance, religiosity and dietary behaviors were examined with Pearson correlation and multiple regression analyses. The results showed a relationship between church attendance and religiosity with fruit intake. Church attendance also showed to have a positive correlation with average fruit and vegetable intake. Religiosity showed a significant relationship with average fruit and vegetable intake. For the multiple regression while none of the unique predictors were significant, together they are able to significantly explain 7.4% of the variance between fruit and vegetable intake (R^2=.074 $F(2,88)$=3.494, p=.04). This indicates that people who tend to be more religious also tend to eat more fruits and vegetables. These results provide information about whether churches are fulfilling their obligations to unpack and inform congregations about the meaning of "your body is your temple" and has implications for the need for health ministries in churches in Mississippi.

B23 Intranasal insulin ameliorates lipopolysaccharide-induced inflammation, lipid peroxidation and neurobehavioral deficits in neonatal rats

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Inflammation and oxidative stress play important roles in brain damage in neonatal human and animal models. Our previous studies have shown that systemic administration of lipopolysaccharide (LPS) induces brain damage and neurobehavioral dysfunction in neonatal rats, which is associated with the production of pro-inflammatory cytokines and oxidative stress. Recent studies suggest that intranasal insulin treatment could be a neuroprotective agent in adults. The objective of the current study was to determine whether intranasal insulin treatment reduces LPS-induced neurobehavioral dysfunction, brain inflammation and oxidative stress in neonatal rats. Intraperitoneal (i.p.) injections of LPS (2 mg/kg) or sterile saline were performed in postnatal day 5 (P5) SD rat pups, and human insulin (25 μg) or vehicle was administered in each nare 5 min after LPS injection. Sensorimotor behavioral tests were carried out 24 hours after LPS exposure and brain tissues were collected to determine pro-inflammatory cytokine interleukin-1β (IL-1β) and lipid peroxidation on P6. Our results showed that the intranasal insulin reduced LPS-induced sensorimotor behavioral disturbances as seen in righting reflex, negative geotaxis, wire hanging, and hind limb suspension tests at P6. Intranasal insulin also reduced LPS-induced brain inflammation as evidenced by the increase in IL-1β levels, and brain oxidative stress, as evidenced by the increase in thiobarbituric acid reactive substances (TBARS) contents. These data suggest that intranasal insulin provides a protective effect against the neonatal LPS exposure-induced sensorimotor dysfunction, brain inflammation and oxidative stress in neonatal rats, which may be associated with the neuroprotective effect of insulin. Key Words: lipopolysaccharide, intranasal insulin, sensorimotor dysfunction, neuroprotection. Supported by Mississippi INBRE Research Scholars Program, NIH grant NH/NINDS R01NS080844, and Newborn Medicine Funds from the Department of Pediatrics, University of Mississippi Medical Center.

B24 CURE: Biodiversity of Fish and Their Microbiome Extraction from the Ross Barnett Reservoir Spillway

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The CURE stands for Course Based Undergraduate Research Experience. CUREs as teaching tools are on the rise due to their good track records and enhanced impact on student learning. CUREs are designed to engage students and provide first-hand experience in novel research topics pertaining to course material. During our summer science program, we participated in a biology CURE project with the goal to assess the biodiversity of fish that inhabit the Ross Barnett Reservoir Spillway located in Ridgeland, MS. We asked the question "What type of fish inhabit the Spillway and can we isolate their gut microbiomes"? We speculated that we would find many different types of freshwater fish at the spillway and that we could also extract the microbiomes of these fish using microbial culturing techniques. Interestingly, using a cast-net, we caught 10 different species of fish at the Spillway habitat. We also found that fish numbers are dynamic and reflect the rising or falling water of the Spillway gates. Different populations of fish were found at rising water as compared to falling water. In the lab, we extracted many different bacteria from the gut of various fish species caught from the Spillway. Using variations in shape and color attributes, we were able to distinguish different types of bacteria in the fish microbiome at the basic level. In the future, we plan to sequence the various fish microbiomes as well as the colonial isolates to the family level. In our experience, the CURE approach is an excellent teaching method to engage students and enhance their learning in biodiversity and microbiome analysis to answer unique research questions.

B25 Development of a Drosophila Model of the SCA1 Disease

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Spinocerebellar ataxia type 1 (SCA1) is a fatal neurodegenerative disease characterized by progressive problems with movement. Patients affected by SCA1 develop an adult onset devastating pathology characterized by peripheral axonal motor and sensory neuropathy, distal muscular atrophy, pes cavus and steppage gait. The main goal of this summer research experience program was the development of a powerful genetic model to investigate pathogenesis of the SCA1 disease. The fruit fly, *Drosophila melanogaster*, is an organism extremely useful for studies on human biology, health and a wide range of pathologies including neurodegenerative diseases. This is because Drosophila genes controlling fundamental cellular functions, such as cell growth and death, are quite identical to those found in human cells. In this work, we developed a Drosophila model of the SCA1 disease by applying a well-known genetic approach. This focuses on the screening of several fly lines with UAS constructs for expression of abnormal polyglutamine repeats. The selected fly line which exhibits normal growth and development are then crossed to a Glass-multiple repeats (GMR) Gal4 line to start expression of the abnormal ataxin-1 gene encoding for polyglutamine repeats. This approach would create a fruit fly model that mimics the human pathological condition. Subsequently, genome-wide transcriptome analysis of this SCA1 fly model will provide greater insight into the mechanism of the disease. The identification of the steps of the SCA1 pathological cascade in turn will help the development of therapies targeting key molecules acting in these steps. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of General Medical Sciences or the National Institutes of Health.

B26 Covalent Tethering of Bacteriophages on Polyelectrolyte Crosspolymer Matrices

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Polyelectrolyte crosspolymers are a class of polymeric thickeners that find industrial uses ranging from pharmaceutical to cosmetic applications. Polycarbophil and Sodium Acrylate Crosspolymers are subsets of polyelectrolyte crosspolymers that were chosen for

these studies due to their superlative physical and rheological properties of suspension, viscosity, bioadhesivity, and shear-thinning rheology. Bacteriophages, also known as phages, are viruses that infect bacteria selectively. Phages work by binding to and injecting their host bacteria with genetic material that replicates inside the bacterium and releases many progeny bacteriophages. The Polycarbophil and Sodium Acrylate Crosspolymers would allow the polymer matrices to maintain their superior viscosity and suspension properties while providing aqueous mucilages for the tethered bacteriophages. These studies involve covalently tethering Φ11 bacteriophages onto the Polycarbophil and Sodium Acrylate Crosspolymers utilizing carbodiimide coupling chemistry. Furthermore, the data confirms that the Φ11 bacteriophages successfully tether to Polycarbophil and Sodium Acrylate Crosspolymer matrices.

B27 What You See Is What You Get, Right?

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Thousands of youth in the US use alcohol, tobacco, and other drugs (ATOD) before the legal age of consumption, and it continues to be a major health problem from pre-adolescence through young adulthood because of ATOD being advertised on television, radio, and social media. The purpose of our research was to determine if TV, radio, and social media advertisements influence the usage of ATOD among youth ages 11-18. Using the Youth Message Development (YMD) intervention, we evaluated 322 youth to determine if what's advertised on television, radio, and social media influences ATOD use. The goal of the YMD intervention is to prevent adolescent substance use by increasing youth's knowledge of advertising techniques used to sell ATOD products; developing their counter-arguing and critical-thinking skills in response to ATOD messages; and helping them actively apply these skills and techniques to create youth-driven, anti-substance use messages. During YMD sessions, participants received pre- and post-test assessments to determine increase in knowledge, as well as a satisfaction survey to assess media literacy/skepticism, media identification, self-efficacy to counter-argue, and ATOD use intention. The data collected showed 238 participants (85%) increased their knowledge; 158 participants (49%) increased critical thinking and counter-argument skills; and 267 participants (83%) increased their self-efficacy to create ATOD messages. Using the YMD intervention, we proved that advertisement through television, radio, and social media does influence the usage of ATOD among youth ages 11-18. However, prevention and education programs, such as YMD, are proven to prevent ATOD use and abuse among youth. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

B28 Identification of Hydrogen Peroxide Sensitivity Factors in *Streptococcus pneumoniae*

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Streptococcus pneumoniae, pneumococcus, is a -Gram-positive bacteria that colonizes nasopharynx of humans. However, pneumococcus can cause serious illnesses, including bacteremia, pneumonia, meningitis, and otitis media in young children. Hydrogen peroxide impacts pneumococcus in two important ways. First, *S. pneumoniae* possesses the *spxB* operon which results in secretion of millimolar concentrations of hydrogen peroxide under aerobic conditions. Secondly, phagocytes use reactive oxygen species including hydrogen peroxide to neutralize the bacterium following phagocytosis. However, it is unknown specifically what pneumococcal factors render it susceptible to hydrogen peroxide. Our hypothesis is that transposon-mutagenesis can identify pneumococcal factors that make the bacterium sensitive to hydrogen peroxide. Therefore, transposon-mediated inactivation of such factors would lead to resistance to hydrogen peroxide. A Tn-seq mutant library of strain D39 was exposed to 100mM hydrogen peroxide for 45 mins and then plated to identify potential mutants surviving this high-dose peroxide exposure. Five pneumococcal mutants were isolated from two separate experiments and the isolated pneumococcal mutants were named Peroxide Resistant Pneumococci (PRP) strains 1-5. Wild-type D39 and PRP strains 1-5 were cultured with and without hydrogen peroxide (25mM) for 1 hr and surviving pneumococci were quantitated by plating on TSA blood agar plates. PRP strain 1 and 2 were found to be the most peroxide resistant, however all 5 mutants were significantly more resistant as compared to D39. Chromosomal DNA from PRP1-5 was isolated, digested, and ligated to a DNA adapter. PCR primers specific for the transposon and the adapter were used to amplify a 120bp product that was sequenced to identify the genes containing the transposon insertion. The results from this study will

identify specific pneumococcal factors that are targets for hydrogen peroxide-mediated killing. These findings will identify new targets for novel antimicrobials against the important human pathogen.

