BIG IDEAS FOR IMPROVING THE LIVES OF MISSISSIPPIANS

2018 Mississippi IDeA Conference

Index

Big IDeAs for Improving the Lives of Mississippians
2018 Mississippi IDeA Conference
Agenda

July 27, 2018 | The Westin Jackson

7:30-8:00 a.m. **Registration**

8:00-9:30 a.m.
Student Mentoring Breakfast
Moderator: Dr. Janet Donaldson, USM
Jackson Ballroom I & II

9:30-10:45 a.m.
Scientific Session I:
Obesity & Cardiometabolic Diseases
Natchez Ballroom

9:30-10:45 a.m.
Scientific Session II:
Cancer
Jackson Ballroom III & IV

10:45-11:00 a.m. **Break**

11:00-12:15 p.m.
Scientific Session III:
Neuroscience
Natchez Ballroom

11:00-12:15 p.m.
Scientific Session IV:
Infectious Disease/Immunology
Jackson Ballroom III & IV

12:15-1:15 p.m.
Lunch
Jackson Ballroom I & II

1:15-2:30 p.m.
Scientific Session V: Community Health & Health Care Disparities
Natchez Ballroom

1:15-2:30 p.m.
Scientific Session VI:Integrating Omics Technology & General Biomedical Sciences
Jackson Ballroom III & IV

2:30-2:45 p.m. **Break**

2:45-3:45 p.m.
Student Engagement & Career Development
Lauren Celano, Propel Careers | Natchez Ballroom

2:45-3:45 p.m.
Community Engagement Interest Group
Jackson Ballroom I & II

3:45-4:00 p.m. **Break**

4:00-5:00 p.m.
Keynote Speaker, Dr. Joey P. Granger, UMMC
Jackson Ballroom I & II

5:00-6:30 p.m.
Poster Session
Natchez Ballroom & Oxford Room

6:30-8:00 p.m.
Banquet
Jackson Ballroom

Student Engagement & Career Development Speaker

Lauren Celano

Founder & CEO
Propel Careers

In this presentation, Lauren will discuss the variety of career paths available to scientifically trained individuals in areas such as academia, government, industry and non-profits. She will provide advice on questions that everyone should ask themselves in order to identify the right type of role and organization aligned to your values, interests, and experience. She will provide advice on how to think about and plan your "career path" and how to incorporate proactive career development. She will provide tips to identify organizations as well as share insight about the "hidden" job market. She will also provide insights on how to build your brand and how to highlight your skills, accomplishments, and experiences in a resume, cover letter and during an interview. Lastly, she will provide tips for how to develop your network to help you grow and succeed in your professional career.

Session Chair: Dr. Glen Shearer
Professor, Department of Biological Sciences
Director of Student Engagement and Career Development, Mississippi INBRE
The University of Southern Mississippi

Keynote Speaker

Dr. Joey P. Granger

Billy S. Guyton Distinguished Professor
Professor of Physiology and Medicine
Director of the Cardiovascular-Renal Research Center
Dean of the School of Graduate Studies in Health Sciences
University of Mississippi Medical Center

Joey P. Granger is the Billy S. Guyton Distinguished Professor, Professor of Physiology and Medicine, Director of the Cardiovascular- Renal Research Center, and Dean of the School of Graduate Studies in the Health Sciences at the University of Mississippi Medical Center in Jackson, MS. He earned his doctorate from Arthur C. Guyton's Physiology Department at the University of Mississippi Medical Center and where John E. Hall served as his Ph.D. mentor. He received his postdoctoral training in physiology in the laboratory of Franklyn G. Knox at the Mayo Clinic from 1983–1985. He was appointed Assistant Professor of Physiology at Mayo Medical School in 1985. In 1986, he joined the faculty of the Department of Physiology at Eastern Virginia Medical School. In 1990, he moved back to the University of Mississippi Medical Center.
Granger's research has focused on the role of the kidneys in the pathogenesis of hypertension. His early research examined the importance of renal interstitial hydrostatic pressure in mediating renal pressure natriuresis. He also examined the importance of atrial natriuretic peptide (ANP) in long-term control of sodium balance and arterial pressure. He demonstrated that ANP had potent actions on the renin-angiotensin system and that chronic physiological elevations in plasma ANP produced long-term improvement in renal pressure natriuresis and reductions in arterial pressure. His later work investigated the role of the renal endothelin and nitric oxide systems in various models of salt-sensitive hypertension. His current research focuses on the role of endothelial and neurohormonal factors in mediating hypertension in animal models of pregnancy-induced hypertension or preeclampsia. Utilizing the RUPP (Reduced Uterine Perfusion Pressure) model of placental ischemia, which was developed by the Granger laboratory, they demonstrated that placental ischemia in the pregnant rat has many of the features of preeclampsia in women. They are currently using this model for the investigation of the mechanisms linking placental ischemia and cardiovascular dysfunction in preeclampsia and for identifying potential drug targets for the treatment of preeclampsia. His laboratory has been continuously funded by R01 and/or P01 mechanisms from the National Heart, Lung and Blood Institute (NHLBI) since 1985. Granger also currently serves as the principal investigator of a NHLBI Institutional Training Grant entitled "*Hypertension and Cardiorenal Diseases Research Training Program*".

Granger also served as President of the American Physiology Society in 2012 and currently serves as Chair of the AHA Council on Hypertension (COH) and on the Leadership committee of the Inter-American Society of Hypertension. He has served on numerous COH committees including as Chair of the Harry Goldblatt Award Selection Committee, Chair of Hypertension Summer School Organizing Committee, Chair of Awards Committee, Vice Chair Trainee Advisory Committee. He also served as a member of the Professional Education Committee, Liaison Member for Basic Science Council, Publications Committee, and Strategic Planning Committee He also served on scientific study sections for the American Heart Association, National Institutes of Health, NASA, and the Veterans Administration. He recently served as chair of the Hypertension and Microcirculation NIH study section. He also served on the National Board Medical Exam Physiology Test Development Committee. He has authored or co-authored over 280 peer-reviewed publications. Granger is currently an Associate Editor for Hypertension and serves as Co-Editor with his brother, Neil Granger, on the eBook series entitled Integrative Systems Physiology. He served as the Editor of the Council for High Blood Pressure Newsletter and an Associate Editor for News in Physiological Sciences and American Journal of Physiology: Regulatory and Integrative Physiology. He is serving or has served as a member of Editorial Boards of American Journal of Hypertension, American Journal of Physiology: Renal Physiology, American Journal of Physiology: Regulatory and Integrative Physiology, Journal of CardioMetabolic Syndrome and the Journal of the American Society of Hypertension.

Granger has received several awards including the 2010 American Heart Association Distinguished Scientist Award, American Physiological Society 2008 E.H. Starling Distinguished Lecture Award, American Physiological Society 2008 Bodil M. Schmidt-Nielsen Distinguished Mentor and Scientist Award, Dahl Memorial Lecture of the American Heart Association, American Society of Hypertension Young Scholar Award, the International Society of Hypertension Demuth Research Award, Inter-American Society of Hypertension Young Investigator Award, the Regulatory and Integrative Physiology Young Investigator Award of the American Physiological Society Water and Electrolyte Section, the Harold Lamport Award of the Cardiovascular Section of the American Physiological Society, the Henry Pickering Bowditch Lecture of the American Physiological Society, and the Established Investigator Award of the American Heart Association.

Session Chairs and Speakers

9:30-10:45 a.m.
Scientific Session I:
Obesity & Cardiometabolic Diseases
Natchez Ballroom

Chair: Dr. James Wilson, UMMC

9:30-9:35 AM	Welcome
9:35-9:50 AM	Dr. Allen Crow, MSU
9:50-10:05 AM	Erika Guise, UMMC
10:05-10:20 AM	Dr. Carol Connell, USM
10:20-10:35 AM	Dr. Michael Ryan, UMMC

9:30-10:45 a.m.
Scientific Session II:
Cancer
Jackson Ballroom III & IV

Chair: Dr. Pier Paolo Claudio, UM
Dr. Yin-Yuan Mo, UMMC

9:30-9:35 AM	Welcome
9:35-9:50 AM	Dr. Kris Reiss, LSU
9:50-10:05 AM	Dr. Flavia De Carlo, UMMC
10:05-10:20 AM	Elliot T. Varney, UMMC
10:20-10:35 AM	Dr. David Pasco, UMMC

11:00-12:15 p.m.
Scientific Session III:
Neuroscience
Natchez Ballroom

Chair: Dr. Nicole Ashpole, UM

11:00-11:05 AM	Welcome
11:05-11:20 AM	Dr. Vijay Rangachari, USM
11:20-11:35 AM	Dr. Russell Carr, MSU
11:35-11:50 AM	Dr. Jason Paris, UM
11:50-12:05 PM	Dr. Lais Berro, UMMC

11:00-12:15 p.m.
Scientific Session IV:
Infectious Disease/Immunology
Jackson Ballroom III & IV

Chair: Dr. Stephen Pruett, MSU

11:00-11:05 AM	Welcome
11:05-11:20 AM	Dr. Fengwei Bai, USM
11:20-11:35 AM	Moses Ayoola, MSU
11:35-11:50 AM	Daniel Kennedy, MSU
11:50-12:05 PM	Dr. Keun Seok Seo, MSU

1:15-2:30 p.m.
Scientific Session V: Community Health &
Health Care Disparities
Natchez Ballroom

Chair: Dr. June Gipson, My Brother's Keeper, Inc.

1:15-1:20 PM	Welcome
1:20-1:35 PM	Dr. Jennifer Lemacks, USM
1:35-1:50 PM	Dr. Charles Chima, UMMC
1:50-2:05 PM	Dr. Michelle Williams, UMMC
2:05-2:20 PM	Sandra Melvin, OAHCC

1:15-2:30 p.m.
Scientific Session VI:Integrating Omics
Technology & General Biomedical Sciences
Jackson Ballroom III & IV

Chair: Dr. Michael Garrett, UMMC

1:15-1:20 PM	Welcome
1:20-1:35 PM	Dr. Eric Vallender, UMMC
1:35-1:50 PM	Dr. Lianna Li, Tougaloo College
1:50-2:05 PM	Dr. Alex Flynt, USM
2:05-2:20 PM	Dr. Hung-Chung Huang, JSU

Scientific Session I: Obesity & Cardiometabolic Diseases

Chair: Dr. James Wilson, University of Mississippi Medical Center

9:30-9:35 a.m. **Welcome**

9:35-9:50 a.m. **"The Relationship of Paraoxonase and Cardiometabolic Diseases"**
Dr. Allen Crow, Mississippi State University

9:50-10:05 a.m. **Novel therapeutic strategies for renovascular disease**
Erika Guise
University of Mississippi Medical Center, Department of Physiology & Biophysics

Chronic renovascular disease (RVD) is the main cause of renovascular hypertension, significantly increases cardiovascular morbidity and mortality, and can significantly deteriorate renal function, greatly increasing the risk of developing chronic kidney disease. RVD is most commonly caused by an atherosclerotic obstruction in the renal artery and renal angioplasty (PTRAs) is frequently performed in patients to successfully resolve this obstruction. However, damage to the renal microvessels beyond the vascular obstruction persists in more than half of these patients despite PTRAs treatment, furthering renal function deterioration and failing to improve cardiovascular risk or hypertension. This lack of success highlights the pressing need for more efficient therapeutic strategies.

Our studies focus on developing therapeutic strategies that target the microvasculature (MV) beyond the vascular obstruction to recover renal function in a translational swine model of RVD. We have demonstrated the feasibility of administering vascular endothelial growth factor (VEGF), an angiogenic cytokine that is key to maintaining microvascular networks everywhere in the body, with an elastin-like polypeptide (ELP) carrier. ELP-VEGF accumulates in the kidneys, has a longer circulating time than free VEGF, and significantly improves renal hemodynamics and attenuates renal injury in the stenotic kidney. Recently, we showed that co-adjuvant ELP-VEGF therapy immediately following PTRAs improves renal outcomes more effectively than renal artery angioplasty alone, demonstrating the feasibility of a novel targeted treatment as a co-adjuvant strategy to improve the renal responses to PTRAs in RVD.

Our studies highlight the role that microvascular disease plays in defining renal recovery in RVD and the potential therapeutic applications of ELP-VEGF-driven therapeutic angiogenesis. Furthermore, our studies suggest that there may be a point in the progression of RVD at which renal injury becomes irreversible with renal angioplasty alone, and therefore a therapeutic strategy that combines targeting the renal MV via therapeutic angiogenesis and PTRAs concurrently may be clinically advantageous.

10:05-10:20 a.m. **Preschool Obesity Prevention with Positive Behavioral Supports: the I-POP Study Design**

Carol Connell, Holly Huye, Brad Dufrene, Caroline Newkirk, Gwendolyn Horton

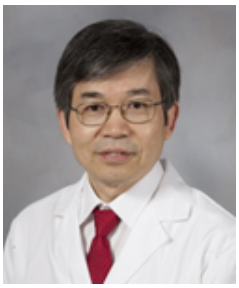
Estimates of overweight/obesity among children aged 2-4 years in Mississippi are 29-31%. Parenting and feeding styles have been associated with child weight status among different sociodemographic groups. However, little research has investigated whether positive parenting practices training can modify feeding style and support favorable weight-related behaviors and outcomes among preschool children. Likewise, little research has investigated the impact of implementing positive classroom management strategies on preschool children's eating and weight status. I-POP is a cluster-randomized effectiveness trail that will test these research
questions. The study includes an evidence-based preschool nutrition and physical activity curriculum for Head Start children enhanced with parent workshops on positive child interaction therapy and teacher training on positive behavioral support strategies. Outcome measures include parenting practices, teaching strategies, child feeding styles of parents, child BMI z-scores, and parent/teacher BMI. The project has the potential to be transferred to other Head Start centers within Mississippi.

10:20-10:35 a.m. **"Plasma Cell Depletion Attenuates Autoimmune Associated Hypertension"**

Michael J. Ryan[1] and Erin B. Taylor[1]

[1] Department of Physiology & Biophysics, University of Mississippi Medical Center

Numerous studies show a direct relationship between circulating autoantibodies, characteristic of systemic autoimmune disorders, and primary hypertension in humans. Whether these autoantibodies mechanistically contribute to the development of hypertension remains unclear. Systemic lupus erythematosus (SLE) is a chronic autoimmune disorder that is characterized by aberrant immunoglobulin production, notably pathogenic autoantibodies, and is associated with prevalent hypertension, renal injury, and cardiovascular disease. Because plasma cells produce the majority of serum immunoglobulins and are the primary source of autoantibodies in SLE, we hypothesized that depletion of plasma cells using the proteasome inhibitor bortezomib would lower autoantibody production and attenuate hypertension. Thirty week old female SLE (NZBWF1) and control (NZW) mice were injected i.v. with vehicle (0.9% saline) or bortezomib (0.75 mg/kg) twice weekly for four weeks. Bortezomib treatment lowered the percentage of bone marrow plasma cells in SLE mice, as assessed by flow cytometry. Both total plasma IgG and anti-dsDNA IgG levels were higher in SLE mice as compared to control mice, but were lowered by bortezomib treatment. Mean arterial pressure (MAP; mmHg) measured in conscious mice by carotid artery catheter was higher in SLE mice than in control mice, but MAP was significantly lower in bortezomib-treated SLE mice. Bortezomib also attenuated renal injury, as assessed by albuminuria and glomerulosclerosis, and reduced the infiltration of B and T lymphocytes into the kidneys. Taken together, these data show that the production of autoantibodies by plasma cells mechanistically contributes to autoimmune associated hypertension, and suggests a potential role for patients with primary hypertension who have increased circulating immunoglobulins.