B29 The thiol specific antioxidant (Tsa1) gene is required for survival in murine macrophages

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Histoplasma capsulatum (*Hc*) is a pathogenic fungus that is the etiologic agent of the common respiratory disease histoplasmosis in humans and other mammals. *Histoplasma* undergoes a dimorphic shift from the mold growth form to the yeast morphotype which is required for pathogenesis. Work in our lab has indicated that a thiol-specific antioxidant gene (*HcTsa1*) plays a role in survival and virulence. In other fungi, the *Tsa1* gene has been shown to be involved in protection from oxidative stress (*C. albicans* and *Saccharomyces cerevisiae)*. *HcTsa1* is strongly upregulated in the yeast (pathogenic) morphotype. To analyze the role of Tsa1 in response to oxidative stress, a RNAi *Tsa1* knockdown strain (90% knockdown) was created. This study focuses on the role *HcTsa1* plays in providing resistance to host-mediated oxidative stress. Murine macrophages are infected at a multiplicity of infection (MOI) at 1:1, 1:10, and 1:50 with yeast phase *Hc* and measured yeast survival 24 hours after infection. We have found that *Tsa1* is required for optimal survival of *Hc* within murine macrophages.

B30 Optimization of Quinoline-based HIV-1 Integrase Inhibitors

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HIV-1 Integrase is a viral enzyme that is essential for the replication of HIV-1. Recent studies have highlighted the vulnerability of the virus to a new class of integrase inhibitors capable of disabling this viral enzyme by triggering its abnormal multimerization at several critical stages of the virus life cycle. We have synthetized a library of active quinoline derivatives in order to better understand the molecular and mechanistic mode of action of these compounds. Our studies combine several approaches such as protein biochemistry, medicinal chemistry and virology. Acknowledgement: This work is funded by the NIH-NIAID under the grant number R21AI127282.

B31 Status of Healthy Drinking of the Young College Students in South Mississippi

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Sugar-sweetened beverage (SSB) consumption is associated with weight gain in youth. Pure water (PW) intake may protect against SSB consumption and consequently, promote a decrease in total energy intake; however, little is known about the status of both SSB and PW among youth in South Mississippi. Information was obtained by surveying a sample of 333 young college students aged 18-25 years enrolled at the University of Southern Mississippi. Descriptive statistics and bivariate analyses including Correlation coefficient, ANOVA and Independent samples t-tests were conducted using SPSS v26. Data were used to estimate the daily SSB and PW consumption in ounces (oz.) by socio-demographic characteristics including race and gender. The average amount of daily SSB and PW consumption was 34.91 oz. with SD of 26.58 and 62.57 oz. with SD of 44.86 respectively. Mississippi-born students consumed significantly larger amounts of SSB compared to those born outside Mississippi ($\bar{x}$=38.06 vs. 28.28, p<.05); however, in-state students consumed significantly smaller amounts of PW than their out-of-state counterparts ($\bar{x}$=59.09 vs. 70.63, p<.05). Additionally, the daily consumption of SSB among African-Americans was significantly higher compared to Caucasians ($\bar{x}$=41.20 vs. 32.90, p<.05). Males consumed substantially larger amounts of PW than females ($\bar{x}$=85.01 vs. 53.86, p<.05), and African-American students, native-born of Mississippi used significantly larger amounts of SSB ($\bar{x}$=40.47, p<.05). There is a need to implement prevention programs aimed at reducing SSB intake, particularly for Mississippi-born African-American students.

B32 The Relationship of Abdominal Fat Density with Simple Anthropometric Measures and its Correlation with Cardiovascular Disease (CVD) Risk Factors in African Americans (AAs)

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In order to assess the relationship of fat density and anthropometric measures, and its correlation with CVD risk factors in African Americans (AAs) non-enhanced abdominal CTs from AAs were gathered (N=2006). Attenuation measurements of psoas/paraspinal/abdominal wall skeletal muscle and abdominal fat depots (VAT and SAT) were measured using a multi-layer segmentation software. In addition, anthropometric measures of waist circumference (WC) and sagittal abdominal diameter (SAD) were measured. Finally, associations of HU (fat density) with anthropometric indices were performed using linear regression and Pearson correlation coefficients. Inter-observer agreement was assessed using intra-class correlation coefficients. WC was moderately correlated with VAT (R^2=0.18, 0.42, p<0.001) and SAT volumes (R^2=0.20, 0.45, p<0.001). SAD most notably represented VAT volume (R^2=0.25, 0.5, p<0.001). Attenuation measurements showed no significant correlation with WC or SAD. The inter-observer agreement was excellent between two readers in a random sub-cohort (ICC>0.96, 95% CI; N=300). SAD and WC are easily measured and showed an acceptable association with VAT and SAT density values, respectively. These anthropometric indexes can potentially serve as useful biomarkers to identify and predict cardiometabolic risk in AAs.

B33 Assessment of Novel, Candidate Analgesics Compared to Oxycodone in Thermal Antinociception, Electronic Von Frey, and Self-Administration

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Prescription opioids (e.g., oxycodone) are highly efficacious in their treatment of pain, however, they are limited by their side effects such as abuse liability. Novel analgesics without the side effects associated with opioids are critically needed. Here, we investigate the antinociceptive effects and abuse liability of drugs among different classes (e.g., kappa opioids and benzodiazepines) combined with or compared to oxycodone. Methods: For the antinociceptive studies, male and female Sprague-Dawley rats received either intravenous oxycodone alone (von Frey) or a series of agonists (i.e., oxycodone, experimental drug 1, and experimental drug 2; hotplate), and cumulative dose-effect curves were determined. For the self-administration study, male Sprague-Dawley rats received oxycodone alone, or as a mixture with the kappa agonists U50,488h, nalfurafine, or triazole 1.1. Results: For the von Frey assay, oxycodone produced a dose-dependent increase in total gram force applied to the hindpaw surface. For the hotplate assay, oxycodone and experimental drug 2 produced dose-dependent increases in latency to emit nociceptive response, while experimental drug 1 did not. For self-administration, oxycodone combined with each kappa agonist produced a dose-dependent decrease in injections earned per session. Conclusion: These studies demonstrate different preclinical strategies that are used to determine the therapeutic and side-effect profiles of candidate analgesic drugs.

B34 The Binding Mechanisms of Probiotics Isolated from Commercial Yogurts

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The use of probiotics as dietary supplements is increasing. Most probiotics are consumed through dairy products, such as yogurt. Probiotics provide a benefit through competing against pathogenic bacteria for nutrients, space, and directly binding. Recently, our laboratory has analyzed the binding efficiency of various probiotics against both Gram-positive and Gram-negative bacteria and found that the efficiency varies based on the probiotic. This study involved isolating yeast from five different yogurt brands and testing the binding efficiency of each through Scanning Electron Microscopy. We found that Oikos and Yoplait Greek bound best to *Salmonella* than the isolates from Yoplait, Activia, and Great Value. To determine if these binding properties were due to surface proteins on the probiotics, we treated isolates with either 1% Sodium Dodecyl Sulfate (SDS) or 2% Triton X-100. Activia and Dannon probiotics were unable to bind with the *S. typhimurium* when treated with SDS and Triton X-100 because of disruption to surface proteins and outer cell membrane proteins. This suggests that the probiotic's binding mechanism is dependent on surface proteins and other function of the outer cell wall. To see if binding could be enhanced, zinc nitrate and calcium chloride, which are binding

enhancers, were also added to the isolated probiotics. These enhancers, however, did not improve binding efficiency. Further research is needed to determine the specific membrane proteins involved and how to enhance binding properties.

B35 NIH COBRE-Natural Products Neuroscience Chemistry Services Under Chemistry And DM-PK Core Facility

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The Chemistry Facility is under Chemistry and DM-PK core is supported by the NIH COBRE Natural Products Neuroscience (NPN) program grant at the University of Mississippi. Our facility supports investigators with lead compound optimization, synthesis, The Chemistry Core has an advisory role for CORE-NPN investigators and Non-CORE NPN investigators that require expertise in the area of exploration of structure-activity relationships, metabolite activity relationships and pharmaceutical and chemical influences on solubility of test compounds and their formulations. Our chemistry research facility core is able to provide support with project needs in synthesis (single-step or Multi-step chemistry) of customized compounds to researchers for in vitro and in vivo assessments, based on natural products or synthetic compounds, exploration of structural activity relationship, lead compound optimization, Compound Purification and Characterization.

B36 Vernonia Amygdalina Shows Promise for the Prevention of Acute Promyelocytic Leukemia

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The treatment of Acute Promyelocytic Leukemia (APL) has been founded on the organization of all-trans retinoic acid (ATRA) in addition to chemotherapy, which is exceptionally successful as a first line treatment; conversely, 25% to 30% of patients will regress, with their illness getting to be recalcitrant to ordinary treatment. Hence, the goal of this research was to determine the therapeutic mechanisms of *Vernonia Amygdalina* inhibits antiproliferative effect, oxidative stress, and apoptosis of HL-60 cells. To accomplish this goal, HL-60 cells were treated with various doses of the *Vernonia Amygdalina* for 24 hours. Cell viability was examined by the MTS assay; oxidative stress was estimated by lipid peroxidation assay, MTS, and cell apoptosis was analyzed by the flow cytometry. Results: The MTS assay indicated that VA significantly reduced the viability of HL-60 cells in dose-dependent manner. Data obtained from the lipid peroxidation assay demonstrated a significant ($p < 0.05$) reduction in the MDA level in treated HL-60 cells compared to the control cells. The results showed that VA acts as antioxidant by decreasing the production of MDA levels in treated HL-60 cells. The flow cytometry assessment showed an increased in the number of apoptotic cells in treated HL-60 cells compared to the control group. These results suggest that VA can act as a complement to the current treatment for APL patients. Taking together, this data provided clear evidence that *Vernonia amygdalina* inhibited cell viability, oxidative stress, and induced apoptosis. This research work was supported by a grant from the National Institutes of Health (Grant No. NIMHD-G12MD007581) through the RCMI-Center for Environmental Health at Jackson State University. Keywords: Bitter leaf, HL-60 cells, chemoprevention, acute promyelocytic leukemia. Acknowledgments. This research work was supported in part by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476; and in part by the National Science Foundation under grant number NSF-1826699 at Jackson State University and Hinds Community College.

B37 Prospective Validation of Rapid Bone Density Screening Method that is Applicable to Routine Abdominal CT Images

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In an effort to improve screening for osteoporosis, the objective of this study was to prospectively validate an opportunistic screening method utilizing color to detect abnormal bone density on CT images. Two-hundred women ≥50 years of age presenting for screening mammograms were recruited and underwent non-enhanced CT imaging of the abdomen. The CT images were processed with software designed to color the vertebral bodies green if bone density was normal and red if abnormal. Four radiologists interpreted L1/L2 bone density using various methods: quantitative CT (QCT), visual assessment of grayscale (Grayscale) and colored (Color) images and measurement of vertebral attenuation (Attenuation). The average accuracy, sensitivity, and specificity were calculated as compared to QCT, the reference standard. The optimal mean attenuation cut point for differentiating normal from abnormal bone density was 145 HU. The average accuracy, sensitivity, and specificity were higher with the Color method (Accuracy: 92, Sensitivity: 92, Specificity: 93) than with the Attenuation (Accuracy: 88, Sensitivity: 89, Specificity: 89) or Grayscale method (Accuracy: 66, Sensitivity: 69, Specificity: 64). Mean time of assessment of 2.8 seconds using the Color method was significantly faster than the Grayscale and Attenuation methods (6.0 and 15.2 seconds, respectively, $p < 0.001$).

B38 Effects of Riboflavin and *Bacillus subtilis* on Internal Organ Development in Ross 708 Male Broilers with or without Coccidial Challenge

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Probiotics, including *Bacillus subtilis*, may improve beneficial bacteria growth in chicken intestines in order to inhibit pathogenic bacteria growth and prevent common intestinal diseases like coccidiosis. However, some beneficial bacteria produce bile salt hydrolase which breaks bile salts, subsequently decreasing lipid absorption and impairing production. The hypothesis of this study was that addition of the bile salt hydrolase inhibitor, riboflavin, to broilers' diets could improve probiotic function and internal organ development when coccidiosis is induced. 13 birds were placed per 96 pens with 8 replication blocks. 12 treatments were in a 3×2×2 factorial arrangement, including 3 riboflavin dosages (0.75, 6.6, and 20 ppm), with or without dietary *Bacillus subtilis*, and with or without cocci challenge. To produce sub-clinical coccidiosis, birds were gavaged with 20× dose of a coccidiosis vaccine on day 14. One bird per pen was randomly selected for gastrointestinal sampling on days 27 and 36 in order to calculate the relative organ to body weights. On day 27, cocci challenge increased relative weights of the proventriculus and spleen ($P = 0.001$), duodenum, jejunum, and ileum (with all $P < 0.0001$). However, on day 36, the effects of cocci challenge on spleen, duodenum, and jejunum were lost and cocci challenge decreased ($P=0.0003$) the relative ileum weight, which was opposite as compared to day 27. In addition, 20 ppm riboflavin supplementation lowered the relative gizzard weight ($P = 0.037$) on day 27. In birds not challenged with cocci, supplementation of *Bacillus subtilis* lowered relative gizzard weight ($P = 0.043$). Among all the 12 treatments, cocci challenged birds fed 0.75 ppm riboflavin and *Bacillus subtilis* exhibited the heaviest duodenum weight on day 36 ($P = 0.032$). The results show that *Bacillus subtilis* may affect the organs under different gut health conditions and cocci challenge may affect the organs differently depending on age, which may be due to the progress of the coccidiosis condition in the gut.

B39 In Vitro Neuropharmacology Core

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The University of Mississippi Neuropharmacology Core facility is dedicated to testing the effects of natural products and other potential neuromodulators in vitro and in vivo. Our in vitro assays include cannabinoid and opioid receptor binding screens, Ki determinations, functional assays, neurotoxicity and neuroprotection tests, and observations of neurite outgrowth using primary neuron cultures. We work with investigators to examine the affinity and efficacy of their compounds (and extracts) in these assays. Additionally, we can perform a variety of molecular biology techniques as requested and are willing to consult and develop new assays as needed. This fee-for-service core is funded by the COBRE-Natural Products Neuroscience P30-GM122733.

B40 Examining the Relationship Between Chronic Disease Status and the Use of Mobile Health Apps Among Younger vs Older Adult Residents of Mississippi

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According to the Centers for Disease Control and Prevention, Mississippi ranks either 1st or 2nd in the nation for deaths attributed to chronic illnesses such as diabetes, heart and kidney diseases. The use of mobile health applications can be an effective tool in chronic disease management; however, there has been little study of the use of these apps among Mississippi adults. The purpose of this research was to determine the relationship between chronic disease status and the use of mobile health apps among adult residents of Mississippi, and to determine whether that relationship differs by age. Data were collected via survey from Mississippi residents, 18 years of age or older, who were recruited from community outreach events. Self-report information regarding chronic disease status and mobile health app use were collected. Demographic variables including age, gender, income, and education level were examined. Results were analyzed with SPSS 20. A moderated multiple regression was computed with chronic disease status regressed onto the app use variables, age, and the interaction of the app and age variables. The sample of participants (n = 405) was mostly female (78%) with an average age of 43 years. Seventy-two percent identified as an ethnic minority, 58% had an education level of less than a 2-year college degree, and 74% earned a yearly income of ≤ $39,999. Analysis showed no statistically significant relation between disease status and mobile health app use ($p = 0.163$), age and app use ($p = 0.474$), and there was no interaction between the relation of disease status and app use with age ($p = 0.999$). These results suggest that further study is needed to identify the specific needs of Mississippians with respect to technology use and chronic disease management.

B41 Polyamine synthesis is required for *Streptococcus pneumoniae* oxidative, nitrosative and acid stress responses

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Polyamines such as cadaverine, putrescine and spermidine are ubiquitous aliphatic polycationic molecules that regulate several cellular processes including stress responses. Impaired polyamine synthesis and transport in *Streptococcus pneumoniae* (pneumococcus) adversely affects survival in murine models of colonization, pneumonia, and sepsis. Polyamines scavenge free radicals, bind and stabilize nucleic acids and protect cells from acid stress. Impaired stress responses in pneumococci with impaired polyamine metabolism could result in the observed attenuation in vivo. In this study, we compared the susceptibility of *S. pneumoniae* TIGR4 and Δ*cadA*, a strain that harbors an isogenic deletion of lysine decarboxylase (catalyzes the synthesis of cadaverine) to oxidative, nitrosative, acid and thermal stress conditions. Wild type and Δ*cadA* were cultured in Todd-Hewitt Yeast extract (THY) medium and colony forming units were enumerated under different growth conditions such as supplementation with H_2O_2, paraquat, *S*-Nitrosoglutathione (*GSNO*), varying pH/temperature of the growth medium. Our results show that Δ*cadA* is more susceptible to low concentrations of exogenous super oxide (1 mM), hydrogen peroxide (2.5 mM) and GSNO, (0.16 mM) compared to the wild type (WT) strain. We observed reduced growth of Δ*cadA* at pH 5.7. Further evaluation of polyamine dependent gene expression responsive to H_2O_2 stress in Δ*cadA* by qRT-PCR, identified downregulation of genes involved in glutathione metabolism, polyamine biosynthesis, protein repair (*htrA*) and scavengers of reactive oxygen species (ROS) (*tpxD*). In summary, this study clearly demonstrates the importance of polyamine synthesis for stress responses that have implications for the survival of this versatile pathogen in the host.