Scientific Session II: Cancer
Chair: Dr. Pier Paolo Claudio, University of Mississippi
Dr. Yin-Yuan Mo, University of Mississippi Medical Center

9:30-9:35 a.m. **Welcome**

9:35-9:50 a.m. **Molecular and structural traits of IRS-1/LC3 nuclear structures – effects on autophagy control and tumor cell survival**

[1,2]Adam Lassak, [2]Dorota Wyczechowska, [1,2]Anna Wilk, [1,2]Adriana Zapata, [1,2] Mathew Dean, [1,2] Luis Del Valle, [1,2] Francesca Peruzzi, [2]Augusto Ochoa, [1,2]Krzysztof Reiss
[1]Neurological Cancer Research, [2]Stanley S Scott Cancer Center, Department of Medicine, LSU Health Sciences Center, New Orleans, LA

Insulin receptor substrate 1 (IRS-1) is a common cytosolic adaptor molecule involved in signal transduction from insulin and IGF-1 receptors. IRS-1 can also be found in the nucleus in tumor cells expressing viral oncoprotein, large T-antigen from human polyomavirus JC or from simian polyomavirus SV40. We report here a new finding of unique IRS-1 nuclear structures, which we observed initially in glioblastoma biopsies and glioblastoma xenografts. These nuclear structures can be reproduced in vitro by ectopic expression of IRS-1 cDNA cloned in frame with nuclear localization signal (NLS-IRS-1). In these structures, IRS-1 localizes at the periphery while the center harbors a key autophagy protein, LC3. These new nuclear structures are highly dynamic, rapidly exchange IRS-1 molecules with the surrounding nucleoplasm, disassemble during mitosis and require growth stimulus for their reassembly and maintenance. In tumor cells engineered to express NLS-IRS-1, the IRS-1/LC3 nuclear structures repress autophagy induced either by amino acid starvation or rapamycin treatment. In this process, IRS-1 nuclear structures sequester LC3 inside the nucleus, possibly preventing its cytosolic translocation and the formation of new autophagosomes. This novel mechanism provides a quick and reversible way of inhibiting autophagy, which could counteract autophagy-induced cancer cell death under severe stress including anticancer therapies.

9:50-10:05 a.m. **"Evaluation of the immune response after ultrasound targeted gene therapy in a mouse model of prostate cancer"**

Flavia De Carlo[1,2,3], Litty Thomas[1,2,3], Gailen D. Marshall[5], Pier Paolo Claudio[1,2,3] and Candace M. Howard[6]
[1]Department of Biomolecular Sciences, University of Mississippi, University, MS
[2]National Center for Natural Products Research, University of Mississippi, University, MS
[3]Department of Radiation Oncology, Medical Center Cancer Institute, Jackson, MS
[4]Department of Biochemistry and Microbiology, Joan C. Edwards School of Medicine, Marshall University, Huntington, WV

[5]*Department of Medicine, Division of Clinical Immunology and Allergy, University of Mississippi Medical Center, Jackson MS*
[6]*Department of Radiology, University of Mississippi Medical Center, Jackson MS*

Gene transfer to malignant sites using human adenoviruses (hAd) has been limited because of their immunogenic nature and host specificity. Murine cells often lack some of the receptors needed for hAd attachment, thus murine cells are generally non-permissive for Ad infection and replication, which limits translational studies of adenoviral gene transfer techniques. We have developed a gene transfer method, which uses a conjunction of lipid-encapsulated perfluorocarbon microbubbles (MBs) and ultrasound (US), to shield and deliver Ads to a site-specific tissue bypassing the requirement of specific receptors (US Patent 8,454,937). We showed in vitro that murine TRAMP-C2 cells display a comparable expression pattern of receptors involved in adenoviral adhesion and internalization to the human DU145 prostate cancer cells. We also demonstrated that both the murine and human cells showed a dose dependent percentage of cells transduced by hAd-GFP after 24 hours, although the murine cells were less efficiently transduced. Additionally, we showed that the murine translational machinery efficiently expressed the GFP transgene at 48- and 72-hours post-transduction. To assess in vivo if our image-guided delivery system could effectively protect the Ads from both innate and acquired immunity, we injected C57BL/6 immunecompetent mice with hAd-GFP/MB complexes. Notably, we did not observe activation of innate (TNF-α and IL-6 cytokines), or acquired immune response (neutralizing antibodies - NAbs). This study brings us a step closer to demonstrate the feasibility of using murine models of cancer to investigate the translation into clinical settings of adenoviral gene therapy mediated by Ultrasound-Targeted Microbubble Destruction.
Acknowledgement: UMMC Intramural Research Grant, Candace M. Howard, (PI), Pier Paolo Claudio (Co-PI), Ultrasound targeted microbubble destruction for anticancer gene delivery (01/01/2016 - 12/31/2017). NIH R21 CA131395-01, Claudio Pier Paolo (PI), Candace M. Howard (Co-PI), Ultrasound guided site-specific gene delivery in prostate cancer (01/21/2009 - 03/31/2013). NIH R03 CA140024, Claudio Pier Paolo (PI), Candace M. Howard (Co-PI), Ultrasound guided gene delivery in pancreatic cancer (08/13/2009 - 07/31/2013). WW Smith Foundation #C0305, Claudio Pier Paolo (PI), Ultrasound enhancement of viral-mediated gene transfer following systemic administration (01/01/2004 - 12/31/2006).

10:05-10:20 a.m. **"The effects of abdominal fat and muscle mass (sarcopenia) on liver surface nodularity in a high-risk population using abdominal CT images"**

Candace Howard[1,2], Edward Florez[2], Elliot Varney[2], Cristiane Santos[2], Charlene Claudio[2], William Varner[2], Seth Lirette[3], Frank Greenway[4], Adolfo Correa[5].
[1]*Investigator in the Development Program for Mississippi Center for Clinical and Translational Research (MCCTR), University of Mississippi Medical Center, Jackson, MS*
[2]*Department of Radiology, University of Mississippi Medical Center, Jackson, MS*
[3]*Department of Data Science, University of Mississippi Medical Center, Jackson, MS*
[4]*Pennington Biomedical Research Center, Louisiana State University, Baton Rouge, LA*
[5]*School of Medicine & Jackson Heart Study, University of Mississippi Medical Center, Jackson, MS*

Non-alcoholic fatty liver disease (NAFLD) is the most common liver disease in the Western world, is clinically silent, and is closely related to obesity, diabetes and dyslipidemia. Individuals with NAFLD and metabolic syndrome have significantly higher overall, cardiovascular, and liver-related mortality. Obesity and sarcopenia (i.e., loss of skeletal muscle mass) have previously been shown to be independent risk factors of NAFLD; however, little to no information is available on the relative magnitude of these effects. We hypothesize that discovery of a readily obtainable, low-cost biomarker to predict NAFLD could improve its detection and diagnosis, even before conventional techniques (ie. lab values) show active disease processes. To test our hypothesis, we evaluated associations of sarcopenia and visceral fat depots with liver surface nodularity in a high risk, African American population. For this IRB-approved retrospective study, non-enhanced abdominal CT images were obtained in 150 African American participants in the Jackson Heart Study, were examined. Waist circumference (WC) and sagittal abdominal diameter (SAD) were measured in each subject. In addition, abdominal wall, psaos, paraspinal muscle volumes and regional abdominal fat volumes were measured using a multi-layer segmentation software (sliceOmatic,TomoVision,v.5.0). The subcutaneous anatomic region was divided into superficial and deep subcutaneous adipose tissue (sSAT/dSAT). Two readers independently assessed liver surface nodularity (LSN) on the CT images of 150 patients using a validated quantitative Liver Surface Nodularity software. Linear regression was used to examine the assocations between LSN scores, WC, SAD, muscle volumes, and fat volumes. Intraclass correlation coefficient (ICC) with 95% confidence intervals was used to assess inter-observer agreement of LSN scores among the two readers. Both anthropometric indices (WC and SAD) showed direct proportionality and strong correlation with total adipose tissue volume (r=0.83,0.74, respectively). WC and SAD indicated a strong inverse association with the ratio of total skeletal muscle and total adipose tissue (r= -0.69,-0.57, respectively). There was a positive coorelation between LSN score and all fat compartments. A higher correlation (r=0.34) was found between LSN and dSAT. Inter-observer agreement of LSN scores was excellent (ICC=0.93, $p<0.001$). This study evinced a positive association between the LSN score, anthropometric indices, and all abdominal fat compartments, while showing an inverse association with both muscle volumes and muscle attenuation. Chronic liver disease and cardiometabolic disturbances are currently major public health concerns. Evidence has long supported an interaction between adipose tissue and the liver (NAFLD); however, there is little to no quantitative data directly reflecting this association. Furthermore, the mechanism responsible for this correlation is disputed and poorly understood. Associating cardiometabolic risk factors with the chronic liver disease could have major implications on the care and management of high risks patients including increasing surveillance and diagnosis of liver disease, even before conventional techniques (ie. lab values) show active disease processes.
Acknowledgement. This work was supported by the MCCTR Investigator Development Award from NIGMS of the NIH Award Number 1U54GM115428.

10:20-10:35 a.m. **Action of Natural Products on Patient-Derived Cancer Stem Cells and Bulk Tumor Cells**

David S. Pasco,[1,2,3] Pier Paolo Claudio,[1,2] Linda Eastham, [1,2] Premalatha Balachandran,[1,2] Jin Zhang[1,2]
[1]National Center for Natural Products Research, [2]Research Institute of Pharmaceutical Sciences, [3]Department of Pharmacognosy, School of Pharmacy, University of Mississippi, University, MS 38677, USA

Genetic and epigenetic events that contribute to the transformation of normal cells into cancerous cells, result in the abnormal functioning of many signalling pathways that control cell metabolism, proliferation, mobilization, differentiation and death. This realization has led to the search for agents that target these pathways. We have utilized a battery of 12 inducible luciferase reporter gene vectors, where expression is driven by enhancer elements that bind to specific transcription factors. Several thousand crude plant extracts and pure compounds were run through this screen using HeLa cells. Several compounds exhibited diverse activity profiles using this battery and were subsequently tested in the ChemoID assay [1], against patient-derived bulk tumor cells and cancer stem-like cells. These cells were isolated from patients bearing Non-small cell lung cancer, triple negative breast cancer or Temodar-resistant Glioblastoma Multiforme. The natural products tested demonstrated either patient or tumor-type specificities for bulk vs tumor stem-like cells *in vitro*. Some natural products showed either additive or more than additive cytotoxicity in combination with many chemotherapeutic agents. Some reduced the effectiveness of certain chemotherapeutic agents. This represents an approach that could afford us an important and unique niche in the Precision Medicine Initiative – identifying patient/tumor-specific natural product-chemotherapeutic combinations that are effective against both bulk tumor cells and tumor stem-like cells.

Reference: [1] Mathis SE., et al. (2014) PLoS ONE 9(8): e105710. doi:10.1371/journal.pone.0105710.

Achnowledgement: This work was supported in part by a contract from the University of Mississippi Medical Center Cancer Institute and the USDA Agricultural Research Service Specific Cooperative Agreement No. 58-6408-2-0009.

Scientific Session III: Neuroscience

Chair: Dr. Nicole Ashpole, University of Mississippi

11:00-11:05 a.m. **Welcome**

11:05-11:20 a.m. **Connecting Oligomer Conformation and Phenotypes in Sporadic Alzheimer Disease**

Vijay Rangachari.
University of Southern Mississippi, Hattiesburg, MS

Widespread phenotypic differences observed among Alzheimer disease (AD) patients are one of the diverse clinical manifestations in all neurodegenerative diseases. Deciphering the molecular mechanisms that underpin such differences especially for an idiopathic disease is rather challenging. Aggregation of amyloid-β (Aβ) peptides has long been known as the key trigger in AD pathology. Polymorphism observed within the aggregation end products of Aβ fibrils seem to correlate with clinically observed pathologic variations, which has in part, corroborated the hypothesis that 'conformeric strains' of Aβ aggregates could manifest in distinct phenotypic outcomes. In our lab, we propose to understand this phenomenon in the context of whether and how the strains of low molecular weight oligomers could propagate their structure faithfully towards morphologically distinct fibrils with conspicuous pathological phenotypes. By biophysical investigations, we recently demonstrated that an Aβ42 dodecamer called Large Fatty Acid derived Oligomers (LFAOs) is able to quantitatively replicate at low concentrations, and at elevated concentrations, propagate their mesoscopic structure faithfully towards morphologically unique fibrils containing the discrete LFAO units. Furthermore, LFAO-seeded aggregates were able to selectively induce massive amounts of cerebral amyloid angiopathy (CAA) to transgenic CRND8 mice as opposed to unseeded or fibril seeded aggregates, which induced more parenchymal deposits. Results based on our model oligomer demonstrate that certain oligomeric strains could faithfully propagate their structure towards distinct fibrils and induce selective pathological phenotypes in the brain. Overall, these results bring forth important mechanistic insights into strain specific propagation of oligomers that have remained elusive thus far.

11:20-11:35 a.m. **"Organophosphorus Insecticides: Mechanisms of Developmental Neurotoxicity"**

Russell L. Carr
Associate Professor in the Department of Basic Sciences, College of Veterinary Medicine, Mississippi State University

11:35-11:50 a.m. **"Neurosteroids as Novel Therapeutics for HIV-mediated Neurotoxicity"**

Jason Paris
Assistant Professor in the Department of BioMolecular Sciences, University of Mississippi School of Pharmacy

11:50-12:05 p.m. **Relationship Between Sleep and Psychostimulant Abuse: Evidence from Animal Models**

Dr. Lais Berro

Post-doctoral fellow, Department of Psychiatry and Human Behavior, University of Mississippi Medical Center

Scientific Session IV: Infectious Disease/Immunology

Chair: Dr. Stephen Pruett, Mississippi State University

11:00-11:05 a.m. **Welcome**

11:05-11:20 a.m. **Congenital Zika infection in wild-type mice potentially cause postnatal behavioral deficits**

Fengwei Bai
The University of Southern Mississippi

A small percentage of babies born to Zika virus (ZIKV)-infected mothers manifest severe defects at birth, including microcephaly. Among those who appeared healthy at birth, there are increasing reports of postnatal growth or developmental defects. However, the impact of congenital ZIKV infection in postnatal development is poorly understood. Here, we report that a mild congenital ZIKV-infection in pups born to immunocompetent pregnant mice did not display apparent defects at birth, but manifested postnatal growth impediments and neurobehavioral deficits, which include weak limb strength, poor balance, and cognitive deficits. We found that the brains of these pups were smaller, had a thinner cortical marginal zone, and displayed increased astrogliosis as compared to dengue virus- and mock-infected controls. In summary, our results showed that even a mild congenital ZIKV infection in immunocompetent mice could lead to postnatal deficits, providing a novel animal model to study ZIKV-associated postnatal developmental deficits.

11:20-11:35 a.m. **Polyamine Metabolism Modulates Capsule Biosynthesis And Stress Response In Streptococcus Pneumoniae.**

Moses B. Ayoola[1], Mary F. Nakamya[1], Seongbin Park[1], Mark A Arick II [2], Leslie A. Shack[1], Justin A. Thornton[3], Edwin Swiatlo[4] and Bindu Nanduri[1,2]
[1] Department of Basic Sciences, College of Veterinary Medicine, [2] Institute for Genomics, Biocomputing and Biotechnology, and [3] Department of Biological Sciences, Mississippi State University, Mississippi State, MS, USA 39762.
[4] Section of Infectious Diseases, Southeast Louisiana Veterans Health Care System, New Orleans, LA 70112.

Streptococcus pneumoniae *(Spn)* that asymptomatically inhabit human nasopharynx can cause invasive infections such as bacterial meningitis, septicemia and most importantly, community acquired pneumonia (CAP). Limited serotype coverage of existing vaccines and increasing prevalence of antibiotic resistant strains necessitate the development of novel treatment and prevention strategies. Polyamines are ubiquitous, aliphatic hydrocarbons that are positively charged at physiological pH and regulate a number of cellular processes. Previous work from our laboratory has shown that deletion of polyamine transport operon (potABCD) and biosynthesis genes (speE and cadA) in Spn results in an attenuated

phenotype in murine models of infections. A primary polyamine mediated mechanism for altered virulence of pneumococci impaired in polyamine transport and cadaverine synthesis is the loss of capsule, a critical virulence factor that is required for evading host immune responses. Using multiple omics approaches such as RNA-Seq, proteomics and metabolomics, we demonstrate that impaired polyamine metabolism results in a shift in carbohydrate metabolism that limits the availability of precursors for capsule synthesis. Based on our results, we propose that a shift in central metabolism observed in polyamine metabolism deficient strains is to counter the impaired stress responses. We observed that ΔcadA is more susceptible to oxidative and acidic stress compared to wild type S. pneumoniae TIGR4. Impaired spermidine synthesis also results in an attenuated phenotype. However, this polyamine mediated attenuation in ΔspeE involves capsule independent mechanisms and efforts to identify the role of spermidine synthesis in the pathogenesis of Spn are ongoing. This work was supported by grant # P20GM103646 (Center for Biomedical Research Excellence in Pathogen Host Interactions) from the National Institute for General Medical Sciences.