B42 Dynamic Epigenetic Control of Transposon Silencing

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Transposable element (TE) activity results in genome instability in a wide variety of organisms, including humans. This instability has been associated with several diseases, including neurofibromatosis, hemophilia and cancer. Epigenetic silencing is an efficient mechanism for the initiation and maintenance of TE repression on a genome-wide scale. Recent studies have revealed that maintenance of epigenetic control of TEs involves dramatic changes in silencing of TEs in different tissues at different times in both plants and animals. We have developed a novel model system in which an active transposon can be silenced by a silencing trigger that is a source of small RNAs. This makes it possible for us trigger and monitor the initiation of silencing in various tissues and at various time points. We have obtained high throughput sequencing data for mRNA and small RNA in various tissues at

various developmental stages in maize. Our preliminary data suggests that in the germinating embryo of maize, the *de novo* RNA directed DNA methylation (RdDM) pathway is replaced by post-transcriptional inhibition. In this poster we will present our preliminary on the RNA seq data analysis that identified Differential Expressed Genes (DEGs) which may be involved with changes in the initiation of TE silencing. These results will provide fundamental knowledge concerning epigenetic control of TEs during development, which will ultimately provide new opportunities for the treatment of diseases that are associated with TE transpositions. Acknowledgement to MS-INBRE grant support.

B43 The *msaABCR* Operon Regulates Aminoglycoside Persistence Via Proton Motive Force Uptake in *Staphylococcus aureus*

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A bacterial phenotypic variant that shows extreme antibiotic tolerance are termed as 'persister cells'. Increasing evidences suggest the association of bacterial persisters with chronic and recurrent infections. Despite this clinical relevance, there are currently no viable means for eradicating persisters. Previously, we showed the involvement of *msaABCR* operon in *in-vitro* persister cells formation in *Staphylococcus aureus* against different antibiotics. Particularly, on exposure to gentamycin, we observed no persister formation in stationary phase *in msaABCR* operon mutant cells within 24 hours of treatment while the wildtype and the complementation strains formed persister cells for extended period. Given the aminoglycosides-drug uptake is dependent on the proton motive force, we hypothesized that deletion of *msaABCR* renders cells to have increased proton motive force consequently increasing the gentamycin-uptake in *S. aureus* cells. We measured the gentamycin uptake using gentamycin-Texas red conjugation method by flow cytometry and found the drug uptake is more in *msaABCR* mutant cells as compared to wild-type USA300 LAC cells. Herein we report, the regulatory role of *msaABCR* operon in aminoglycoside persistence that is dependent on the proton motive force. This study highlights the importance of *msaABCR* operon as a drug target for eradicating staphylococcal persisters and overcome recalcitrant infections.

B44 The effects of carbohydrate on virulence expression in *Staphylococcus aureus*

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Staphylococcus aureus is a significant pathogen in both the community and nosocomial settings. Frequently, *S. aureus* asymptomatically colonizes the skin and mucosal membranes of the hosts, but it opportunistically causes highly invasive and lethal diseases such as pneumonia, endocarditis, and septicemia. A transition from the skin and mucosal membrane to deeper tissues will rapidly change surrounding environments such as nutrients to which *S. aureus* rapidly adapt and regulate expression of virulence factors. However, the mechanism by which how *S. aureus* respond and adapt to the nutritional change has not been fully understood. Among many nutritional components, carbohydrates are the major nutrients commonly utilized by hosts as well as pathogens to produce energy and cellular components for support their life cycle. In hosts, glucose is the most abundant carbohydrate in the serum and the preferred carbohydrate metabolized by the central carbon metabolism. In addition, other carbohydrates are also available from diets and metabolic derivatives. In this study, we investigated the effect of these carbohydrates available in hosts on expression of virulence factors by *S. aureus*. We found that glucose is the major carbohydrate that supported growth and proliferation of *S. aureus* but repressed expression of virulence factors including staphylococcal cytotoxins and superantigens. By contrast, metabolism of fructose, mannose, and glucose-6-phosphate (G6P) significantly increased expression of virulence factors. Increased expression of virulence factors by fructose was repressed by an addition of glucose while that by mannose and G6P was not affected. Our results clearly demonstrated that carbohydrates play an important role in not only supporting growth but also regulating differential expression of virulence factors in *S. aureus*. The carbon catabolite repression (CCR) is a central regulatory mechanism of bacteria to regulate gene expression for successful metabolic adaptation. In the future study, we will investigate the role of CCR mechanism on carbohydrate dependent expression of specific virulence factors. These results will shad a light to understand the mechanism of metabolic adaptation of *S. aureus* during invasion of host deep tissues. Obtaining such knowledge is important to develop effective intervening therapeutics.

B45 Examining Unsatisfactory STI Testing and its Effects on Clinic Spending

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The United States has an increasing five-year trend in sexually transmitted infection (STI) case openings. To better handle these cases and to reach a cure, intensive research is required. A hindrance for reaching a cure is the unsatisfactory STI vitals sent by clinics. The unsatisfactory vitals also place an additional financial burden on the clinics. With more patients coming, it is not viable to increase the unsatisfactory reports. This research project looks at the causes of the unsatisfactory reports within one Jackson, MS clinic and provides solutions. Primary data was extracted from Open Arms Healthcare Center Clinic. Data consisted of de-identified STI results from 2018 until now. All data was recorded in an excel spreadsheet and transmitted to SPSS for statistical analysis. Analysis consisted of descriptive and financial statistics. Results showed a 58% decrease from 2018 in the number of unsatisfactory results. Primary reasons for unsatisfactory results include: 1) specimens over hemolyzed, 2) specimen remaining in clinic too long, and 3) specimens not identified or labeled properly. Overall over the year, OAHCC managed to decrease the number of repeat tests which in turn increase OAHCC revenue by 78.14%. Research identified the primary factors for unsatisfactory results and insight into human error within the clinical laboratory. Recommendations include, increased staff training on laboratory procedures and policies as well as processes for transporting laboratory specimens. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

B46 Differentially expressed genes in varroa mite *Varroa destructor* throughout its various parasitical phases

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The varroa mite, *Varroa destructor,* is a major ectoparasite of the honey bee *Apis mellifera* that causes significant colony losses and is a vector of many bee viral diseases. Varroa females undergo two biological phases; reproductive and phoretic phases. The reproductive-phase mites feed on the bee brood, while the phoretic females feed on adult bees. We collected a total of 90 female foundresses and nymphs (reproductive phase) from infested bee brood as well as phoretic females from adult bees using the alcohol wash method. RNA extraction was carried out on all samples and qPCR was conducted to explore the genetic expression of three selenoproteins genes (SELENOS, SELENOT, SELENOTp53) and two antioxidant genes; Superoxide Dismutase 1 gene (SOD1) and the Peroxidase 1 (Pod1). Our results showed that phoretic females feeding on adult bees expressed significantly ($P < 0.001$) higher levels of Sod and Pod1 compared to both nymphs and reproductive females. SELENOS however, was significantly more expressed ($P < 0.01$) in nymphs compared to phoretic and reproductive female mites. The SELENOTp53; a homologue of the selenoprotein T gene (SELENOT), was uniquely more expressed in nymphs compared to both other biological phases. Our data concluded that antioxidant non-selenoprotein genes play more significant role in the gene regulation of female mites when parasitizing on adult bees, while selenoproteins are more required for both nymphs and female mite of the reproductive phase. This finding could have important implication on the ongoing selection effort of candidate genes for varroa mite RNAi control. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institutes of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

B47 Sequential and/or Intermittent Release of Multiple Drugs from Bioerodible Drug Delivery Films

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For patients with psychiatric diseases, adherence to medication schedules, medication errors, and abuse are common issues. Promising new forms of therapy for these patients, such as micro-dosed lysergic acid diethylamide (LSD), where patients receive 10-20% of a full dose every third day, present further drug delivery challenges. Sequential or intermittent release of drugs from an implanted device could ensure long-term drug compliance, automate drug dosing during the life of the implant, and eliminate potential for abuse and medication errors. To this end, we generated polymeric films composed of cellulose acetate phthalate (CAP) and Pluronic F-127 (P) polymers that are capable of co-encapsulating a wide variety of drug molecules. CAPP films form by the non-covalent association of CAP and P polymers, and the films slowly re-dissolve in water via surface erosion to allow controlled drug

release. We generated CAPP films via a slow solvent evaporation method, where CAP and P were dissolved – along with one of three model drugs Fluorescein, Rhodamine B, and Ketoprofen – in acetone and left to dry at 4 degrees Celsius. Drug release profiles were quantified from single layer devices to establish the connection between film thickness and drug release rate. Based off release profiles generated from the analysis of single layer devices, multilayered devices were fabricated to achieve controlled, intermittent release of the model drugs. We found that the multilayered devices could successfully release fluorescein and rhodamine in sequential order with a delay of 48 hours between release. To further tailor the films, polymer concentration, layer order, and encapsulated drugs can be varied in a modular manner. Thus, CAPP films are a promising technology for long-term, sequential and/or intermittent release of psychiatric agents from an implantable device, and the device will be further optimized to achieve ideal release profiles for the micro-dosing of LSD in patients with treatment-resistant depression.

B48 T Cell Inhibition During Pregnancy Prevents Post-Partum Anxiety-Like Behavior in Rats With A History Of Severe Preeclampsia/HELLP Syndrome

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Severe preeclampsia and Hemolysis elevated liver enzyme low platelet (HELLP) syndrome, are potentially life-threatening conditions with high maternal mortality and morbidity. During pregnancy these women have hypertension, increases in inflammatory cytokines, blood brain barrier (BBB) permeability and increased T cells. During the post-partum period these women are reported to be at an increased risk of developing psychological disorders such as post-traumatic stress disorder (PTSD). We have recently shown that T cell suppression to experimental HELLP rats during pregnancy attenuates inflammation, BBB permeability and hypertension. As T cells have been implicated in contributing to behavioral abnormalities, *we hypothesized that T cell reduction during pregnancy to rats with HELLP could decrease the occurrence of anxiety-like behavior in the post-partum period.* On gestational day (GD) 12, mini-osmotic pumps infusing sFlt-1 and sEng were placed into rats to induce HELLP syndrome (n=28). A subset of HELLP rats (n=13) received 2mg/kg of Orencia (Abatacept) on GD13 and all rats had their mini-osmotic pumps removed 12-24hrs post-delivery to remove the source of sFlt-1 and sEng. Rats without mini-osmotic pumps served as normal pregnant (NP; n=14) controls. Beginning in the 4th post-partum week rats underwent testing in marble burying, elevated plus maze (EPM) and locomotor activity. Mean arterial pressure was measured between postpartum day 46-48, tissue and plasma collection or Evan's blue (EB) infusion to assess BBB permeability. Post-partum HELLP rats buried significantly more marbles compared to NP (61.4 vs 38.9%; p=0.01) and HELLP+O rats (34.7%; p=0.05). HELLP rats also spent significantly more time in the closed arms of the EPM compared to NP (170.9 $\pm$ 14.1 vs 103.2 $\pm$ 16.6sec; p=0.009) and HELLP+O rats (108.7$\pm$ 20.4sec; p=0.02). HELLP rats traveled a greater distance in the open field compared to NP (2571 $\pm$ 219.2 vs. 1777 $\pm$ 219.7cm; p=0.02) and HELLP+O (1560 $\pm$ 166.6cm; p=0.03). Rats with a history of HELLP syndrome had increased BBB permeability in the brainstem compared to NP rats (1.8 $\pm$ 0.5 vs 0.58 $\pm$ 0.1 (pg/g EB tissue)/µg/mL EB plasma; p=0.04), however this was reversed by treatment with Orencia (0.48 $\pm$ 0.13 (pg/g EB tissue)/µg/mL EB plasma; p=0.03). HELLP rats had significantly more circulating $CD4^+$ T cells compared to NP rats (5.3 vs 2.18%; p=0.02). Similar results were seen in the liver where HELLP rats had significantly more hepatic $CD4^+$ T cells compared to NP rats (2.9 vs 0.53%; p=0.03). HELLP rats had a significant increase in hepatic levels of IL-6 (4.2 $\pm$ 0.44 vs 2.7 $\pm$ 0.49pg/mg/mL; p=0.04) and IL-1beta (31.9 $\pm$ 3.08 vs 21.9 $\pm$ 3.1pg/mg/mL; p=0.04) as well as increased sFlt-1 (128.9 $\pm$ 13.4 vs 76.8 $\pm$ 13.9pg/mg/mL; p=0.02) compared to NP rats. There were no statistically significant changes between the groups in plasma levels of these proteins. HELLP rats had significantly increased MAP compared to NP (136.8 $\pm$ 4.9 vs 115.3 $\pm$ 7.4mmHg; p=0.02) and HELLP+O rats (117.2$\pm$4.7 mmHg; p=0.01). These results suggest that HELLP syndrome during pregnancy contributes to an increase in anxiety-like behavior, BBB permeability, liver inflammation, increased $CD4^+$ T cells and hypertension in the post-partum. The current results suggest that T cell suppression during pregnancy can also help prevent chronic hypertension and increased anxiety in the post-partum period.

B49 The Animal Behavior Core (ABC) of the COBRE Center for Psychiatric Neuroscience (CPN) at University of Mississippi Medical Center

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The final common pathway of all CNS activity is the behaving organism. Moreover, behavior is plastic, changing during development, in response to the environment and in response to disease states. Dissecting and analyzing behavior over an animal's lifetime requires observation at levels ranging from simple component behaviors such as sensation to integrated

behavioral processes like learning and memory. This range of observation requires customized facilities, equipment considerable technical expertise. The ABC was created by the CPN to serve the needs of researchers at UMMC and other facilities address these needs. Mission. The mission of the ABC is to improve the scope and competitiveness of functional CNS research at UMMC, COBRE and INBRE facilities in Mississippi by providing researchers with: 1) the tools and assistance to identify and monitor animal behavior across species; 2) training in state-of-the-art techniques in the analysis of behavior and; 3) assistance with the interpretation and presentation of data and results relating to behavior. Services. The ABC provides a centralized base of physical space, equipment, expertise and protocols for investigators seeking functional behavioral measures of CNS activity under normal and pathological conditions. It provides investigators with the means to phenotype animal behaviors under a variety of treatments and conditions. Support Provided. Investigators have the option to contract with the ABC to conduct specific procedures themselves using ABC facilities or utilize the support of ABC technical staff on a fee for service basis. Contact information at https://www.umc.edu/Research/Centers-and-Institutes/External-Designation-Centers/Center-for-Psychiatric-Neuroscience/Core-Resources/Animal-Behavior-Core.html. Supported by P30 GM103328 and the University of Mississippi Medical Center.

B50 Abiotic and biotic stresses induce the expression of glycine-rich proteins in the lone-star tick *Amblyomma americanum*

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Ticks are disease vectors spreading deadly pathogens to thousands of people annually. The lone-star tick *Amblyomma americanum* is a significant health concern in the US, given its expanding geographic range and vector competence for disease such as *Ehrlichia chaffeensis*, *Borrelia lonestari*, *Ehrlichia ewingii*, *Francisella tularensis*, *Theileria cervi* and heartland virus. *A. americanum* has recently been associated with delayed anaphylaxis to red meat and is the first recorded example of an ectoparasite causing food allergy in the United States. Tick feeding requires the secretion of a huge number of pharmacologically dynamic proteins and other molecules which are vital for the formation of cement cone, the establishment of the blood pool and to counter against the host immune response. Glycine rich proteins (GRPs) are found in several organism and serve variety of functions such as structure and cellular process. Functional characterization of GRPs in tick has not been fully elucidated. GRPs have been found to play direct or indirect role in cement cone formation however new evidences suggests that these GRPs are major players in tick physiology as well as reproductive fitness. In this study, RNA interference approach was applied to decipher their functional role in tick hematophagy, microbial homeostasis, biotic and abiotic stress response and reproductive fitness via silencing differentially and constitutively expressed glycine-rich protein genes during early, mid and late phage of tick feeding. Additionally, the transcriptional regulation of GRPs was determined after exposure to biotic and abiotic stresses including cold and hot temperature, injury, and oxidative stress. This caused a significant up-regulation of AamerSigP-34358, Aam-40766, AamerSigP-39259, and Aam-36909. Our results suggest ticks repurpose these proteins and further functional characterization of GRPs may help to design novel molecular strategies to disrupt the homeostasis and the pathogen transmission.

B51 The Impact of Untreated Traumatic Brain Injuries in Elderly Adults over the Age of 65 over a Three-Month Period of Time

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Bharat R. Narapareddy, MD from ModernMedicine Network reports that elderly adults may not know they are living with a Traumatic Brain Injury, or TBI. In total, approximately 5 million Americans are coping with a Traumatic Brain Injury. According to the Psychiatric Times, the elderly, presuming adults 75 years and older, have experienced some of the highest numbers of injuries that surpass the numbers of infants. 350,000 military veterans were evaluated and correspondingly their mild TBI nearly doubled their risk of dementia diagnosis. The aim of this study is to determine the effects untreated Traumatic Brain Injuries in the elderly. We will determine whether traumatic brain injuries have a detrimental irreversible effect on the body when left undiagnosed over a three-month period. This study will interpret data collected from the at the time of recognition of traumatic brain injuries in elderly ages 65 and older. A recent meta-analysis suggests a correlation between TBI and Parkinson disease. There is still little evidence that traumatic brain injuries are sustained over a period of time longer than five months. Patrick

Cambell's study (2019) speculates that 25% of concussions correlate to visual dysfunction. When the elderly were diagnosed with visual dysfunction due to a concussion related injury, recovery time caused more issues when day to day tasks were performed. When visual dysfunctions occur, recovery time increased an additional two months compared to elderly adults that had not suffered visual imparities. Women were also found to have a higher positive VOMS compared to men (42% compared to approximately 23%).