11:35-11:50 a.m. **"BH3-only Protein PUMA and Innate Immunity in Pneumococcal Infection"**

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The Gram-positive, commensal bacterium Streptococcus pneumoniae (pneumococcus) is an opportunistic pathogen capable of causing serious diseases in humans in the absence of a sufficient immune response. We hypothesized that pneumococcus stimulates expression of the pro-apoptotic, BH3-only Bcl2 family member Puma in a p53-independent manner. In differentiated p53-/- neutrophil progenitors, puma was up-regulated compared to the wild-type neutrophils upon exposure to pneumococcal strains TIGR4 and EF3030 (approx. 3-fold v. 5-fold, respectively). Expression of puma was also up-regulated more than 6- and 11-fold in differentiated wild-type and p53-/- progenitors, respectively, when stimulated with TIGR4 compared to TIGR4R ΔSpxB, suggesting a mechanism of H_2O_2-induced oxidative stress-dependent puma expression. The gene encoding the ER stress-related transcription factor C/EBP-homologous protein (CHOP) was also up-regulated in differentiated p53-/- neutrophil progenitors compared to the wild-type and differentially expressed upon stimulation with TIGR4 and EF3030. Additionally, in our murine pneumonia model, cytokine analysis of blood and lung tissues from wild-type and puma-/- mice intranasally challenged with 2.5×10^5 CFU TIGR4 strain revealed significant differences in G-CSF, GM-CSF, IFN-ϒ, IL-1α and β, -6, -9, -10, -12 (p40 and p70), -13, and -17, IP-10, KC, MCP-1, MIP-1α and β, MIP-2, RANTES, and TNF-α. These findings suggest that puma can be modulated via a p53-independent mechanism, plays an important role in innate immunity, and that regulation of cell fate may be central to its protective role.

11:50-12:05 p.m. **Suboptimal stimulation with staphylococcal enterotoxin C1 induces immunosuppressive CD4+CD25+ regulatory T cells by differential expression of FOXP3 isoforms**

Juyeun Lee, Nogi Park, Jooyoun Park, Keunseok Seo
Department of Basic Sciences, Mississippi State University

Superantigens (SAgs) are potent toxins produced by Staphylococcus aureus and cause massive activation of T cells leading to toxic shock syndrome. However, during asymptomatic colonization, S. aureus produces SAgs at very low concentrations of which pathogenic roles have not been well established. We found that stimulation of human peripheral blood mononuclear cells with SEC1 induced CD4+CD25+FOXP3+T cells, a typical phenotype of immunosuppressive regulatory T cells (Tregs). However, CD4+CD25+FOXP3+ T cells induced from stimulation with SEC1 at the dose inducing optimal T cell stimulation (1 μg/ml) as in toxic shock syndrome were not functionally immunosuppressive, while those cells from stimulation with SEC1 at the dose inducing suboptimal T cell stimulation (1 ng/ml) as in asymptomatic colonization were functionally immunosuppressive Tregs. The suppression was mainly mediated by the galectin-1 in a cell-to-cell contact dependent manner. Suboptimal T cell stimulation induced activation of PTEN-mTOR-Akt pathways, leading to differential expression of FOXP3 isoform lacking exon 2, preferably localized to the nucleus, while optimal stimulation induced activation PI3K-mTOR-Akt pathways, leading to full length of FOXP3 preferably localized to cytoplasm. The inhibition of PI3K during optimal stimulation induced in CD4+CD25+ T cells expressing FOXP3ΔE2 isoform which showed strong immunosuppression. These results demonstrate important role of Treg in colonization of S. aureus and identify PI3K as an important therapeutic target against toxic shock syndrome.
Acknowledgement: This work was partially supported by grants from Center for Biomedical Research Excellence in Pathogen-Host interactions, National Institute of General Medical Sciences, NIH (1P20GM103646-01A1) and Animal and Plant Quarantine Agency, South Korea (Grant I-1543081-2015-17-01).

Scientific Session V: Community Health & Health Care Disparities

Chair: Dr. June Gipson, My Brother's Keeper, Inc.

1:15-1:20 p.m. **Welcome**

1:20-1:35 p.m. **"Mississippi INBRE Community Engagement and Training Core To Implement a Community-Based Research and Obesity Management Program"**

Jennifer L. Lemacks[1], June Gipson[2], Mohamed Elasri[3]
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[2]President and CEO, My Brother's Keeper, Inc., Jackson, MS
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The state of Mississippi (MS) continues to be infamous for poor health outcomes in general and particularly among African Americans, a predominant minority and underserved population in the state. Obesity and HIV/AIDS are among the top public health priorities in MS. In order to address these issues, Mississippi INBRE's Community Engagement and Training Core (CETC) aims to improve research capacity and provide research and outreach opportunities for student, faculty and community members in the state. This core will provide the infrastructure for faculty and students at undergraduate institutions to conduct community-based participatory research (CBPR) in MS. Additionally, the core will focus on obesity and HIV as two preventable conditions that disparately impact minority populations. The CETC represents a collaborative effort by three universities (University of Southern Mississippi, USM; Jackson State University, JSU; University of Mississippi Medical Center, UMMC) and the community-based organization, My Brother's Keeper, Inc. The CETC established the Telehealth Center that represents a collaborative effort among MBK, USM, and JSU to assess the implementation of technology-supported asynchronous and synchronous intervention delivery, participant monitoring, and mobile health strategies. To provide opportunities for CBPR and translational research, the core will conduct telehealth implementation research using a trans-disciplinary team of scientists to guide preventative behavior management of obesity and HIV/AIDS in real-world settings. A major part of this effort is to support the work of the Telenutrition Program to use the RE-AIM Framework to assess the implementation of an evidence-based, intensive behavior therapy (IBT) for obesity intervention (with a motivational interviewing [MI] framework) based on the Centers for Medicaid and Medicare Services (CMS) IBT for obesity benefit. The intervention will be examined under real-world conditions with technology supplementation to address obesity and related chronic disease among young adult (18–45 years of age) African Americans across the state. The intervention contact will model the CMS IBT for obesity benefit according to the patient contact schedule (of weekly visits in the first month, biweekly in months 2–7, and once a month per months 8–12) and include nutrition, stage of change and other physical and psychosocial assessments. Program delivery will be assisted by the Bridge2U web and mobile platform and supported in both clinic and community settings. Our proposed project will shed new light on how IBT for obesity (and

similar) models may be amended to facilitate the provision of health care resources in areas with limited to no resources, such as the state of Mississippi.
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.

1:35-1:50 p.m. **Translating the National Diabetes Prevention Program to Community Health Centers in Mississippi**

Charles Chima
University of Mississippi Medical Center

Diabetes is a growing problem in the United States, and Mississippi in particular. 1 in 2 adults in Mississippi now have diabetes or prediabetes: 13.6% of the adult population have diabetes while another 37.5% have prediabetes. Prediabetes is a strong risk factor for developing diabetes in the short term, hence the incidence and prevalence of diabetes will continue to grow rapidly if unchecked. There is widely accepted evidence that enrolling people with prediabetes into a structured lifestyle modification program can reduce their risk of progressing to diabetes by 58%. Yet, 9 out of 10 people with prediabetes do not know that they have it. Thus, screening for prediabetes is an important entry point to evidence-based diabetes prevention, such as the national Diabetes Prevention Program (DPP) championed by the CDC. Although the effectiveness of DPP has been known for over 15 years, just like the implementation lag experienced with most scientific findings it is yet to become incorporated into routine clinical practice. Furthermore there are socioeconomic and geographic disparities in diabetes care and outcomes across Mississippi, with less educated, lower income, rural, and racial-ethnic minorities doing worse off than their counterparts. Therefore, there is urgent need for translational research to promote widespread adoption of DPP, especially among vulnerable populations. This study proposes innovative technology-enabled approaches to improving health equity in diabetes prevention. It will explore how electronic health records and telehealth can be leveraged to develop an effective, feasible, and scalable process for screening, testing, and providing DPP to people with prediabetes at community health centers across Mississippi.

1:50-2:05 p.m. **"Using Telehealth to Improve Cancer Care and Outcomes in Rural Populations"**

Michelle S. Williams[1]
Department of Population Health Science and The Cancer Institute, University of Mississippi Medical Center

Telehealth is an effective tool for overcoming barriers related to poverty, culture, and social injustice that may prevent people in Medically Underserved Areas from being engaged in care in primary care settings. In the US, telehealth has been used in a variety of applications such as the management of type 2 diabetes, monitoring patients with kidney disease, stroke care, and linking of veterans to health services after natural disasters. Many health insurance companies provide reimbursement for telehealth, however, telehealth is currently not commonly used to provide care for patients across the cancer care continuum. The goal of this systematic review was to identify the benefits of using telehealth to provide care to cancer survivors in rural and medically underserved areas in the US. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to guide the study. The results of the study can be used to inform the development of strategies to increase the

dissemination of strategies to increase the use of telehealth in the care of cancer patients along the cancer care continuum.

2:05-2:20 p.m. **A Retrospective Chart Review of the Open Arms Healthcare Center's Becoming a Healthier U (BHU) Preventative Health Screening Program**

Sandra C. Melvin[1], Tamika Curtis[1], Ian Taylor[2]
[1]Open Arms Healthcare Center, Jackson, MS
[2]Mississippi Research Scholar, Millsaps College, Jackson, MS

The BHU program is a community-based initiative that provides sexual health screenings to patients of Open Arms Healthcare Center (OAHCC) in order to identify those people at greatest risk for sexually transmitted infections (STI's) and HIV infection and link them to treatment and preventative services. The focus of this study was to identify and describe the trends among patients enrolled in the BHU program. This retrospective clinical chart review analyzed electronic health record data of patients who participated in the BHU program from February 1, 2013 to January 31, 2018 to describe the prevalence of sexual health risk factors. Data analysis was conducted using IBM SPSS Software. Of the BHU participants (n=1,913), a majority were male, African-American, Non-Hispanic, Heterosexual, and without insurance. About 45.8% of patients reported having unprotected sex. During the BHU screenings, 12% of patients tested positive for chlamydia, and 2.4% tested positive for HIV. Those who had positive screens were linked to care, however, a majority of patients who tested negative did not return for follow up preventive care. The BHU Program is a useful tool for identifying patients with STI's and linking them to treatment; it is also able to serve those without typical means of access to care due to lack of insurance. However, more efforts should be placed on follow up care and utilization of preventative services as part of a comprehensive prevention and control program.

Scientific Session VI: Integrating Omics Technology & General Biomedical Sciences

Chair: Dr. Michael Garrett, University of Mississippi Medical Center

1:15-1:20 p.m. **Welcome**

1:20-1:35 p.m. **"Gene expression in the prefrontal cortex associated with impulsivity"**

Eric J Vallender[1], Shaurita D Hutchins[1], Robert A Gilmore[1], Xiao Zhang[1], Gouri J Mahajan[1], Alison J Athey[2], James C Overholser[2], George J Jurjus[2,3], Lesa Dieter[2], Grazyna Rajkowska[1], Craig A Stockmeier[1]

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[3]Louis Stokes Cleveland VA Medical Center, Cleveland, OH

Impulsivity has been identified as an important endophenotype of several mental health disorders. In the prefrontal cortex, the dorsolateral (dlPFC) and orbitofrontal (OFC) regions in particular have been associated with both impulse control generally as well as changes during disease. This work aimed to identify differences in gene expression in the prefrontal cortex associated with natural variation in impulsivity. The dlPFC and OFC were isolated from 70 demographically similar individuals with a mood disorder diagnosis or psychiatrically normal controls but without a history of illicit substance abuse. A psychological autopsy was performed on all individuals with screening on the Behavioral and Emotional Impulsivity subscales of the SIDP-IV. Total RNA was isolated and next generation sequencing was performed using an Illumina NextSeq 500 with a 150 bp paired-end protocol. Data was processed using multiple bioinformatic pipelines, cuffdiff and DESeq2, and functional enrichment was performed with Ingenuity Pathway Analysis. Differential gene expression associated with impulsivity was identified in the OFC, but not the dlPFC (FDR < 0.05). These differences were not associated with post-mortem interval, tissue pH, RNA quality, or age at death. Among the approximately 200 differentially expressed genes identified was an overrepresentation of those involved in dopamine signaling, including various receptors, transporters, and metabolism enzymes. These findings demonstrate differences in gene expression associated with impulsivity, occurring in the absence of specific pathology, specifically in the orbitofrontal cortex. These transcriptomic differences suggest natural variability inherent in cortical dopaminergic systems.

Acknowledgement: This work was supported by the University of Mississippi Center for Psychiatric Neuroscience and NIH (GM103328).

1:35-1:50 p.m. **"Association of Doublecortin like kinase 1 with stemness and chemoresistance of colorectal cancer cells"**

Lianna Li

Biology Department, Tougaloo College, Tougaloo, MS, USA

Colorectal cancer (CRC) is the third most common cancer diagnosed and the second leading cause of cancer-related deaths in the United States. About 50% of CRC patients relapsed after surgical resection and ultimately died of metastatic disease. Cancer stem cells (CSCs) are believed to be the primary reason for the recurrence of CRC. Specific stem cell markers have been demonstrated to play critical roles in initiating tumorigenesis, facilitating tumor progression, promoting metastasis and increasing chemoresistance. Doublecortin-like kinase 1 (DCLK1), which is a microtubule associated serine/threonine kinase, is identified as a specific marker for the gastrointestinal stem cells with debate and it is upregulated in several solid tumor along the gastrointestinal tract, including the CRC. Our research aims to further elucidate identity of DCLK1, reveal its correlation with chemoresistance of CRC cells and evaluate whether DCLK1 can be an effective therapeutic target for CRC treatment. In order to achieve our goal, we established stable DCLK1 over-expression cell lines using the HCT116 cells. Effects of DCLK1 on the stemness of CRC cells, including capability of self-renewal and pluripotency were determined. IC_{50} of 5- Fluorouracil (5-Fu) for the treatment of DCLK1 overexpression cells and whether DCLK1 modifies chemoresitance of CRC cells through apoptosis pathway were investigated. Transcriptome changes due to DCLK1 overexpression was evaluated using RNA-Seq technology. Our results demonstrated that DCLK1 overexpression enhanced the stemness of DCLK1 overexpression cells and it increased the chemoresistance of CRC cells via the anti-apoptosis pathway. Differentially expressed gene analysis revealed that several critical pathways involved in the cell cycle control and cell survival were modified by DCLK1 overexpression. In conclusion, DCLK1 is closely associated with enhanced stemness and increased chemoresistance of CRC cells. It might be an intriguing therapeutic target for the treatment of CRC patients.

1:50-2:05 p.m. **Small RNA Biology in Two Mite Species**

Alex Sutton Flynt, PhD
Assistant Professor, The University of Southern Mississippi

RNA interference (RNAi) is comprised of diverse mechanisms revolving around 18-30 nucleotide (nt) small RNAs with pervasive roles in negative regulation of gene expression and defense against invasive genetic elements (i.e. viruses and transposons). Many small RNA species are poorly conserved, suggesting a plastic nature that might contribute to adaptation. This is particularly evident when comparing small RNA biology across vast evolutionary distances. Chelicerae arthropods (spiders, mites, ticks, and scorpions) represent a basal clade with unique configuration of RNAi pathways. To investigate how small RNA biology differs in these organisms we examined the status of RNAi in Dermatophagoides farinae, the american house dust mite, and in Tetranychus urticae, the two-spot spider mite. The history of D. farinae is particularly unusual as they evolved from a parasitic ancestor, a life history associated with genome reduction/rearrangement. Through genome and transcriptome analysis we have uncovered divergent biology in the two species. Dust mites appear to have lost a major class of small RNA termed piwi-associated RNAs (piRNAs) while spider mites have an expanded piRNA pathway. piRNAs are essential for maintenance of genome stability through repression of transposable element activity. These changes in small RNA biology highlight how rewiring of small RNA pathways may contributed to genetic novelty and innovation for accessing new ecologies.