B52 Examining the Relationships Between Where Mississippian Minorities Prefer to Receive Their Health, Nutrition, and Physical Activity Information and Their Stage of Change for Diet and Physical Activity

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Health knowledge is crucial in addressing preventable chronic diseases, such as diabetes, hypertension and obesity. Although medical professionals are some of the most commonly reported sources of health information, many people receive their information from sources outside of the medical profession. Minorities, particularly African Americans and Native Americans, suffer disproportionately from preventable chronic diseases, have barriers to health care access, and score lower on health care knowledge. For example, in Mississippi, 50% of 82 counties have 10 or fewer primary care providers making health care information from alternative sources even more likely. The purpose of this study is to examine where Mississippi minorities prefer to receive health information, not including health clinics, and its relationship with their stage of change for diet and physical activity and disease status. Participant eligibility included adult (18+) African American (108) and Native American (141) Mississippians who had an average age of 42.84 years. We collected data on the following demographic variables: age, gender, race, and church attendance. Participants were recruited from outreach events conducted at a university and in Mississippi minority communities. Eligible participants completed paper and pencil surveys as well as electronic surveys. Data were collected from surveys analyzed using SPSS 20. Variables included access to alternative sources of health and stages of change for diet and physical activity. Descriptives reported on demographics included race, gender, age, stage of change for diet and physical activity, disease status and preferred sources of health care information. In order to determine the relation between preferred source of health care information and readiness to change diet and activity levels and disease status, a correlation was computed between preferred source of health care information and the dependent variables, stage of change and disease status. Other than a health care clinic, people in this sample prefer to receive health related information from a grocery store (31.7%), retail store (26.9%), worksite (22.2%), church (12.6%), or a barbershop (4.9%). In our study we found that their alternative site preference to receive health related information was not related to stage of change in diet nor physical activity. Our results indicate that a predominantly African American and Native American population mostly prefer the grocery/retail store and worksite as alternative sites to receive health care information. The preference for alternative sites does not seem to relate to readiness to change diet and physical activity behaviors. Future research should examine population differences in relation to alternative site preferences to further identify implications for health outreach.

B53 Understanding the role of Selenogenes in Endoplasmic Reticulum homeostasis in an arthropod vector of Lyme disease

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Tick-borne diseases are a public health issue and they affect people every day. A new tick-borne pathogen, *Borrelia miyamotoi*, has emerged. It is a relapsing fever spirochete that is considered a distant cousin to Lyme Disease agent and has recently been found to cause disease in humans. This pathogen has been found in Ixodid ticks such as *Ixodes ricinus* (Sheep Tick) and *Ixodes scapularis* (black-legged Tick). In humans, *Borrelia miyamotoi* causes recurrent fever, flu-like symptoms, and can also cause more severe illnesses such as meningoencephalitis. Unlike other Borrelia spirochetes, this pathogen can be vertically transmitted, passed from mother to offspring, which allows for the survival of the pathogen for many generations. There is very little to no research on *B. miyamotoi* infection within the tick vector that contribute to the understanding of its molecular mechanism to survive within the

tick host before transmission to the mammalian host. Selenoproteins (Seleno) are an essential line of defense against oxidative stress damage. These are also responsible for a myriad of other functions including Se transport, protein folding, and endoplasmic reticulum-associated degradation (ERAD). To study the molecular determinants of *B. miyamotoi* infection in *Ixodes scapularis*, we used an *Ixodes scapularis* embryonic cell line (ISE6) to study the gene expression of select genes involved in Endoplasmic Reticulum stress. Confluent ISE6 cells were co-cultured with *B. miyamotoi,* oxidative and ER stressors (H_2O_2, paraquat, Thapsigargin, and tunicamycin) for 24 hours. After 24 hours, the cells were harvested, RNA was extracted and multiple Endoplasmic reticulum-associated degradation (ERAD) genes were analyzed using qRT-PCR. Our results show that the chemically induced oxidative ER stress causes upregulation of ERAD and Unfolded Protein Response (UPR) genes similar to the upregulation caused by *B. miyamotoi* infection. In both *B. miyamotoi* infection and chemically induced ER stress, there is significant upregulation of up to a 30-fold increase of ERAD component selenoprotein genes, *SelenoK*, *SelenoM*, *SelenoN*, and *SelenoS*, and UPR genes, inositol-requiring enzyme (IRE1) and activating transcription factor 6 (ATF6). Results will be presented in the context of pathogen survival strategy with its tick host.

B54 Imputation of Genome-Wide Association Study Data Using Autoencoders

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Imputation is the process of replacing missing values in a dataset with an estimate. This estimate can be made using a variety of methods, such as Bayesian principle component analysis, linear regression, Gaussian mixture clustering, and more. In this study, we aim to use autoencoder networks to perform imputation on data from genome-wide association studies (GWAS). This type of data has the potential to identify genes involved in complex human diseases by searching the genome for small variations known as single nucleotide polymorphisms (SNPs). Using these methods, researchers have already been able to identify SNPs involved in a number of complex conditions including Parkinson's disease, Chron's disease, heart abnormalities, and diabetes. In the future, GWAS may provide promising results for the progression of precision medicine since they have the potential to identify SNP variations that affect a person's response to certain drugs or govern the interactions between an individual's genes and their environment. However, the path to accomplishing this is filled with many computational challenges. One of the most prominent challenges is that, due to noise and errors from the experimental process, most GWAS data is plagued with missing values. These holes in the otherwise complete matrix can obscure the complex relationships encoded by the data and decrease its usefulness. Naturally, imputation methods are well-suited for handling this problem. However, since each of these studies can potentially observe thousands of SNPs simultaneously, traditional imputation methods may not be able to take advantage of this large amount of data and the complex correlations encoded within. Therefore, we propose to use deep learning techniques and autoencoders, a type of neural network that automatically learns data representations by training the network to ignore noise, to model these complex relationships and impute the missing values. Currently, our preliminary work with a basic autoencoder architecture based on single omics data has produced promising results. In addition to confronting the challenges of using multi-omics data, our future work will focus on improving these results by optimizing the model's architecture and parameters.

B55 The *Histoplasma capsulatum* Stress-Response Protein Hc*DDR48* Is Involved In Resistance To The Antifungal Drugs Ketoconazole And Amphotericin B

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Histoplasma capsulatum (Hc) is a systemic, dimorphic fungal pathogen. *Hc* grows as a multicellular mold at environmental temperatures (25°C) whereas, upon inhalation into a human or other mammalian host (37°C), it transforms into a unicellular, pathogenic yeast. Our research is focused on characterizing the cellular stress response protein *HcDDR48*. Literature in *C. albicans* has shown that *CaDDR48* is required for optimal survival against the antifungal ketoconazole and amphotericin B. This study aimed to investigate if *HcDDR48* plays a role in antifungal drug resistance in *Histoplasma* as well. In a *ddr48* deletion mutant, we found a 50% decrease in fifty-percent inhibitory concentration (IC_{50}) and minimum inhibitory concentration (MIC) when treated with of

ketoconazole and amphotericin B. Work is underway to construct an *Hc* strain that is over-expressing *HcDDR48* to determine if antifungal resistance increases in a *HcDDR48*-dependent manner.

B56 Pyridine Derivatives as HIV Integrase Inhibitors

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Potential drug targets in AIDS patients are the three unique enzymes in the life cycle of the virus: HIV reverse transcriptase, integrase, and protease. This project aims to develop inhibitors for HIV integrase. An assay has been developed in the Kessl lab to determine the effectiveness of potential HIV integrase inhibitors. The inhibitors are based on aromatic heterocycles with some conserved substituents. A variety of substituents in select positions are introduced via Palladium-coupling reactions, after the heterocyclic core has been established previously. Simple precursors are employed for the synthesis of the heteroaromatic core. For the pyridine core, substituted malonic esters allow for a versatile and easily manipulated building block. The initial cyclization reaction involves an aminocrotonate ester and utilizes the deprotonation of an amide by sodium ethoxide. Subsequent chlorination with $POCl_3$ prepares the heterocycle for further functionalization. The development of the side chain is the focus of this project. Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

B57 Tick Immunity: Understanding *Rickettsia parkeri* infection in *Amblyomma maculatum* tick interactions through innate immunity and redox signaling pathways

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Selenoproteins, incorporated from dietary selenium, plays an important role in immunity and inflammation responses due to its vital role in regulating reactive oxygen species and redox status in almost all tick tissues. Due to its importance, previous studies have been done to show that Selenophosphate synthetase 2 (SPS2), a homologue of Selenophosphate synthetase (SelD) identified in mammals, is essential for selenoprotein biosynthesis. In this study, we hypothesize that silencing of SPS2 will cause an increase in *Rickettsia parkeri* levels in infected *Amblyomma maculatum* ticks. To define the functional role of SPS2 in hematophagy and pathobiome colonization, an RNAi approach was utilized to deplete target genes expression in pathogen infected ticks. The transcriptional expression of target genes was confirmed in the knockdown tissues of SPS2. A significant decrease in replete weight, and a marked increase in distress in the host provided evidence for the critical role of target genes during feeding of knocked down ticks. A qPCR and 16S rRNA diversity assays showed that the gene-silenced ticks had significant increase in *R. parkeri* load than the control, proving that SPS2 play a role in the maintenance of tick pathobiome. In addition to SPS2, another gene that will be looked at is Relish, a homologue of nuclear factor-kappa B (NF-kB), in the immune deficiency signaling pathway, which regulates the expression of Microplusin, an antimicrobial peptide (AMP). Interplay between redox signaling of SPS2 and innate immunity pathways initiated by Relish will be discussed in the context of tick-pathogen interactions.

B58 Screening of CRISPR/Cas9 induced mutations by Restriction Fragment Length Polymorphism

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MicroRNAs (miRNAs) are a group of small non-coding RNA molecules found in multicellular-organisms. miRNAs negatively regulate the production of a specific protein by pairing with and inhibiting translations in the RNA that will produce the proteins. This group is short because it is made up of 22 nucleotides. In this study, we want to investigate a particular miRNA called MiR-107 using a genome editing technology called CRISPR/CAS9 and the common fruit fly, *Drosophila melanogaster*. This type of technology is a precise and facile technology that researchers use to edit genomes by induction of double strand breaks in a targeted DNA sequence. We designed the gRNA sequence and the repair template that would generate two class of mutants. The first, with two SNPs within its seed sequence and the other with deleted seed sequence. We are using recombination immediate repairs to reconstruct the base pairs. Once the flies became adults, we crossed with a balancer stock. When the new embryos became older,

we began a process called Restriction Fragment Length Polymorphism (RFLP). During this time of the project, we used Polymerase Chain Reaction (PCR) and digestion to screen the flies to see if they have the desired mutation that we were seeking. Once we get the results, we will be able to determine that miR-1017 will expand the lifespan of the *Drosophila melanogaster* instead of reducing it.

B59 Effects of User Interface Modification on User Nutrition Reporting

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Previous research has investigated self-report dietary assessment methods such as 24-hour recalls and food diaries. However, there is growing interest in using mobile technology for dietary assessment. The primary purpose of the study was to examine how changes in user interface could affect the way food log application users input food entries. The study was conducted using the food log portion of the chronic disease management platform Bridge2U. Participants for this study were randomly assigned to two groups. Group 1 was given the food log application in its default form, which contained a meal diary, a meal shopping cart with a food search bar, and a portion selection form with a display showing the nutrition information for the selected food item and portion size. Group 2 received the same application except the nutrition information display was hidden, which made nutrition information unavailable at the time of food selection. The secondary purpose of the study was to examine how the nutrition information display affected decision-making time for food logging and number of calories logged. The investigators hypothesized that the presence of nutrition information would increase decision-making time and cause participants to report fewer calories. For the sake of observation, the participants swapped conditions after three days of food entry. The results indicated that participants decreased the time needed to enter nutrition information day by day whether nutrition information was available or not at the start of entry. The reported research fills a gap in the literature to identify how the presence of nutrition information in food log apps may bias actual foods logged by users. More research is needed to examine the factors that influence nutrition reporting using mobile food logs.

B60 Contribution of exopolysaccharide pathways to the biofilm formation and fitness of *Pseudomonas synxantha* 2-79 under water stress

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Wheat grown in the low-precipitation areas of the Pacific Northwest supports large populations of phenazine-producing (Phz+) rhizobacteria. These beneficial microorganisms colonize plant roots and control *Rhizoctonia solani*, a ubiquitous soilborne fungal pathogen of cereal crops. Previous studies revealed that the abundance of Phz+ rhizobacteria is inversely related to irrigation, suggesting that these organisms are naturally adapted to arid soils. However, the molecular basis behind this phenomenon is currently unknown. In this project, we used *Pseudomonas synxantha* 2-79 as a model to study the contribution of capsular exopolysaccharides (EPS) to the fitness of Phz+ rhizobacteria under water stress. The annotation of 2-79 genome revealed the presence of pathways for the synthesis of three EPSs: alginate (*alg*), the aggregative polysaccharide Psl (*psl*), and a potentially novel exopolysaccharide (*eps*). We fused promoters of these pathways to *gfp* and demonstrated that *alg*, *psl*, and *eps* genes are induced under water-stressed conditions. We also tested isogenic mutants and demonstrated that although the EPSs minimally affect biofilm formation, they provide a crucial contribution to the ability of 2-79 to tolerate desiccation. Our findings will help to understand better how beneficial rhizobacteria maintain physiological activity and interact with their plant hosts under conditions of drought stress. This work was supported by the NSF award IOS-1656872 and Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

B61 Racial differences associated with risk factors and prevalence of hypertension at OAHCC

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The prevalence of hypertension and its consequences remain high in the African American population which are associated with higher rates of sickness. Particularly in Mississippi, over 700,000 residents have hypertension and thousands more are at risk. The objective of this study is to investigate patients with hypertension at Open Arms Healthcare Center (OAHCC), describe commonly prescribed medication, examine demographics, and analyze correlation of patient's body mass index (BMI).This study used an electronic medical record review (EHR) of records from OAHCC within a two year period between January 1, 2016 to December 31, 2018. Charts were reviewed for hypertension, medication, and BMI. Descriptive analysis provided information about the hypertensive patient population at Open Arms. Data was analyzed using SPSS version The EHR data revealed of the 2,237 patients receiving BHU (Becoming a Healthier U) services, 5% were found to be hypertensive. Descriptive analysis was used to describe the population, age, gender, race/ethnicity, and BMI. Of the104 patients identified with hypertension aging 18-64, 76 patients were prescribed hypertension medication, and 30.3% were prescribed multiple hypertensive medications. The most common individually prescribed medications were Hydrochlorothiazide (22.4%), Lisinopril (17.1%), and Amlodipine (17.1%). Also, it was found that Amlodipine was more commonly prescribed to females and Hydrochlorothiazide was more prevalent with males. BMI was examined and it revealed that 41.3% of the patients were obese, 28% were overweight, and 17.3% were extremely obese. This research aids in enhancing awareness of hypertensive patients, commonly prescribed medications, and correlation between obesity and hypertension OAHCC. The BHU program is a useful service that provides sexual health screening along (STI's and STD's) with typical clinic testing (blood pressure, blood glucose, etc) to patients. One of its main goals is to link individuals to necessary support services. With only 5% being diagnosed with hypertension from the patients that receive BHU services, it is very likely that majority of BHU patients are unaware that they may have hypertension, which allows this study to report the prevalence of chronic disease at OAHCC. Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

B62 Microbubble-Mediated Delivery of Human Adenoviruses does not Elicit Innate and Adaptive Immunity Response in an Immunocompetent Mouse Model of Prostate Cancer

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Gene transfer to malignant sites using human adenoviruses (hAds) has been limited because of their immunogenic nature and specificity. Murine cells lack some of the receptors needed for hAds attachment, thus murine cells are generally non-permissive for hAds infection and replication, limiting translational studies. We have developed a gene transfer method using lipid-encapsulated perfluorocarbon microbubbles (MBs) and ultrasound to protect and deliver hAds to a target tissue, bypassing the requirement of specific receptors. In an in vitro model, murine TRAMP-C2 and human DU145 prostate cancer cells displayed a comparable expression pattern of receptors involved in hAds adhesion and internalization. We also demonstrated that murine and human cells showed a dose-dependent increase in the percentage of cells transduced by hAd-GFP after 24-hours and that GFP-transgene was efficiently expressed at 48- and 72-hours post-transduction. To assess the protection of the hAds within our microbubble delivery system in vivo, we injected healthy immunocompetent mice (C57BL/6) or mice bearing a syngeneic prostate tumor (TRAMP-C2) with hAd-GFP/MB complexes. Notably, we did not observe activation of innate or adaptive immune response. This study begins to demonstrate the feasibility of murine cancer models to investigate the clinical translation of adenoviral gene therapy by Ultrasound-Targeted Microbubble Destruction.

B63 Banana Peel Extract: Amyloid Beta Peptide and Behavior in DNA

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Quadruplex forming sequences in telomeric DNA and promoter regions of oncogenes are related with tumorogenesis. Stabilizing these unusual tetraplex structures in DNA can prevent tumor cell proliferation, which have been regarded as potential pathways for cancer therapy. In our previous studies we have proved plant flavonols as useful G4/C4 binders. In the present study, we have prepared an isopropanol extract from banana peel (BE) and performed a comparative study on the binding of BE and a flavonol morin with G4/C4 using steady state absorption, fluorescence, circular dichroism and size exclusion chromatography (SEC)

measurements. Two complementary G4 and C4 single stranded oligonucleotide along with the duplex (made by hybridizing the G4/C4) were used. We noticed that in C18 HPLC the retention time of BE and morin are the same, indicating similar sizes of the two. BE shows significant solvent dipolar relaxation when studied in solvents of different polarity. BE also exhibits excited state intra-molecular proton transfer (ESPT) similar to common flavonol-like fisetin. We extended our studies on G4/C4 in the presence of nicotine (NIC), which is a potent oxidative stress inducer. BE and morin exhibited different characteristics in the presence of NIC. We observed BE as a better extrinsic probe than morin. Dynamic light scattering (DLS) studies determined the size of DNA molecules in bound and free states. Further studies using NMR and FTIR are underway. We are extending this study in beta peptides. This work was supported by: NSF-RIA award 1800732 (PI), NSF-TIP award 1818528 (co-PI) Institutional Development Award (IDeA) from the NIGMS under grant number 20GM103476 (seed grant PI).

B64 Garlic Presents a Possibility in the Management of Acute Promyelocytic Leukemia

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Garlic supplementation in diet has been shown to be beneficial to cancer patients. Recently, its pharmacological role in the prevention and treatment of cancer has received increasing attention. However, the mechanisms by which garlic extract induces cytotoxic effects in cancer cells remain largely unknown. The present study was designed to use HL-60 cells as a test model to determine whether garlic treatment induced toxicity to human leukemia cells is mediated through oxidative stress. Human leukemia (HL-60) cells were treated with different concentrations of garlic extract for 24 hr. Live and dead cells was determined by trypan blue exclusion test and microscopic imaging. The role of oxidative stress in garlic toxicity was assessed by lipid peroxidation, glutathione peroxidase (GPx) and catalase (Cat) assays, respectively. Oxidative stress biomarkers showed significant increase ($p < 0.05$) of malondialdehyde levels on one hand and gradual decrease of antioxidant enzyme activity (GPx & Cat) on the other hand with increasing garlic doses. Taken together, finding from the present study demonstrates that at therapeutic concentrations, garlic treatment induced cytotoxic effects through oxidative in HL-60 cells. Keywords: Garlic, HL-60 cells, trypan blue Test, oxidative stress, microscopic imaging. Acknowledgments. This research work was supported in part by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476; and in part by the National Science Foundation under grant number NSF-1826699 at Jackson State University and Hinds Community College.