2:05-2:20 p.m. **"Bioinformatics Study for the Interplay of Environmental and Genetic Factors Associated with Prostate Cancer"**

Duber Gomez-Fonseca[1, 3], Paul B. Tchounwou[1, 2], Richard A. Alo`[1, 3] and Hung-Chung Huang[1, 2]

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Abstract: Prostate cancer (PCA) is among the top four most common cancers in both sexes combined and the second most common cancer in men. Exposure to environmental hazards has been associated with different cancers in humans. Genetic risk factors have also shown to contribute to the cause of PCA. Since there is not a unique environmental or genetic risk factor that can be responsible or associated with PCA alone, it is vital to identify the genetic risk as well as the environmental risk factors that can contribute together to initiate the prostate tumor to grow. Several studies and literature reviews have been conducted to investigate the roles of environmental and genetic risk factors to determine their association on PCA. Based on our reviews and studies, we have found an extensive amount of information about susceptible genetic and environmental risk factors for PCA that has assisted us to examine the consequences of the interplay of these factors on the cause of PCA initiation. We tried to tabulate all the identified genetic (i.e., susceptible genes or alleles) and environmental (e.g., cigarette smoking, air pollution, pesticide exposure, or heavy metal poisoning) risk factors for comparative studies side by side to understand the interaction and interplay of these risk factors. So far, we found that obesity, diabetes, and genetic polymorphisms in some key genes have phenotypic correlations in PCA. Also, environmental risk factors (e.g., cigarette smoking) do have detrimental effects in the genetic or epigenetic level on the adverse outcome of PCA. There really are gene-environment interactions and interplays associated with PCA, "the greatly overexpressed KRAS in the malignantly transformed prostate cell due to chronic Cadmium or Arsenic exposure" is just another example. In addition, the prostate is exposed to environmental and endogenous stress and increasing age is another significant risk factor for PCA. DNA methylation, genomic imprinting, and histone modifications are examples of epigenetic factors known to undergo change in the aging and cancerous prostate. Our study can provide an overall and clear view of how aging, environmental, and genetic/epigenetic factors interact and interplay for the occurrence of PCA. Furthermore, based on our hypothesis that the cohort groups studied in different Labs on the same disease in similar populations should have similar genotype-phenotype correlations, an expression quantitative trait loci (eQTL) analysis on gene expression and SNP data from huge microarray and NGS datasets would be performed to identify more de novo genetic alleles that might play a bigger role on PCA initiation. A list of the Bioinformatics software used for this project would be also surveyed and evaluated.

Keywords: Microarray, next-generation sequencing (NGS), single nucleotide polymorphism (SNP), gene expression, quantitative trait loci (QTL), gene-environment interaction, epigenetic, aging, prostate cancer (PCA)

Acknowledgement: This research supported by the National Institutes of Health/National Institute on Minority Health and Health Disparities Grant # G12MD007581, through the RCMI Center for Environmental Health at Jackson State University.

P1 "Analyzing the Effectiveness of the Dual Sex Education Program on STI Knowledge for Participants in the ICAN Project"

Kendriana Addison[1], Tiarra McMillan[2]
[1]Mississippi INBRE Service Scholar, Alcorn State University, Lorman, MS
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Adolescents account for approximately 3 million of the 340 million STI cases in the United States. Research suggests lack of sex education in schools could be linked to STI rates because students' knowledge and awareness of STIs is poor. Additionally, lack of communication between parents and students about sex could be a factor in the increasing STI rates. Many students who have prior knowledge of STIs receive information from their parents, friends, or the media, but the perceived information could be inaccurate. The David and Lucile Packard foundation funded the ICAN Reproductive Health Program, which is a community-based program to improve sexual education and STI knowledge among adolescents in the Jackson public school district and surrounding school districts. Participants in the program are educated on STI knowledge, puberty, and preventative methods. To determine perceived knowledge, students and parents were given a pre-assessment. The groups were educated separately about different components of sex education and given post-assessments. STI knowledge scores were isolated from other components of the pre and post-assessment, and a single factor ANOVA was conducted to analyze data using the Statistical Package for the Social Sciences (SPSS), a statistical software analyzing tool. Although there was an increase of knowledge, the results indicated that there is no statistical significance (p-value = 0.139) of increasing knowledge before and after the intervention.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P2 Assessment of harmful algal blooms in the Western Mississippi Sound (WMS) and their potential impacts on oysters and human health

Javia Anderson[1] and Padmanava Dash[2]
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Abstract: Harmful algal blooms (HABs) are one of the major agents of water quality deterioration. Some species of HABs produce toxins that can propagate through the food web and cause harm as humans eat the seafood. In December of 2015, the Mississippi Sound was affected by a red tide bloom that resulted in fish kills, bird deaths, beach closures, and a early shutdown of the commercial oyster fishery. The objective of this study was to measure the concentration of HABs in the WMS and to assess the potential impacts of HABs on human and aquatic health. A total of 38 water samples, 9 of which were collected March, 20 in May, and 9 samples in June, 2018 were analyzed in this study. The water samples were processed for chlorophyll a, phycocyanin, total nitrogen, phosphate, algal toxin concentration measurement and microscopic analysis. Phycocyanin is a pigment, which is associated to cyanobacteria that can produce 60 types of toxins. The phycocyanin concentrations were 0.564±0.254 µg/L in March, 4.03±1.92 µg/L in May, and 7.02±2.71 µg/L in June. Phosphate concentrations were 0.0345±0.0108 mg/L in March, 0.0273±0.0136 mg/L in May, and 0.14±0.00564 mg/L in June, and total nitrogen concentrations were 0.283±0.0368 mg/L in March and 0.295±0.136 mg/L in May. The results suggest that cyanobacterial concentrations increased as a response to increase in nutrient concentrations in the Mississippi Sound. Currently, results are being analyzed and will be presented in the poster.

P3 Fentanyl Abuse during Pregnancy: Deleterious Effects on Offspring Development

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Opioids are the most commonly prescribed analgesics; however, their use is associated with side effects including abuse and dependence. While the effects of opioids are well described for adults there is limited knowledge regarding the effects of these drugs on the developing child. We determined the effects of i.v. fentanyl self-administration during pregnancy on offspring development and behavior. Female rats were trained to self-administer the opioid fentanyl under a fixed-ratio schedule in daily 6-hr sessions; sham-operated dams served as controls. When litters were born. Health, weight and achievement of age-appropriate developmental milestones were assessed in all pups. Additionally, offspring were evaluated for production of ultrasonic vocalizations as a measure of emotionality. Cognitive ability was assessed with a novel object/place recognition test. Prenatal fentanyl exposure profoundly affected pup survival immediately after birth and significantly delayed the achievement of developmental milestones compared to control pups that had not been exposed to fentanyl in utero. While pup weight did not differ between groups at birth, weight differences emerged later with fentanyl-exposed pups presenting significantly lighter than controls. Despite similar weight in early infancy, head circumference was significantly smaller in fentanyl-exposed pups. Fentanyl-exposed pups exhibited more ultrasonic calls, as well as alterations in learning and memory compared to controls. Our results indicate that chronic high dose in utero fentanyl exposure, as a consequence of abuse, has widespread adverse effects on offspring survival, as well as physical, social and cognitive development.

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.

P4 "Exploring the Associations of Social Determinants of Health to Breast Cancer Incidence and Mortality in African American Women"

Kadriana Armstrong[1], Logan Beverly[2], Kameron Hooker[3], Kennedy Jones[4], Krystal Phillips[5]
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As defined by the American Cancer Society, breast cancer is a form of cancer that begins when cells of the breast grow uncontrollably. These cells typically form tumors which are malignant if they grow into surrounding tissues or metastasize into distance regions of the body. There are two common forms of breast cancer, ductal (cancer begins in the ducts that carry milk) and lobular (cancer begins in the glands that make breast milk). Cancer is the second leading cause of death in the United States, exceeded by heart disease. One in every four deaths in the United States is due to cancer. According to the Centers for Disease Control and Prevention (CDC), the leading form of cancer in women is breast cancer. In 2015, 816,453 new cases of cancer were reported, and 282,107 women died of cancer in the United States. This

means for every 100,000 women, 415 new cancer cases were reported and 136 women died of cancer. Breast cancer incidence is lower among African American women than among Caucasian women; however, the breast cancer mortality rate is higher in African American women. The aim of this study is to evaluate the association of social determinants of health to the incidence and mortality rates of African American women with breast cancer. Furthermore, this study will seek to determine if the social determinants of health are the contributing factors to African American women being disproportionately affected by breast cancer.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P5 "Mental Health Continuum of Care among Male to Female (MTF) and Female to Male (FTM) Transgender Individuals"

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Individuals who identify as transgender tend to experience higher rates of mental health issues than the general population. While approximately 6.7 percent of the general population suffers from depression and other mental health disorders, nearly half of all individuals who identify as transgender experience these issues. Pervasive discrimination, sex-segregated discrimination, harassment by government agency staff, police harassment, and refusal of medical care are all issues that transgender individuals often experience that lead to depression and other mental health disorders that require mental health continuum of care and treatment. A comparative analysis was conducted to determine the number of transgender individuals-MTF versus FTM who are more likely to seek mental health continuum of care service. Data was extracted from Advanced MD Electronic Health Records system at Open Arms Health Care Center for population-level surveillance of mental health follow-up appointments for 120 randomly selected transgender individuals aged 16 to 61. Using Microsoft Excel, the data was analyzed through frequency distribution and graphed to interpret and illustrate the results of the analysis. The Pearson correlation analysis showed that transgender assignment and attended follow up mental health appointment has no significant correlation therefore; Hypothesis 1 was rejected. Data revealed that transgender assignment and age of client has a significant correlation therefore, Hypothesis 2 was accepted. The study revealed that transgender assignment has no correlation with mental health continuum of care but it was shown that the age of the client significantly correlated with the attended follow up mental health appointment.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P6 "A Computational and Spectroscopic Study of Cu(II)Imidazole4Cl2"

Virginia Baker[1], Jacqueline Gayton[2], Jared Delcamp[2], Nathan Hammer[2]
[1]Mississippi INBRE Research Scholar, Delta State University, Cleveland, MS
[2] Department of Chemistry and Biochemistry, University of Mississippi, Oxford, MS

Mycorrhizal fungi networks are essential for the nutrient uptake of higher order plant species. These fungi secrete enzymes that allow for the uptake of water, nitrogen, phosphorus, and other minerals needed by the host plant. One of the enzymes that is secreted by the fungi is laccase. This enzyme is known to

oxidize para-diphenols through free radical reactions. The active site structure of laccase is made up of copper (II) histidine complexes. The most interesting part of these complexes is the bond between the nitrogen in the imidazole ring of the histidine and the copper at the center of the complex. In order to study the interactions between the copper and the nitrogen in this complex, a model was created: Cu(II)Imidazole4Cl2. The copper-nitrogen intramolecular interactions were studied in both solid and solution form through Ramen spectroscopy, solid form through diffuse reflectance, and in solution form through UV-Vis spectroscopy. This data was then compared to electronic structure calculations.

P7 "Determining the Association between Social Support, Sexual Behaviors and HIV Related Stigma in AAMSM in the Deep South"

Zoe' Beckworth[1], Daniel Chavez- Yenter[2]
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The HIV epidemic among African American men who have sex with men (MSM) is one of the most urgent public health challenges in the United States. African Americans comprised 14% of the national population but accounted for 44% of new HIV infections in 2009, with MSM accounting for 51% of new infections among all African Americans. In 2015, there were twice as many Black MSM diagnosed with HIV than white MSM. The Centers for Disease Control and Prevention estimates that 1 in 2 Black MSM will become infected with HIV if current trends in HIV prevention, care and treatment continues. Findings of existing studies have suggested that higher level of social support might be generally related to fewer HIV-related risk behaviors in MSM. Chi-squared testing was used to test for associations in data from the MARI survey to understand the relationship between social support and sexual behaviors that lead to HIV. The MARI study is a two-city, population-based cohort study designed to study behaviors and psychosocial factors among Black MSM in the Deep South (Jackson, MS and Atlanta, GA) and to investigate the determinants of HIV risk and sexual behaviors. Surprisingly, more men who have sex with men have medium to high levels of social support. Out of the 330 men surveyed, only 84 reported having low levels of social support. There was no significant association that linked higher levels of social support to safer sex practices or lower prevalence of HIV.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P8 "Student Research Success in an Inner City High School STEM Classroom"

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Jim Hill High School, a large but under resourced, inner city school, implemented a specialized science program labeled SOAR (Student Oriented Academic Research) in September, 2000. SOAR students undertake a defined series of Carnegie credit-accruing courses under the leadership of a single high school teacher. In 2016, a Health Science Academy component was added to the program. Uniquely, SOAR participants are self-selected based on interest and attitude and student grades in previously completed science classes have no impact upon admission. Once students begin SOAR, they have the option to remain in the program for up to three years. Over the past 18 years, over 1500 students have been

trained, 80 of whom have been in the health science academy component. The students have participated in 16 community science public forums; 16 American Heart Association Heart Walks; 50 have served as local elementary school science fair judges; and 80 have been trained as UMMC Community Health Advocates. Students conducted a school wide health fair in 2017-18 and discovered two individuals with previously undiagnosed type one diabetes. Of particular note has been the successes garnered by student participation in science fair at all levels. For the last 11 consecutive years, Jim Hill students have received the trophy for the most winning projects at the 11th and 12th grade level at Region II Science Fair. For the past two years, students have received the trophy for the most winning projects at the 9th and 10th level as well. The greatest success was noted in 20xx, when Jim Hill students were awarded 63 % of all awards received at Region II Science Fair. That same year, 23% of all awards given at the Mississippi State Science Fair were presented to Jim Hill students. A total of 12 students have been selected to compete at the International Science and Engineering Fair since 2000. Teacher guidance and curriculum realignment offers opportunities to improve engagement of and demonstrate success by high schools students in science research activities. "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."

P9 "Dalpha-5 Gene Expression in *Drosophila melanogaster*"

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MicroRNAs (miRNA) have been well established as a potent regulator of the gene expression and are generated through number of pathways. Mirtrons are a class of miRNA that are generated through a drosha independent (non-canonical) pathway. Although the large population of mirtrons have been identified in animal genomes, their functional studies remain least explored. In this study, we try to uncover the biological role of tailed mirtron 1017 in *Drosophila melanogaster*. For this, we first tried to observe the expression pattern of Dalpha5 in the wild type flies as well as in the miR-1017 mutant background using Dalpha5-GFP flies. miR-1017 has been found to target the acetylcholine receptors, Dalpha5, and therefore decreases its expression. We hypothesized that expression of Dalpha5 is regulated in activity dependent fashion. To test the hypothesis, we feed the Dalpha5-GFP flies with Donepezil, which elevates AchR activity and Mecamylamine, which is a known AchR antagonist. Drug treated fly brains are dissected and immunohistochemistry is carried out using anti-GFP for visualizing GFP expression. The expected results are that the Dalpha-5 gene would affect the level of activity of acetylcholine. Therefore, Donepezil will increase the expression of Dalpha-5, and Mecamylamine will decrease the expression of Dalpha-5. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS and the Mississippi INBRE Research Scholars Program.

P10 "But Do Apples Really Fall Far From Their Tree?"