B65 Trends in Major Risk Factors for Cardiovascular Disease Among Adults Age 55+ in the Mississippi Delta Region

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The Mississippi Delta region covers about 11,000 square miles of the northwest part of the state, between the Mississippi and Yazoo rivers. The population is 554,754, with 49.7% of residents being black and 46.9% being white. The Mississippi Delta has been recognized for its recurrent poor health outcomes and has some of the most profound disparities in cardiovascular health in the state and the nation. The primary researchers from this project used the Behavioral Risk Factor Surveillance System (BRFSS). Using the BRFSS, primary researchers conducted a Longitudinal study design from 2001 to 2010 on 11,978 participants in the Mississippi Delta. They investigated using self-reported data in prevalence of high blood pressure, high cholesterol, diabetes, obesity, physical inactivity and current smoking. For our study, as secondary researchers, we focused on The Transtheoretical Model, also integrating a nonexperimental evaluation design with logistic regression analysis. This was used to test for change over time in the prevalence of high blood pressure, high cholesterol, diabetes, obesity, physical inactivity and current smoking. Overall, the researchers were able to conclude that from the years 2001 to 2010, there was a significant increase in the prevalence of high cholesterol, diabetes, and obesity in the Mississippi Delta, which includes the Yazoo County with significant risk factors for cardiovascular disease.

B66 Simple Anthropometric Biomarkers of Complex Body Composition as Predictors of Cardiovascular Risk Among African-Americans

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This retrospective observational study included non-enhanced abdominal CTs from adult African Americans (AAs) (N=2006) in an effort to correlate anthropometric biomarkers to CT body-fat composition with the goal to predict CVD risk. Anthropometric measures of waist circumference (WC) and sagittal abdominal diameter (SAD) were measured. Using a multi-layer segmentation software, regional fat volumes and abdominal skeletal muscle including psoas, paraspinal and abdominal wall were also measured. Visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT) were separated in abdominal adiposity. Additional, superficial (sSAT) and deep (dSAT) SAT were distinct anatomic regions. Correlations were examined using linear regression models. Inter-observer variability between two readers was assessed in a random 20% of the full cohort (n=300). SAD and WC were directly proportional with VAT and SAT. A linear relationship between SAD and VAT was significant (R^2=0.58, 0.76, p<0.001). However, the strongest correlation was found between WC and SAT (R^2=0.79, 0.89, p<0.001). There was excellent inter-observer agreement for all parameters (ICC>0.96, 95% CI). VAT is a critical biomarker of obesity-related CVD; however, its calculation takes >35 min/subject on cross-sectional images. SAD and WC showed strong associations with VAT and SAT, respectively. This data supports anthropometric biomarkers use in stratifying cardiometabolic risk in AAs.

B67 Detecting Breast Cancer from Histopathological Images Using Transfer Learning

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As one of the most prominent public health issues, breast cancer continues to wreak havoc and carries some of the highest morbidity rates seen among worldwide cancer diagnoses. Although early diagnosis is an arduous task that depends on the experience of pathologists, it can help to ameliorate some of this morbidity by increasing the chance of successful treatment and survival. Fortunately, the early diagnosis process can be streamlined by performing automatic diagnosis of breast cancer via analysis of histopathological images. Predictions made using such methods can have a great impact on patient survival rates at this stage. However, traditional feature extraction methods fall short of being able to accomplish this, as they generally can only extract low-level image features instead of complex, abstract features. As a result, these traditional methods are greatly dependent on the prior knowledge and manual feature selection skills of humans. On the other hand, deep learning techniques can extract informative features from images automatically. Models trained with deep learning can learn high-level abstract representations of images. Therefore, we have utilized supervised and unsupervised deep learning techniques to analyze histopathological images of breast cancer in the BreaKHis dataset (containing 7,909 images). Specifically, we used models based on deep convolutional neural networks known as Inception_V3 and Inception_ResNet_V2. First, we used transfer learning techniques to adapt the Inception_V3 and Inception_ResNet_V2 architectures to distinct binary and multi-class problems within histopathological breast cancer image classification. Then, we used image augmentation techniques to mitigate the influence of imbalance in the subclasses. We compared our experimental results for supervised breast cancer image classification to results available from other studies. This demonstrated that Inception_V3 and Inception_ResNet_V2 based breast cancer histopathological image classification is superior to the existing methods that we have found. Furthermore, these findings show that the Inception_ResNet_V2 network is the best deep learning architecture that we have found for performing diagnosis of breast cancers by analyzing histopathological images, especially on the augmented dataset.

B68 Versatile surface functionalization of water-soluble monodisperse iron oxide nanoparticles

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Ultrasmall iron oxide nanoparticles (IONPs) gain intensive attention because of high potential for T1 weighed magnetic resonance imaging (MRI). In this study, ultrasmall IONPs with function groups were successfully synthesized via one-pot synthesis by first thermal decomposition of iron acetylacetonate $Fe(acac)_3$ precursor in diethylene glycol (DEG), followed by mixing the surface

ligands at the end of the reaction. This facile synthesis method enabled binding of different surface coating materials such as dopamine hydrochloride (DOPA), polyethylene glycol with thiol end group (thiol-PEG), and polyacrylic acid (PAA) onto the IONPs, introducing new surface functionalities for possible future application. The size growth of IONPs can be well controlled as evidenced by TEM studies. The stability of nanoparticles was correlated with the change of hydrodynamic size and zeta potential. While TEM results showed no significant change in the nanoparticles core size before and after surface modification, hydrodynamic size slightly increases due to the presence of ligands molecules on the surface. The attachment of surface ligands was studied by FTIR and TGA. In addition, we explored the potential of further introducing new functionalities on the surface modified-IONPs by bioconjugation of fluorescence cationic dyes, The effect of surface ligands on the relaxivity of IONPs (r_1 and r_2) were also studied. The r_2/r_1 slightly reduced after surface modification for IO-PEG and IO-PAA. The r_2/r_1 ratio for IO-DOPA greatly increased due to the high HD size and strong aggregation. Acknowledgement: This work was partially supported by an MS INBRE curriculum development grant from the NIGMS under grant number P20GM103476-17.

B69 Implicating Ribonuclease in Mammalian Tailed Mirtron Biogenesis

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Mirtrons are small RNAs which bypass Drosha cleavage and they are classified in three categories of 5' –tailed, 3' –tailed and conventional. Though many tailed mirtrons have been recognized in recent years, their biogenesis particularly removal of tail residues have not been studied well. This is due to low abundance of these small RNAs and absence of an experimental system to directly examine their expression. In this study, we have focused on biogenesis of two tailed mirtrons miR-668 (mouse 3') and miR-5010 (human 5'). After detecting the expression of the two mirtrons in HEK cells, different constructs of the mirtrons were transfected and RNA sequencing was performed. The reads demonstrated that Endo and exoribonucleases are involved in trimming the miR-5010 and miR-668, respectively. All reads illustrate high frequency of untemplated nucleotide reads at the 3' end. Later, we can incubate the radio-labeled in vitro transcribed miR-5010 & miR-668 with nucleases to check whether they are involved in their biogenesis pathway or not.

B70 Antiviral RNA interference in mouse embryonic stem cells is virus-dependent

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Differentiated somatic cells in vertebrates mainly use the protein-based interferon (IFN) system as innate immunity against viral infection. Since the IFN system is underdeveloped in mouse embryonic stem cells (mESCs), we studied whether RNA interference (RNAi) serves as an alternative antiviral defense mechanism in these cells. RNAi is the predominant antiviral defense system in non-vertebrate animals and other eukaryotes, but evidence for RNAi in mammalian cells is controversial. RNAi uses short interfering RNAs derived from processing of viral double stranded RNA intermediates by the cytoplasmic RNaseIII enzyme dicer to limit viral infection. In order to test whether RNAi is functional in mESCs, we used dicer knockout (DKO) mESCs and an IFNβ-neutralizing antibody to negate RNAi and IFN systems (respectively) in mESCs. When challenged with Chikungunya virus (ChikV), DKO mESCs were less susceptible to viral infection compared to wild-type mESCs. This seems to be due to an increased basal level of IFNβ in DKO mESCs, as the IFNβ-neutralizing antibody increased the susceptibility to ChikV infection. RNAi hence did not have any role against ChiKV infection in mESCs. However, upon infection with La Crosse virus (LACV), DKO mESCs were found to be more susceptible than wild-type mESCs, and the IFNβ-neutralizing antibody did not have any effect on susceptibility, suggesting that RNAi could be an antiviral defense mechanism against LaCV infection. Our results indicate that RNAi as an antiviral mechanism in mESCs could be virus-dependent.