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Teen pregnancy is a very common and important public health issue. The Center for Disease Control and Prevention (CDC) announced an eight percent decrease in teen birth rates (births per 1,000 females ages 15 to 19 years) from 2014 to 2015. This decrease was present in all races, including Hispanic teens; however, the disparities which influence teen pregnancy persist. This trend suggest that there are other compelling factors that are contributing to the rates of teen pregnancy such as socioeconomic disparities. Many youth today live in stressful environments where there is increased unemployment rates, violence and substance use present, and poor housing conditions (Reproductive Health Equity for Youth- RHEY). According to the CDC, certain social determinants of health, such as the environment in which a teen lives, high unemployment, low income, and low education have been associated with teen pregnancy. Female teens in child welfare systems are at an increased risk of teen pregnancy and birth than other groups; those living in foster care are more than twice as likely to become pregnant than those who are not. Many pregnant teens believe that their babies will lead lives very different from their own. However, they feel that by having a child will improve their lives, when in fact they are only exposing their child to the same life they lead (Trickett, 20). Compared with babies of older mothers, those born to teenagers are more likely to have lower birth weights, increased infant mortality, an increased risk of hospital admission in early childhood, less supportive home environments, poorer cognitive development and, if female, a higher risk of becoming pregnant themselves as teenagers (Langille, 1). The aim of this study is to evaluate the influence of violence, drug abuse, and family relations and structures on teen pregnancy.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P11 Allosteric Drug Designing for Breast and Prostate Cancers with Acquired Hormone Therapy Resistance

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About 30% of ERα positive breast and AR-A positive prostate tumors are found to develop resistances to hormone therapy and resume growth in hormone independent manner. This presents a major challenge in drug designing. Both these malignancies exhibit an increased level of CaM and CaM-ER and CaM-AR complexes and ERα and AR-A isoforms suggesting hormone-independent pathway to transcription. Accordingly, hormonal therapy, which targets suppressing hormone synthesis (aromatase inhibitors) or altering the conformational landscapes of the receptor's co-regulator binding domains using selective receptor modulators, fails to inhibit these hormone-independent pathways. In order to address the issue, we identify and validate alternate allosteric protein targets and use them to develop new generation of anti-cancer agents. Using the crystal structures of ERα and AR-A Ligand binding and DNA binding domains, molecular modeling, molecular dynamics simulations, and bioinformatics we identified the hydrogen-bonding contacts and sequence motifs that are responsible for dimerization and/or DNA recognition. The crucial amino acids of a motif are then grafted on stable helices (alanine and glutamine) in order to develop peptide-based inhibitors. In ERα, using the dimerization sequence motif LQXXHQXXAQ (497-506) as a template we have developed designer peptides AAHQALAQAAAAAAAAA and AADQADAQAAAAAAAAA which exhibit significant suppression of ER-expression in MCF-7 breast cancer cell lines. The designer

peptides inhibit ERα dimerization – an essential process in ER mediated transcription. In AR, protein-protein binding contacts are insignificant to find a suitable target. The LCAXRXD motif (578-584) of AR that binds with AR and DNA is being studied for its suitability to develop designer peptide. Discovery of novel protein targets from protein-protein interfaces would open avenues for the development of a new generation of peptide based and small molecule therapeutics for tamoxifen-resistant breast cancers and casodex-resistant prostate cancer and would complement already existent ligand-based therapy.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P12 "Implementation of AAPM TG-132 Recommendations in the Treatment Workflow with the Gamma Knife Icon"

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Purpose: Gamma Knife Radiosurgery is a precise form of therapeutic radiation that is used to treat malignant and benign tumors with focused radiation beams. With the advent of the Gamma Knife Icon, treatment delivery is highly dependent on registration accuracy of multiple imaging modalities. AAPM TG 132 provides professional recommendations to quantify the accuracy of an image registration system including recommended quantitative tests: target registration error (TRE), mean distance-to-agreement (DTA), and DICE similarity coefficient. We hypothesized that all calculated (TRE) and mean DTA for the image study combinations of CT – MRI, CBCT – MRI, and CBCT – CT will be less than the maximum image voxel size involved in the specific registration and that the DICE would be greater than 0.8
Methods: TRE, Mean DTA, and DICE were used on two computer-generated phantoms – one geometric and anatomic; then, images for ten patients (IRB 2017-0266) were anonymized and analyzed with the same tests. Finally, descriptive and inferential statistics were performed such as mean, standard deviation, 95% confidence interval, median, and Student's t test in order to further compare the image registration combinations.
Results: The hypothesis related to TRE and mean DTA was confirmed, however, DICE was not consistently greater than 0.8 for all comparisons. CBCT registration to CT and T1 MRI was statistically significant with smaller TRE values than CT to T1 MRI.
Conclusion: Improved registration results with CBCT may be due to smaller voxel size for those modalities though max voxel size of involved image modalities does not change.
Acknowledgement: This work was funded by Mississippi INBRE through the NIH-NIGMS grant number P20GM103476.

P13 "Influence of Alginate and Oxidized Alginate Degradation Rates on Polymeric Wound Dressings"

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Alginate is a natural polymer commonly used in the field of biomaterials. Electrospun nanofiber mats created by this polymer have the capability of regenerating tissue and serving as both a wound healing dressing and a drug delivery system. The fibers from the alginate mats will not degrade effectively in a

biological environment. By partially oxidizing the alginate backbone, hydrolytic degradation is induced allowing the alginate to become more efficient for drug loading and release rates. In this study we analyzed the degradation rates of both alginate and oxidized alginate over the course of two months. The degradation of these polymers were effected by various pH levels and temperatures. The data from this study can be used to create a more effective and efficient drug-loaded wound dressing.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from NIGMS under P20GM103476.

P14 "Mommy & Me: Developmental Delays in Children Born to Adolescent Mothers"

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Teen pregnancy in the U.S. has been a pressing issue for many years. The rates have fluctuated over the years causing for further research. Birth control and condom usage have been strongly promoted in various communities in order to reduce the incidence of adolescent pregnancies and the spread of sexually transmitted diseases. According to the Centers for Disease Control and Prevention in 2013, teen births declined, but still more than 273,000 infants were born to adolescent mothers, ages 15 to 19. According to the National Center for Biotechnology Information (NCBI), 20% of children born to adolescent mothers have developmental delays. A developmental delay is defined as the condition of a child being less developed, mentally or physically, than is normal for its age. We used the scholarly article Developmental Status of Children of Teen Mothers: Contrasting Objective Assessments with Maternal Reports by the U.S. Department of Health and Human Services as a guide for our project. Data from various scholarly articles and other sources were also collected that highlighted multiple components of developmental delays in children. Using sets of secondary data, our research examined developmental delays reported of children born to adolescent mothers. Most areas of delays were in problem solving, personal/social, and gross motor skills. We conclude that adolescent mothers hinder developmental skills because they are less likely to be aware of the associated developmental risks among their children. Preventive programs and services can help adolescent mothers avoid physical, cognitive, communication, social, emotional, and behavioral delays in their children.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P15 "Exploring the association between Income, Education, and HIV diagnosis AAMSM aged 18-29 in Jackson, Mississippi"

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Males have consistently higher rates of HIV infection than females. Trends show that men are nearly four times as likely to be infected with HIV. In 2015, males represented 78% of all reported cases and among

those living with HIV in Mississippi; African American men had the highest prevalence rates. In this research we used The MARI Study which talks about the high prevalence of African American males who have sex with men(AAMSM). We analyze the demographics sections of The MARI Study, which include income, education level, age and socioeconomic status. After looking at the data, our hypothesis stating education and income has a relationship with African American men who have sex with men have a higher prevalence of HIV is inaccurate. We are interested in income and education because if a person does not have the financial resources for regular screening and preventive care, their limited access may create more barriers to care.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P16 "Investigating the Relationship Between HIV Diagnosis and Depression Among African American MSM Aged 18-29 in the Jackson MSA"

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Little is known about the prevalence and impact of depression in persons newly diagnosed with HIV. People living with the HIV exhibit more severe mental health symptoms than do members of the general public (including depression and PTSD symptoms). Most studies focus on depression in outpatients already in the process of establishing care. The purpose of this project was to determine if there is a significant relationship between HIV diagnosis and depression. Participants in the study were African American MSM, living in the Jackson, MS area. A questionnaire, of various topics regarding social support and depression, was given to examine personal experiences. Of the 323 participants, 133 reported as being HIV positive. Of those HIV positive individuals, 50% reported experiencing fewer symptoms of depression, which determined there was no significant relationship between depression and HIV diagnosis. Though these results did not reach statistical significance, screening for and treating depression at the time of HIV diagnosis may improve linkage to and retention in HIV care. There is also a lack of knowledge among health care providers about LGBT related issues and training around mental health services for the LGBT population in medical education. If left untreated, depression can cause HIV-infected individuals to stop their treatments, stop going to medical appointments, and to actively not stay engaged in personal care in general.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P17 "Compressive Modulus of 3D Printed Polylactide Scaffolds"

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For decades, metal alloys have been the primary materials used for bone implant fabrication. Recently, research on polymeric materials has led to the development of biodegradable materials for orthopedic applications. The purpose of this study was to determine the mechanical properties of 3D printed polylactide scaffolds as a function of pore size (560 µm, 700 µm), number of layers (1, 2), and number of struts (5, 6). Our hypothesis was that the Young's modulus would be greater for scaffolds with smaller

pores, and that no differences as a function of number of layers or number of struts would be observed. Eight scaffold models were designed using CAD (Solid Works) and fabricated via 3D printing (Makerbot Replicator Z18, n = 5). Compression tests (MTI-2K) were run at a displacement rate of 1 mm/min. Force data was normalized to the cross-sectional area of the columns that form the scaffold. Young's modulus was determined from the best-fit line through the linear portion of the stress-strain curve. Differences among groups were evaluated by three-way ANOVA with post hoc Tukey analysis (SAS 9.4). As expected, Young's modulus was significantly greater for 560 μm scaffolds compared to that for 700 μm scaffolds ($p<0.0001$), and no effect of number of struts was observed. However, there was a significant effect of number of layers ($p<0.0001$). Current work includes finite element modeling of the scaffold geometries to determine load distribution and for comparison of theoretical and measured effective elastic moduli of these scaffolds.

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P18 "Trichomonas vaginalis virus Typing of 36 Mississippi isolates of Trichomonas vaginalis "

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Trichomonas vaginalis is the protozoan parasite that causes trichomoniasis, which is the most common non-viral STD in the world. The parasite itself can be infected with a double-stranded RNA virus called Trichomonas vaginalis virus; there have been four strains of this virus (TVV1-TVV4) identified. Reverse transcription polymerase chain reaction (RT-PCR) with strain specific primer sets was used to type 36 Mississippi T. vaginalis isolates. TVV sequences were confirmed by Sanger sequencing. These data represent the first comprehensive analysis of TVV in Mississippi and in conjunction with clinical data will begin to help researchers understand the phenotypic effects, e.g. drug resistance, associated with the presence of individual TVVs.

P19 "Investigating Adolescent Sex Health Knowledge and Teen Pregnancy Rates in the Southwest Mississippi River Region"

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Recently there has been a gradual increase in the teen pregnancy rates in the Southwest Mississippi River Region. Issaquena County has the highest teen pregnancy rate (55.6%), and Claiborne County has the lowest pregnancy rate (39.8%); Adams County has a median rate of 45.7%. During this research, Adams County will be the focus due to the higher amounts of suitable data for the county. The Southwest Mississippi River Region, specifically Adams County, have teen pregnancy rates that are higher than the national average. The national teen pregnancy rates are 22.3 pregnancies per 1,000 people, but in Adams County the rate is 37 pregnancies per 1,000 people. I hypothesize that there will be a direct correlation in adolescent sex health knowledge and teen pregnancy rates in the Southwest Mississippi River Region, specifically Adams County. An analysis was performed to determine if a correlation between teen pregnancies and condom knowledge exists. The target group examined adolescents aged 15-19 in the

Southwestern Region of Mississippi. SPSS was used to analyze the data and generate graphics to depict the results of the analysis. During research, I discovered that adolescent sex health knowledge in the Southwest Mississippi River Region, particularly Adams County, are not reflective of the pregnancy rates of this region for the year 2016. There is not a reflection being represented between the teen pregnancy rates and the adolescent sex knowledge in Adams County. There is a positive trend in relation to sex knowledge but the pregnancy rates are continuously soaring.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P20 "Synthesis of Various Spacers and Drugs for Conjugation to ELPs"

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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.
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.
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P21 "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 pathogen and causes the disease listeriosis. The gram positive facultative anaerobe can tolerate the stressors it encounters in the gastrointestinal tract, such as bile and acidic conditions. Previous data have suggested that oxygen and bile availability influence the stress response. It has been observed that bile resistance *of Listeria monocytogenes* strain F2365 increases under anaerobic condition. It was hypothesized that genes involving oxidative stress response will be differentially regulated under physiologically relevant condition of acidic pH and anaerobic environment. The aim of this study was to determine how the growth and differential gene expression of *L. monocytogenes* strain F2365

is regulated under acidic pH upon exposure to bile at anaerobic conditions, which mimics the physiological environment of duodenum. Cells were grown aerobically as well as anaerobically to mid- logarithmic phase, then exposed to either 0% or 1% bile under both neutral and acidic pH. After the bile exposure, growth was observed for 7 hours both aerobically and anaerobically by viable plate counts. There was significant change in growth of F2365 under bile exposure at acidic pH. Whole trancriptomic analyses were carried out using RNA isolated from *Listeria monocytogenes* F2365 at both aerobic and anaerobic conditions, upon exposure to 0% and 1% bile at acidic and neutral pH. Gene Ontology analysis indicated that genes responsible for stress response, DNA repair, removal of super oxide radicals etc. are upregulated upon bile exposure under anaerobic condition at acidic pH. Hence, this study demonstrates that upon exposure to bile at pH of 5 under anaerobic conditions, stress response of *Listeria monocytogenes* F2365 is differentially regulated which may impact its pathogenicity.

P22 "Evaluating the Effects of Cell Membrane Fatty Acid composition on the Resistance to Bile-Induced Damage in Avirulent strains of *Listeria monocytogenes"*

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Listeria monocytogenes is a gram-positive, foodborne pathogen that causes listeriosis. When this bacterium enters the gastrointestinal tract, it encounters stressors including bile and low oxygen availability. The goal of this project was to determine if the incorporation of fatty acids into the cell membrane from bile improves bile survivability among avirulent strains of *Listeria*. To do so, the three *L. monocytogenes* strains HCC23, L028, and 15313 as well as the *Listeria* species *L. innocua* were tested. For each, the fatty acid profiles were determined after bile exposure using Fatty Acid Methyl Esters (FAME) analysis. Previous results from our lab have shown that fatty acids were incorporated into the cell membrane when exposed to bile, but this incorporation only improved the bile survival of an avirulent strain. The bile survival of each avirulent strain was determined under both anaerobic and aerobic conditions following pretreatment with a commercial lipid mix (Sigma L0288). Based on changes in the cell membrane lipid composition, the rigidity of the membrane was also measured through anisotropy using the florescent dye, DPH (1,6-diphenyl-1,3,5-hexatriene). The results from the aerobic survival assays showed that the incorporation of fatty acids improved bile resistance for the strains, but only the strain, 15313 had an increase in bile survival under anaerobic conditions. The results suggest that avirulent strains may incorporate fatty acids to survive bile, but at the expense of a loss in fitness. Further research is needed to ascertain if the fatty acid incorporation impacts the expression of cell membrane efflux pumps.

P23 TnSeq Screening for Novel Antibiotic Importers in Streptococcus pneumoniae

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Streptococcus pneumoniae (pneumococcus) is a Gram-positive bacterium that asymptomatically colonizes the human nasopharynx and is also capable of causing invasive disease including pneumonia

and meningitis. Antibiotic resistance is increasing significantly and finding novel ways to treat infections is therefore crucial. Due to the inability of many antibiotics to freely diffuse through the bacterial cell wall, we hypothesized that certain antibiotics may be imported by specific transporters normally used to transport other substrates. To test this hypothesis, we have utilized a magallan6 transposon mutant library of strain D39 to screen for mutants capable of growing on various antibiotics. We isolated several pneumococcal mutants capable of growing at concentrations of fosfomycin and azithromycin well above the minimum inhibitory concentration (MIC) for this species (~16µg/mL) and (~0.5µg/ml). Growth of a fosfomycin mutant, Fos1, was not affected by concentrations up to 500µg/mL as determined by 24 hr growth curves. Azithromycin resistant mutants AZ5 and AZ6 were able to grow at 20µg/ml. Chromosomal DNA flanking the transposon insertion sites was sequenced and revealed SP1208 (uridine kinase) as the gene interrupted in Fos1, and SP0268 (pullulanase) in AZ5 and AZ6, respectively. We are currently creating deletion mutants in these two genes to confirm the phenotype and plan to extend this research to identify transporters for additional classes of antibiotics. Identifying compounds that can induce expression of such antibiotic transport/modification systems will allow us to dramatically increase the concentration of the antibiotics within bacteria, thus overriding resistance mechanisms and resurrecting antibiotics rendered useless against many drug-resistant pathogens.

P24 Synthesis and Characterization of Novel Elastin-Like Polypeptides

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Elastin-Like Polypeptides (ELP) are class of biopolymers that are composed of a repeating pentapeptide sequence that mimics mammalian elastin with the structure VPGXG. ELP has a Low Critical Solution Temperature (LCST) which enables it to dissolve in solution at lower temperatures and above the LCST the ELP aggregates into insoluble coacervates. This work makes use of a robust chemistry to attach various biocompatible Lewis bases to the ELP molecules. This will allow the ELP to act as an electron donor to specific types of atoms that are electron deficient. These atoms will act as coordination centers for the ELP molecules and allow them to exhibit certain advantageous and tailorable properties. This work will explore how stereochemistry, and different electron deficient molecules change the behavior of ELP and its transition temperature. Nanodrop UV vis will be used to explore how changing the electron deficient molecules effects the electrons in the ELP and thus the UV wavelength absorbance. FT-IR will demonstrate the change in functional groups after the reactions have occurred. Lastly, dynamic light scattering will be used to show a change in transition temperature of the ELP when exposed to different variables.

P25 "MOM is the Best: Accessing the Evidence That Supports the Benefits of Mother's Own Milk (MOM) And Factors That Influence A Mother's Decision to Breastfeed"

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Infant mortality and premature birth are two catastrophes that are ignored far too often due to the uncomfortable idea of death, especially infant death. It is hypothesized that a correlation exists between low breastfeeding rates and high infant mortality rates in Mississippi. The purpose of this secondary data-analysis research was to access updated scientific evidence on the benefits and nature of Mother's Own

Milk (MOM) and examine factors that influence a mother's decision to breastfeed. In total, 22 public reports, peer-reviewed literature, and data graphs that have been published between 2013-2018 were reviewed to analyze and synthesize information for this secondary data analysis to provide updated information pertaining to breast milk, breastfeeding, infant mortality, and factors that influence breastfeeding. The exploration demonstrates that factors, such as, but not limited to, household income, maternal (age, education, and race) represent vital justifications for a mother's decision to breastfeed. As reviewed, there are many health and wellness benefits for the mother and child if a mother chooses to breastfeed or provide human milk to her infant. The data spotlights breast milk as a vital source of nourishment and key ingredients for survival in term and preterm infants alike, while also underlining barriers associated with exclusive breastfeeding. Education on the benefits of breast milk and exclusive breastfeeding and supportive outreach among all Mississippi mothers, regardless of their age, race, education, or income, will be the next step towards reducing the high infant mortality rates in Mississippi.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P26 Novel Small Molecule Inhibitors of Human Cytomegalovirus (HCMV) Replication

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Human cytomegalovirus (HCMV) is a herpesvirus closely related to the viruses that cause oral and genital herpes, chickenpox, and shingles. Although HCMV is normally latent in healthy individuals, the infection can be life-threatening in immunocompromised individuals and neonates. There is no vaccine approved for HCMV infection and the antiviral drugs that are available suffer from side-effects, low efficiency, and resistance. Therefore, there is an urgent need to find newer drugs and therapies. Our laboratory screened several small molecules with antiviral promise. Most of these candidates came from a library of small molecules obtained from National Cancer Institute and a few were synthesized by a collaborating laboratory. Preliminary screening identified five candidates with excellent antiviral potential against HCMV and little to no cytotoxicity. The main hypothesis in this project is that these identified antiviral candidates block a specific stage of virus replication in host cells. Analysis of viral protein expression reveals that none of these five candidates block early to late viral protein expression. We are currently investigating the localization of viral proteins in inhibited cells to study impact on viral protein trafficking. The long term goal of this project is to characterize the mechanism of action of identified antiviral candidates at molecular level using animal model of HCMV infection in order to determine in vivo efficacy so that some of these candidates can be tried in future human clinical trials.
Acknowledgement: This work was funded by Mississippi INBRE through the NIH-NIGMS grant number P20GM103476.

P27 "Preparation and characterization of viral stocks of insect-specific flaviviruses"

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Abstract: Flaviviruses are a group of single-stranded RNA viruses including Zika, Dengue, and West Nile viruses that can cause a leading health concern to humans and animals in the world. Development of antiviral vaccines is an urgent and unmet demand to combat these viral infections. Insect-specific flaviviruses (ISV) are some of the flaviviruses that only infect and replicate in insects, such as mosquitos or ticks. These ISVs have the potential to be developed as a safe and efficient vaccine candidate against Zika virus and various other flavivirus infections. In this study, we prepared viral stocks of ISVs, i.e. Cell Fusing Agent (CFAV), Kampung Karu (KPKV), La Tina (LTNV), Long Pine Key (LPKV), and Nhumirim viruses (NHUV). These ISVs are a relatively new discovery; however, they can be found throughout all of the American continents and Asia. New viral stocks were established through the resuspension from powder and growth of the ISFs CFAV and KPKV in C6/36 cells. ISVs Zika, Dengue, and West Nile virus allow us to generate chimeric viral vaccine candidates. In addition, these viruses can also be studied for the mechanisms of flaviviral transmission between vertebrates and invertebrates.
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.

P28 "Effects of Prolonged Sitting on Central Cardiovascular Hemodynamics and Cognitive Function"

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Prolonged sitting can negatively impact markers of peripheral vascular health. Whether sitting can have a similar impact on central cardiovasuclar hemodynamics and cognitive function, and if pre-existing morbidities amplify these effects are unknown. To address this, participants (N=20, age=26±7; BMI=30±7 kg/m^2; 7 female) were taken through 3 hours of sitting followed by a 10-minute walk (treadmill). Cognitive function (Stroop test) and cerebral perfusion (near infrared spectroscopy; total hemoglobin—tHb) were assessed during sitting (10, 60, 120, and 180 mins) and following the walk. Central cardiovascular hemodynamics and aortic stiffness (pulse wave velocity—aPWV) were measured via the oscillometric method before, during and after sitting. Bodyfat%, and accelerometry data were used to characterize weight and physical activity status. Following sitting, there was no change in Stroop times; however, both Color and Text times decreased following the walk (e.g., Color Time: 10 mins sitting, 19±3 sec vs. Post walk, 16.7±3.6 sec, p<0.001, d=*0.66*). A similar finding was noted for change in reaction time (e.g., p=0.036, d=*0.5* for Color trial). Cerebral perfusion did not change during sitting, but increased during walking (180 mins sitting=415±38 μM vs. 10 mins of walking=432±42 μM; p<0.001, d=0.44). There was an increase in aPWV for normal weight (Pre-sit=5.3±0.8 vs. Post-sit=5.6±0.9 m/s, p=0.028, d=0.38), but not in participants classified obese (p=0.135, d=0.27). These findings suggest that a 3-hour bout of prolonged sitting did not appear to alter cognitive function or cerebral perfusion but may increase aortic stiffness in

normal weight individuals. Walking can improve cognitive function, an effect possibly related to increases in cerebral perfusion.
Acknowledgement: This work was supported by a grant through the American Kinesiotherapy Association grant# GR05488.

P29 Nightmare Treatment: Clinician versus Smartphone

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Sleep plays a vital role in human functioning. Unfortunately, sleep deficits are very common in military and veteran communities, with approximately half of veterans returning from deployment suffering from nightmares. Frequent sleeping difficulties are associated withposttraumatic stress disorder and suicide. Accessibility of evidenced-based treatments is limited, but use of smartphone applications (SPA) may be a viable way to extend the reach of nightmare therapies. However, the acceptability, feasibility, and effectiveness of using SPA for nightmare treatment has not been explored. This study examined the effectiveness, acceptability, and adherence of smartphone administered imagery rehearsal therapy (SPA) and in-person imagery rehearsal therapy (IRT) in a sample of veterans. Participants (N = 13) were veterans endorsing at least one nightmares a week and were randomly assigned to one of the active treatment conditions. Participants were assessed at baseline, 1-week post treatment, and 4-weeks post treatment. Surveys and clinician administered interviews were collected at each time point, in addition to daily surveys regarding sleep and substance use. There were no significant differences between the in-person therapy group and the SPA group. The Dream EZ app did result in significant reduction in nightmares (p=.02), insomnia (p=.02), and PTSD (p=.01) symptoms, whereas there were no significant improvements in the group receiving in-person IRT. This study was an initial step to demonstrate the effectiveness of the Dream EZ app and shows the potential of the app to increase availability of nightmare treatment.

P30 Exploring the Activity of MauG on the Oxidation of Tryptophan and its Derivatives

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MauG catalyzes the conversion of preMAHD to a fully function MADH by inserting an oxygen atom to the indole ring on -Trp57 and crosslinking -Trp57 and b-Trp108 through post-translational modification. Tryptophan is an essential amino acid and presents in many proteins playing important functional roles. Tryptophan is also a precursor for neurotransmitters and vitamins such as 5-HTP (5-hyrdoxytryptophan), serotonin, melatonin, and vitamin B6 (nicotinamide). In this research, we have found MauG catalyzes the hydroxylation of free tryptophan through a different catalytic mechanism. . The kinetic of the reaction was studied using UV-Visible absorption spectroscopy and supported by LC-MS spectroscopy. Analysis of the kinetic data indicates MauG catalyzes the insertion of first oxygen to tryptophan with a rate constant of 1.8×10^{-3}. The LC-MS study of the reaction indicates that tryptophan is first converted to a mono hydroxyl tryptophan which is then quickly converted to a di-hydroxy tryptophan. The reaction then proceeds to form cross-linked tryptophan which is evidence by a dimer peak in LC-MS and small increase of absorbance at 350 nm. Steady-state kinetic study of the MauG catalyzed oxidation of free tryptophan yields a Km of 3.2 uM.

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P31 Synthesis of polymer binders to study structure/binding interactions with proteins involved in celiac disease

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Approximately one percent of Americans have celiac disease (CeD), an autoimmune disorder that triggers an inflammatory response after genetically predisposed individuals consume gluten-containing products. Currently, there are no pharmacological treatments available for CeD patients, and the only treatment option is a gluten-free diet. While it has been reported in the literature that high molecular weight anionic polymers are able to bind to gliadin (a component of gluten) and reduce the overall inflammatory response, the mechanism of the interaction is not well understood. Previous studies in our laboratories established experimental conditions to synthesize poly(2-acrylamido-2-methylpropane sulfonate) (polyAMPS) and poly(3-methylpropyl-3-methylbutonate) (polyAMBA) at low degrees of polymerization (DP). PolyAMPS and polyAMBA at low DPs were used to test the effects of anionic strength and hydrophobic character on polymer/protein interactions at the molecular level to understand their potential as therapeutic agents for proteopathic diseases.

P32 Vernonia amygdalina Shows Promise in the Management of Acute Promyelocytic Leukemia

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Abstract: The treatment of acute promyelocytic leukemia (APL) has been based on the administration of all-trans retinoic acid plus anthracycline chemotherapy, which is very effective as first line therapy; however 25 to 30% of patients will relapse with their disease becoming refractory to conventional therapy. Therefore, the aim of the present study was to investigate whether medicinal plant induced cell death is associated with necrosis. To achieve this goal, HL-60 cells were treated with different doses of medicinal plant for 24 hours. Cell viability was determined by MTS, trypan blue, and propidium iodide assays respectively. Cell apoptosis was assessed by the flow cytometry. The results obtained from the MTS, trypan blue, propidium iodine assay indicated that at very low dose, medicinal plant has a stimulatory effect on the growth of HL-60 cells. A significant ($p < 0.05$) gradual decrease in live cells was observed when exposed to high level of medicinal plant. Data generated from the propidium iodide indicated that medicinal plant exposure significantly ($p < 0.05$) increased the proportion of fluorescence positive cells (necrotic death cells) compared to the control. This cytotoxicity was found to be associated with necrosis as revealed by a significant increase in dead cell concentration (Fluorescence) with increasing of medicinal plant doses. Data generated from the flow cytometry demonstrated that Vernonia amygdalina induced apoptosis through caspase-3 activation. These results provide useful data on the anticancer activities of *our medicinal plant* in leukemia and demonstrated the novel possibilities of this medicinal plant in developing leukemia therapies.
Keywords: Vernonia amygdalina, HL-60 cells, cytotoxicity, microscope images, apoptosis
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P33 Curriculum Enhancement of the Environmental Health and Bioinformatics Programs at Mississippi Valley State University: Experiential Investigations of Toxicity for Select Environmentally Relevant Nanoparticles

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The production of nanoparticles (NPs) (particles <100nm in any one direction) has steadily increased over the past several decades. Metal NPs such as titanium oxide, copper oxide, and silver are some of the most abundantly produced NPs. Applications range from their use as antibiotics, to agents of bioremediation and wastewater treatment. While nanotechnology holds great promise for a variety of applications, there remains significant question as to the impacts of accumulating of nanoparticles in the environment. With MS INBRE Curriculum Development support, we incorporated experiential investigations of microbial nanotoxicity into MVSU's Environmental Health and Bioinformatics graduate program courses, "Environmental Microbiology" and "Genomes and Genomics and Genome Technology", respectively. Relationships between DNA, mRNA and proteins was central to the curriculum. The production of reactive oxygen species (ROS) following NP exposure was emphasized. Students were given first-hand experience in pure culture techniques and acute exposures to NPs in 96-well plates. Analysis of gene expression through real-time qPCR as a means to assess toxicological response to environmental stressors was covered in lectures and labs. For our studies, we focused on MN-superoxide dismutase (MSD1) and thioredoxin dependent peroxidase (PRX6) as molecular components of biological antioxidant response systems. In addition to experiential laboratory exercises, students learned the importance of bioinformatics analyses. Basic Local Alignment Search Tool (BLAST) search algorithms were used for MSD1 and PRX6 using the National Center for Biotechnology Information public access portal. Queried sequences of MSD1 and PRX6 were aligned and phylogenetic trees were generated using Molecular Evolutionary Genetics Analysis (MEGA 7).

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P34 "Head and Neck Squamous Carcinoma Cells Pre-Treated with Benzyl Isothiocyanate Become Sensitized to the Effects of Chemo-Radiation"

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We demonstrate that in HN12 and HN30 Head and Neck Squamous Cell Carcinoma (HNSCC) cell lines, pre-treatment with the sulphur-containing phytochemical benzyl isothiocyanate (BITC) prior to radiation and cisplatin treatments, significantly sensitized HSNCC cells to therapy by enhancing cell death through a mechanism that involves the induction of apoptosis. We also show that BITC significantly increased cell death through induction of reactive oxygen species (ROS) production. The increase in ROS and decrease in cell viability seen in the HNSCC cells 24-hours following BITC treatment were attenuated by a pre-treatment with the antioxidant Glutathione (GSH). This data demonstrates that increased levels of ROS play an important role in the mechanism by which BITC induces cell death in HNSCC cells. These results

also suggest that the use of BITC holds promise in the clinical setting as a potential adjuvant treatment to enhance the effects of chemo-and radiation-therapy in patients with HNSCC.
Acknowledgement: This work was funded by a startup grant from the University of Mississippi.

P35 "A Comparative Analysis of HIV Risk-Factors Among African American Heterosexual Men and African American Heterosexual Women in the Jackson, MS MSA"

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This project is a comparative analysis that focuses on heterosexual men and women aged 18-30 in the Jackson, MS MSA area. The purpose was to determine if the men or women involved were more vulnerable to contracting HIV based on an analysis of self-reported answers used to create a Client Risk Profile. This sheet contains the main risk factors that would put them at higher risk for contracting HIV. After creating a frequency report with the answers of the participants; we were able to identify prevalence of risk in both men and women. The analysis revealed insignificant difference in the number of women vs. men who tested positive for HIV; however, there were a larger number of women who participated in high-risk sexual activities. In fact, the numbers were larger for women in the risk factors that follow: sex while intoxicated and/ or high on drugs, sex with person of unknown HIV status, sex with anonymous partner, diagnosed with a sexually transmitted disease (STD), unprotected sex with multiple partners, and sex with someone who is HIV positive. Although they were not diagnosed with HIV in the previous 12 months of this study, if these women continue have these at risk sexual behaviors, then they might come in contact in the near future. Being that women were in fact more susceptible; my hypothesis was rejected.
Acknowledgement: This work was funded by an Institutional Development Award (IdeA) from the NIGMS under grant number P20GM103476

P36 "Nicotine Induced Stress in Human Breast Cells: A Dose Dependent Study"

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Nicotine (NIC) is a major tobacco alkaloid and a component of E-cigarettes. NIC causes injury of various organs which include kidney, prostate and 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 increases risk in the relevant population. In this study we are aiming to find out a dose dependence of nicotine exposure on the human breast cells. We chose HTB26 breast cancer cell as model for breast cell. 100, 200, 300 and 400 µM nicotine in ethanol were used to dose the cells. Phase contrast imaging and cell viability assays are performed, where we noticed dramatic changes in cell morphology and viability at 200 µM and more concentrations of NIC. Further biochemical assays are underway.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476. BS also likes to thank NSF-TIP award 1818528 for research support.

P37 "Development of Benzoxazine Biaryl Quinolines for the Inhibition of HIV-1 Integrase"

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HIV-1 Integrase (IN), the enzyme responsible for insertion of viral DNA into host cell chromatin, represents a multifunctional therapeutic target for HIV-1 treatment. Pursuant of our endeavors to further develop a library of heterocyclic candidates for IN inhibition, we have implemented a synthetic strategy for the preparation of multi-substituted quinoline scaffolds. This presentation will discuss the target allosteric binding pocket within an IN catalytic core domain dimer and the synthetic progress utilized for structure activity relationship studies. Specifically, we have focused on the development of benzoxazine derivatives with a 4-step synthesis. This strategy utilized a benzoxazine boronic ester which was coupled to the quinoline scaffold via Suzuki coupling. Subsequent hydrolysis produced the desired quinoline candidates for the biochemical assays. A total of four substrates were examined for their ability to inhibit HIV-1 Integrase. To survey the generated quinolines, we performed dose response measurements for each synthesized compound using an homogenous time resolved fluorescence (HTRF)-based *in vitro* assay.

P38 msaABCR Operon Regulates Cell Death in Staphylococcus Aureus During Biofilm Formation.

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Key problem with *S. aureus* as a pathogen is the acquisition of antibiotic resistance which is further worsened by their ability to produce biofilm. Studies indicates that a subpopulation in *Staphylococcus aureus* also undergo tightly regulated process called Programmed cell death (PCD) in biofilm condition. PCD is beneficial for the surviving population by releasing extracellular DNA, proteins and carbohydrates which are constituents of biofilm extracellular matrix. Also, many cell wall targeting antibiotics acts as inducer for biofilm via cidABC mediated pathway. Previously, we showed that deletion of msaABCR operon led to increased cell death during biofilm development. However, the mechanism behind unregulated cell death in msaABCR mutants' biofilm is still unknown.

To understand mechanism for programmed cell death by msaABCR operon, we performed our assays in TSB supplemented with 35mM glucose. Under excess glucose condition, *S. aureus* culture supernatants are acidic due to buildup of acetic acid which eventually leads to generation of reactive oxygen species (ROS) and the potentiation of PCD which mimics the biofilm micro-environment for cells. msaABCR mutant exhibited increased rate of cell death in stationary growth phase compared to that in the wild-type strain under excess glucose condition, which was reversed to wild type level when they were grown in presence of MOPS buffered TSB with excess glucose. This result suggested that increased production of acetate is trigger for unregulated cell death in mutant. This will be further confirmed by measuring acetate production by wild type vs mutant. Sub-inhibitory concentration of vancomycin, which was shown to be inducer for biofilm production in previous studies, couldn't induce biofilm formation in msaABCR mutant. Vancomycin enhanced more biofilm formation in presence of excess glucose in wild type strain but not in msaABCR mutant. In addition, deletion of msaABCR operon resulted in increased expression of cidR regulon including CidA, CidC and LrgA suggesting its role in PCD in biofilm production via cidABC pathway. Thus, we seek to define the role of msaABCR operon regulating these genes directly or indirectly to show its effect on PCD in S. aureus.

P39 "Analysis of the Photoinduced DNA-cleavage Activity of *N*-Methoxy Substituted Aromatic Heterocycles"

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N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. Applications of photoinduced cell death are found in Photodynamic Cancer Therapy. 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.

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P40 The UMMC Molecular and Genomic Core: A Resource for High Throughput Genome Sequencing in Mississippi

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The University of Mississippi Medical Center (UMMC) provides centralized access to molecular and genomics expertise and services through its Molecular and Genomics Core Facility (MGCF). The mission of the MGCF is to serve as a nucleus to develop research and educational programs to increase the competitiveness and enhance biomedical discovery of researchers at UMMC and across the State of Mississippi. In recent years, high-throughput genomic technologies, such as next-generation sequencing (NGS) has been increasingly useful to understand the complex interactions associated with living organisms. The MGCF is equipped with several genomics platforms, including instruments for NGS (Illumina NextSeq500, MiSeq, and pending purchase of iSeq) as well as single cell sequencing (Bio-Rad ddSeq single-cell isolator) capabilities. These instruments provide high-quality platforms for diverse applications from bacterial whole genome sequencing, 16S microbial sequencing, amplicon sequencing, to mammalian level genome sequencing (WGS), and whole transcriptome analysis (RNAseq). Specifically, the MGCF provides investigators: (1) consultation for implementing genomic technology; (2) sample preparation, quality control, and storage; (3) sequencing and genotyping; (4) microarray, NGS, and validation via quantitative real-time PCR (SYBR green and Digital Droplet); and (5) preliminary bioinformatics analysis. In summary, the MGCF provides cutting-edge genomic technologies and genomics expertise to academic institutions throughout the State of Mississippi to enhance scientific discovery.

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P41 "Synergistic Effects Of Proteasomal And Lysosomal Enzyme Inhibitors On Plasma Membrane CFTR"

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BACKGROUND AND OBJECTIVES: A mutated CFTR (Cystic Fibrosis Transmembrane-conductance Regulator) impairs chloride ion channel, and is responsible for causing the genetic disease cystic fibrosis. Our laboratory has shown that the plasma membrane half-life of the most common of CFTR mutations (DF508) is much shorter (~4 h) than that of wild-type CFTR (>48 h). [Heda et al, Am J Physiol, 280, C166-C174, 2001]. We hypothesize that this reduced DF508-CFTR half-life may be due to the distinct role of proteasomes, lysosomes and/or CFTR-protein(s) interactions. In this study we present the effects of some potent inhibitors of proteasomes and lysosomes and their synergistic effects in rescuing the CFTR from degradation. METHODS: Epithelial cell lines from human lung (CFBE) stably transfected with DF508 or wild type CFTR were pre-treated with 5 mM sodium butyrate at 27^{o}C for 60 hrs to up-regulate the plasma membrane CFTR expression. Cells were then "chased" at 37^{o}C in the presence of protein synthesis inhibitor (cycloheximide) and/or inhibitors of proteasomes (MG132, lactacystin, ALLN, leupeptin), or lysosomal enzymes (E64, EST, chloroquine). Cell lysates were immunoblotted with anti-CFTR antibody and CFTR-specific signal was detected by chemiluminescence using c300 image analyzer (Azure Biosystems). RESULTS: All inhibitors with the exception of chloroquine partially rescued the degradation of plasma membrane DF508-CFTR in CFBE cell line. There is little or no synergistic effects was observed when these inhibitors were used in combination. CONCLUSIONS: Our data suggests that CFTR degradation is partially controlled by proteasomes and lysosomal enzymes.

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P42 Altered hormone receptor expression in rat placenta following maternal vertical sleeve gastrectomy

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Intrauterine growth restriction (IUGR) results in long term metabolic disease later in life. Our previous work using vertical sleeve gastrectomy (VSG) to surgically reduce maternal obesity prior to pregnancy, results in small-for-gestational age offspring that develop greater metabolic disease later in life compared to obese controls. The mechanism driving this transmission of metabolic disease following bariatric surgery from mother to offspring is undetermined.

VSG in humans and rodents results in elevated bile acids and glucagon like peptide-1 and reduced ghrelin amongst a variety of other circulating hormone changes. Independent lines of research have been undertaken to determine whether these hormone changes are independently sufficient to elicit the improvements identified following surgical weight loss. Though these hormone alterations are potentially beneficial in the non-pregnant setting, in the context of VSG pregnancy these types of hormone changes collectively may adversely affect placental development and fetal health.

Here we performed VSG or Sham-VSG in female Long Evans rats and after 5 weeks recovery, we performed timed breeding. At gestational day 19, animals were euthanized and placenta excised and processed for real-time PCR-based gene expression analysis. When compared to placenta from lean, body-weight matched control dams, VSG placenta exhibited reduced mRNA expression of insulin receptors

(ir), leptin receptors (obr), androgen receptors (ar) and bile salt export pump (abcb1). Furthermore, VSG placenta expressed significantly increased ghrelin O-acyltransferase (goat) mRNA, the rate limiting enzyme for production of active ghrelin. No differences were identified in ghrelin receptor (ghsr) or glucagon-like peptide 1 receptor (glpr).
Taken together, these preliminary data suggest that during VSG pregnancy, the fetal-placental unit responds to the altered hormonal milieu of the dam. Further work is required to determine the role of these particular hormones in the growth and development of the fetus and whether they contribute to the long-term outcomes of VSG offspring.
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P43 Interleukin-17 Mediates Activation of Cytolytic Natural Killer Cells in Pregnant Rats

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Preeclampsia is a hypertensive disorder of pregnancy characterized by intrauterine growth restriction (IUGR), and chronic immune activation including increased T_H17s and cytolytic NK cells (NK_C). We recently developed a novel model of preeclampsia in which placental ischemia (PI)-induced T_H17s cause a preeclampsia-like phenotype in pregnant rats characterized by hypertension, IUGR, and increased NK_C. In the current study, we investigated a novel role for IL-17, the main cytokine secreted from T_H17s, to directly induce NK_C activation in pregnancy. IL-17 (150 pg/day) was chronically infused into normal pregnant (NP) rats from gestation day (GD) 12-19 (NP+IL-17) via i.p. minipump. On GD 18, carotid catheters were implanted and on GD 19 MAP, fetal weight, placental weight, placental NK_C, and NK_C-associated proteins were measured and NK cytotoxicity was assessed in vitro. MAP increased from 100±3 mmHg in NP (n=9) to 115±1 mmHg in NP+IL-17 (n=12). Fetal weight decreased from 2.5±0.04 g in NP to 2.3±0.03 g in NP+IL-17. Placental weight decreased from 0.62±0.02 g in NP to 0.55±0.01 g in NP+IL-17. Placental NK_C increased from 2.6±1.6% in NP to 11.3±2.2% in NP+IL-17. Placental levels of NK_c proteins were increased in NP+IL-17 compared to NP rats. Importantly, placental NK cell in vitro cytotoxicity against YAC1 cells was 72.04±9% for NP and 126.7±14.6% for NP+IL-17. These data demonstrate a shift from non-cytolytic NK to NK_C cells in the placentas of NP+IL17 rats. In addition to hypertension and IUGR, this study demonstrates novel roles for IL-17 to directly activate NK_C during pregnancy.
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P44 Renal Injury following pregnancies complicated with HELLP Syndrome and Acute Kidney Injury in rats

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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%. Women with a history of HELLP are reported to have higher incidences of kidney disease compared to women with histories of normal pregnancies. We tested the hypothesis that rats with HELLP+AKI during pregnancy would have post-partum renal injury. On gestational day (GD)12, miniosmotic pumps infusing sFlt-1 and sEng were placed into rats to induce HELLP. A subset of HELLP and NP rats underwent bilateral renal ischemia-reperfusion surgery for 45 minutes on GD18 to create AKI. Dams (n=4/group) were allowed to deliver and age until post-partum week 12. 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. 3 months post-partum glomerular filtration rates were decreased in HELLP and HELLP+AKI rats compared to NP rats and serum creatinine was significantly increased in HELLP ($p=0.006$, $p=0.03$) and HELLP+AKI ($p=0.001$, $p=0.01$) compared to NP and NP+AKI rats. MAP was significantly increased in post-partum HELLP rats compared to NP ($p=0.02$) and NP+AKI ($p=0.02$). HELLP+AKI dams had a significant increase in MAP compared to NP rats ($p=0.01$). 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.

P45 "Tetrahymena Reticulon (TtReticulon) may be required for *Tetrahymena* conjugation"

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The ability of membranes to fuse to one another is fundamental for many processes including tissue morphogenesis, virus transmission, and secretion. As a result, much work has sought to identify the molecular determinants that regulate membrane fusion. The ciliate, *Tetrahymena Thermophila,* undergoes extensive membrane fusion during mating, in which *Tetrahymena* of different mating types temporarily fuse in order to exchange gametic nuclei. Importantly recent work has suggested that the lipid content at the conjugation junction (the site of fusion) changes during formation of the fusion pore. This change in lipid content is associated with membrane curvature near the arising fusion pores at the conjugation junction. However, this data raise several interesting questions. First, it is unclear whether lipids accommodate membrane curvature or promote membrane curvature. Second, it is unknown how this change in lipids occurs at the conjugation junction. Interestingly, work from Cole et. al suggested that the endoplasmic reticulum may extend into fusion pores during conjugation. This possibility is intriguing since the lipid transfer proteins at the ER could facilitate the lipid content at the conjugation junction, however the role of the ER in shaping the conjugation junction remain untested. Here we report that *Tetrahymena* reticulon (TtReticulon) a protein known to tubulate ER membranes in other eukaryotes, localizes to the conjugation junction. Our preliminary studies show that deletion of TtReticulon result in defective pair formation. Future studies aim to determine if the mechanism by which TtReticulon regulates the conjugation junction. Specifically we will determine if there is a direct effect on ER morphology and formation of fusion pores.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P46 "Early-Life REM Sleep Deprivation Alters Learning and Social Behavior in Young Adult Rats"

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Previous studies have shown that early-life REM sleep deprivation (REMSD) during postnatal day (P) 16-19 delays maturation of hippocampal LTP-stability in P23-25 rats, and blocks the induction of hippocampal LTP in older adolescents. Here we investigated whether early-life REMSD affects behavior in adolescent rats. Tests such as novel object recognition (NOR) and novel place recognition (NPR) are associated with hippocampal function. The open field (OF) test examines anxiety levels while social development is examined by observing adolescent play behavior. In social play behavior rats are video recorded for 20 minutes after being reunited with their cage mates. The final 15 minutes are scored for instances of specific interactions. The open field test allows a rat to explore an open field for five minutes. The time spent in perimeter squares versus the center square assesses anxiety levels. In the NOR test rats are first exposed to two identical objects for five minutes, removed while one object is replaced with a novel object. The animal is returned to the arena and time spent with the familiar and novel objects is used to calculate a discrimination index (DI). The NPR test first exposes rats to two identical objects after which the rat is removed while one object is moved to a novel location. The time spent with the familiar objects versus the novel placements is compared with the DI. Preliminary data suggests that early-life REMSD has long-term effects on hippocampal-dependent learning and social development in young adult rats.
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.

P47 "Body Composition Analysis and Metabolic Fat Deposition in African Americans"

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African Americans (AAs) are disproportionately affected by obesity-related CVD. Metabolically active visceral adipose tissue (VAT) is more likely than subcutaneous adipose tissue (SAT) to positively correlate with increased cardiometabolic risk/disease. We hypothesize that low-cost predictive anthropometric measures predictive of obesity-related diseases can be identified by assessing the correlation of sagittal abdominal diameter (SAD) and CT measures of fat distribution in AAs. To test our hypothesis, a HIPPA-compliant, IRB-approved retrospective study was performed on non-enhanced CT images of 150 AAs during Exam2 of Jackson Heart Study. Waist circumference (WC) and SAD by DICOM viewer (OsiriX MD, v.9.0.2). Paraspinal muscle, VAT and SAT volumes from 24 consecutive 2.5mm slices centered at the L4/L5 intervertebral space were obtained using segmentation software (sliceOmatic, Tomovision, v.5.0).

Fat compartment volumes (cm^3) were correlated with SAD and WC. SAD was measured at the anterior superior iliac spine level. WC was measured at the iliac crest. Correlations of WC and SAD with VAT and SAT were examined using linear regression models. SAD and WC showed positive correlations with VAT and SAT. Muscle volume played a role in correlation. SAD correlated best with visceral adipose tissue within the participants with paraspial volume of >150cm^3 and ≤150cm^3 (R^2=0.68,0.58, p<0.001 for both). WC correlated best with subcutaneous adipose tissue in patients with >150 cm^3 and ≤150cm^3 of paraspinal muscle (R^2=0.79,0.74, p<0.001 for both). Our study findings show that anthropometric measures such as SAD can be useful markers for regional distribution of body fat and support their use in studying cardiometabolic risk.
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P48 Expression of Mast cell degranulation relevant SNAREs and Munc18 Proteins

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Mast cells play an important role in immunity, allergies, cancer, and cardiovascular disease by the release of mediators that are stored in the mast cells' granules. Mast cells degranulate involving membrane fusion proteins, SNAREs (Soluble NSF(N-ethylmaleimide-sensitive factor) Attachment Protein) REceptor). There are two different kinds of SNAREs, Q-SNAREs (SNAP-23, Syntaxin3, and Syntaxin4) which are found on the plasma membrane, and R-SNAREs (VAMP 2,3,7,8) found on the vesicles/granule membrane. One set of Q and R- SNAREs interact with each other to form a functional trans-SNARE complex; which is required for the fusion of two membranes. These trans-SNARE complexes are selectively regulated for fusion and one of such regulators are Munc 18 proteins. We use reconstitution methods to explore the functional pairing of Q-SNAREs and R-SNAREs along with the presence of Munc 18 regulators. For these reconstitution fusion reactions; purified recombinant SNARE and Munc 18 proteins are required. We hypothesize that using IPTG in E. coli will activate the Lac Operon causing the proteins to be expressed. To test this hypothesis: to the E. coli culture containing the gene of interest; we added IPTG, incubated the cells at 37^O C for 4hrs or 16^O C overnight and ran the resuspended cell lysates in SDS-PAGE to observe if the proteins were induced or not. A clear protein band of right molecular weight, only in the presence of IPTG in the sample indicated that proteins have been successfully induced. Acknowledgement: This work was funded by Mississippi INBRE through the NIH-NIGMS grant number P20GM103476.

P49 Assessment of harmful algal blooms in the Western Mississippi Sound and their potential impacts on oysters and human health

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Abstract: Oyster landing has been declining in the Mississippi Sound in an alarming rate. Wastewater and nutrient from the urban areas in the coast is one of the top threats to the oysters. The nutrients including nitrogen, phosphorous, and carbon, and suspended sediments negatively affect the oysters, while the pathogens cause human health issues when pathogen-contaminated oysters are consumed by humans.

The main objective of this study was to investigate the water quality parameters including pathogens, suspended sediments, and nutrients, and assess their potential impacts on oysters and human health. From over the oyster beds of the Western Mississippi Sound (WMS), 38 water samples were collected, 9 in March, 20 in June, and 9 in July, 2018. The samples were filtered for colored dissolved organic matter (CDOM), suspended particulate matter (SPM), pathogens, dissolved organic carbon, total nitrogen, phosphates, and cations. CDOM absorption and fluorescence was measured to gain insights into the dissolved organic matter quantity and quality. In spring of 2017, oyster diebacks happened as a result of hypoxia caused by excessive dissolved organic matter in WMS. SPM concentrations were 32.8±3.07 mg/L, 39.6±10.9 mg/L, and 43±15.6 mg/L during the March, May, and June fieldtrip, respectively. Bacterial concentrations were lowest in May than March and June with a mean total coliform of 1180±1090 colonies/100 mL, mean heterotrophic bacteria of 13200±12800 colonies/100 mL, mean Escherichia Coli of 19.9±14.2 colonies/100 mL and mean enterococci bacteria of 7.26±17.6 colonies/100 mL. Currently, all the other results are being analyzed and will be presented in the poster.

P50 The Use of Naturally Occurring Compounds from Plants to inhibit Quorum Sensing Signaling in *Pseudomonas aeruginosa*

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Pseudomonas aeruginosa is a multi-drug resistant pathogen, and the causative agent of life-threatening infections in individuals with serious health problems such as cystic fibrosis. It is ranked as one of the top five most problematic pathogens. Plant derived antimicrobials are currently being researched heavily as alternative therapeutics to antibiotics against infections caused by antibiotic resistant microorganisms. In this study, we tested 4-Hydroxy-2,5-dimethyl-3(2H)-furanone (HDMF) from strawberries for activity against surface motility, biofilm formation and production of pyocyanin in P. aeruginosa PAO1. We used a modified broth microdilution method to determine the minimal inhibitory concentration (MIC) of HDMF required to inhibit the growth of PAO1. Our results showed the MIC of HDMF against PAO1 is 7 mg/ml. At sub-MIC concentrations of HDMF, we showed that 3 mg/ ml of HDMF caused PAO1 to produce 17 times less pyocyanin in comparison to control. Our motility assays also revealed that 3 and 4 mg/ml of HDMF significantly ($P < 0.05$) reduced the ability of PAO1 to swim, swarm, and twitch. We are currently trying to determine the effect of HDMF on biofilm formation and attachment in PAO1. So far, we have shown that sub inhibitory concentrations of HDMF affects important virulence factors controlled by quorum sensing in P. aeruginosa without significantly affecting bacterial growth. Findings from this study will contribute to identification of synergistic combinations of naturally occurring plant antimicrobials that can be used to overcome infections caused by multi-drug resistant pathogens.

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P51 A Survey Of South Mississippi: Examining The Relationship Between Social Support And Intention To Make Dietary And Physical Activity Behavioral Changes

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According to the Centers for Disease Control and Prevention, the state of Mississippi, at 37.7%, has the second highest rate of adult obesity in the nation (Behavioral Risk Factor Surveillance System, 2016). Because of the strong correlation among chronic and obesity-related diseases, poor diet, and physical inactivity, effective obesity management strategies need to consider the complex psychosocial interactions of diet and physical activity behavior changes to support and promote a successful behavior change journey for both the targeted individuals and the program providers. The purpose of this study was to analyze the impact of social support on the intention to make dietary and physical activity behavioral changes by conducting a community needs assessment in Southeast Mississippi. Survey data, collected through outreach events at community-based sites and social media, included demographics, access to health care, nutrition, physical activity, use of technology, social support, and self-efficacy. Participant eligibility included adults (18 years of age or older) and Mississippi residents. Survey respondents (n=143) were predominately female (68%), ranging in age from 19 to 84 years (M=44.06, S=18.3), with a majority of participants reporting their race as white (white=41%, black=36.6%, Asian=12.7%, Alaskan Native=1.4%). Many respondents (33%) had a 4-year college degree, and most (77%) were employed with a large majority (81%) earning more than $30,000 per year. Most participants reported having 'Good' (37%) or 'Very Good' (20%) physical and mental (36% and 40%, respectively) health. The dataset will examine the implications of perceived social support on intentions to change nutrition and physical activity behaviors. The findings of this study will provide crucial insights to assist organizations with providing specific social support through programs and resources that will address obesity concerns in Mississippi and the United States. Our research will assist with the understanding of obesity-related factors that may improve the management of obesity and -related preventable chronic diseases, such as hypertension, diabetes, heart disease, stroke, and cancer.

P52 "MLST Genotype and Trichomonas vaginalis virus Characterization of 37 Samples of *Trichomonas vaginalis* from the American Type Culture Collection, External Lab, and Mississippi"

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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). In this study, twenty-six *T. vaginalis* isolates from the American Type Culture Collection (ATCC), five long-term cultures, and six Mississippi isolates were characterized. In addition to MLST genotyping, cultures were typed for the presence of specific TVV (1-4) by RT-PCR and confirmed by Sanger sequencing; 49% harbored at least one TVV and of the TVV-infected TV isolates nearly half (46%) carried more than one virus strain. TVV1 and TVV3 were the most common virus (found in 73% of infected TVs) and TVV4 was not detected in any ATCC strain. The analyzed regions of TVVs here were identical to those found in long-term cultures from an external lab. We have included the ATCC isolates most frequently investigated in the

literature. For example, 30001 alone has been referenced by the ATCC 48 times. These data will serve as an important resource for researchers investigating *T. vaginalis* and may yield improved strategies for trichomoniasis treatment.

P53 "The Impact of Environmental Factors on Risky Sexual Behaviors in the Jackson MSA"

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According to the CDC, Jackson, MS is ranked 4th among US cities with the highest rate of HIV infection. Specifically, sexually active persons are more likely to experience HIV/STI exposure and/or unplanned pregnancies due to risky sexual behaviors which is commonly defined as behavior that increases a person's risk of exposure to sexually transmitted diseases/infections and/or experiencing unintended pregnancies. This study was designed to examine the perceptions of the impact of environmental factors on risky sexual behaviors. Presumably, environmental factors such as socioeconomic status, lack of sexual and reproductive health education, and substance use are perceived to stimulate the probability of risky sexual behaviors. For the purpose of this study, a brief survey was developed and disseminated to elicit responses regarding perspectives about risky sexual behavior. All data collected was voluntary and self-reported. According to the data collected, surveyors supposed the lack of sexual and reproductive education (84.5%), drug and alcohol use (58%), and lack of appropriate income-generating activities for youth (48%) impact risky sexual behaviors in the Jackson, MS MSA. Based on qualitative and quantitative study results, implantation of sexual and reproductive education courses in schools as well as contraception courses should be strongly considered in order to reduce the frequency of sexual risk behavior.

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P54 "Targeting HIV-1 Integrase During Viral Maturation"

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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. While the pharmaceutical industry has shown great interest in these intriguing antivirals, how they function is not fully understood. Using a library of active quinoline derivatives, our research aims to better understand the molecular and mechanistic mode of action of these compounds by examining how they modulate both protein-protein and protein-nucleic acid interactions. Our studies combine several approaches such as protein biochemistry, medicinal chemistry and virology.

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P55 Metabolism of cholesteryl esters correlate with the progression of prostate cancer

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Background: Studies pinpoint that accumulation of cholesteryl esters (CE) could be a crucial biological process involving PCa progression. Because the metabolism of CE is mainly co-regulated by CE degradation enzyme, LAL, and CE synthesis enzyme, ACAT1, we hypothesize that the expression levels of LAL and ACAT1 correlate with the progression of prostate cancer.
Methods: We performed Immunohistochemistry (IHC) for LAL and ACAT1 on a tissue microarray containing 71 prostatic tissues, including 20 benign prostatic tissues (BPT), 36 localized PCa (LPCa) and 15 metastatic PCa (MPCa) tissues. Student's T Test was used for data analysis.
Results: Results showed that the IHC score for LAL was highest in BPT (4.71), higher in LPCa (4.16), and lowest in MPCa (3.17). The difference in IHC score for LAL was not statistically significant between BPT and LPCa ($p=0.32$), but was statistically significant between BPT and MPCa ($p=0.049$). In contrary, the IHC score for ACAT1 was lowest in BPT (1.34), higher in LPCa (3.74), and highest in MPCa (4.46). The difference in IHC score for ACAT1 was statistically significant between BPT and LPCa ($p=0.0009$), and between BPT and MPCa ($p=0.0001$).
Conclusion: Therefore the expression levels of LAL and ACAT1 were reversely correlated with the progression of PCa: the more advanced PCa is the lower the expression level of LAL and higher the expression level of ACAT1 are. The significance of this study not only reveals a new mechanism in PCa progression, but also discovers novel therapeutic targets in treatment of advanced PCa through regulating CE metabolism.
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P56 "Sestrin2 Suppresses Age-related Hypertrophy by Inhibiting mTORC1 Signaling Pathway"

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The mechanistic target of rapamycin complex 1 (mTORC1) plays a critical role in the regulation of cell growth and energy state. A novel stress-inducible protein, Sestrin2 was recognized as a sensor for mTORC1 pathway. It is hypothesized that cardiac mTORC1 activation modulated by Sestrin2 is impaired in aging that sensitizes heart to hypertrophy. C57BL/6J young WT (4-6 months) and aged WT mice (24-26 months), and young Sestrin2 knockout mice (4-6 months) were subjected to transverse aortic constriction (TAC) for pressure overload. The ex vivo working heart perfusion was used for measuring substrate metabolism. The protein levels of cardiac Sestrin2 were decreased with aging. There are no phenotypic differences in young WT, aged WT and Sesn2 KO mice under normal physiology, while aged WT and Sesn2 KO versus young WT mice exhibit bigger hearts after 4 weeks of TAC surgery. The echocardiography showed an impaired cardiac function of aged WT and Sesn2 KO hearts by pressure overload. The pressure overload-induced phosphorylation of mTOR and mTORC1 downstream effectors 4E-BP1 and p70S6K were augmented in aged WT and Sesn2 KO versus young WT hearts. The swollen mitochondria with severely disrupted cristae and higher levels of redox markers $pShc^{66}$ and 4-hydroxynonenal were observed in aged WT and Sesn2 KO versus young WT hearts by pressure overload. The rate of glucose oxidation and fatty acid oxidation were impaired in the aged WT and Sesn2 KO versus

young WT hearts by pressure overload. Intriguingly, pressure overload induced an interaction between Sestrin2 and GATOR2, a complex of unknown function that positively regulates mTORC1. Moreover, the binding affinity between Sestrin2 and GATOR2 is impaired in the aged WT hearts ($p<0.05$ vs. young WT). Furthermore, Adeno-associated virus 9 (AAV9)-Sestrin2 were delivered into the aged WT and Sesn2 KO hearts via a coronary delivery approach that rescued the protein levels of Sestrin2, attenuated mTORC1 activation and increased the tolerance of both aged WT and Sesn2 KO hearts to pressure overload. Thus, cardiac Sestrin2 is a sensor for mTORC1 pathway in response to pressure overload. Sestrin2 deficiency in aging could be a reason for an increased sensitivity to hypertrophy in the elderly.
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P57 Recombinant expression and Purification of Amyloid-β 42 (Aβ42) peptide

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Amyloid-β (Aβ) is an intrinsically disordered peptide, the aggregates of which are found in the extracellular amyloid plaques characteristic of Alzheimer disease (AD). Investigation into the mechanisms of Aβ aggregation has typically been performed using synthetic peptide, which is expensive. A cost-effective alternative is to recombinantly express the protein in E.coli , which also offers a way to label the protein and to generate specific mutants. Therefore, we have expressed M-Aβ1-42 (Aβ42) in BL21 DE3 cells followed by a method developed by Walsh et al (1). The protein was expressed in inclusion bodies from which the protein was purified. We present the challenges that we overcome to generate pure monomeric Aβ42. Briefly, cellular DNA was found associated with the inclusion bodies, which protected it from nuclease digestion. The nucleic acids were removed through cycles of sonication, centrifugation, and re-suspension in lysis buffer before the inclusion bodies were denatured. These wash steps also lead to loss of the protein, so it was desirable to optimize the minimum required washing steps to eliminate contaminants such as nucleic acids from the protein. Additionally, we have purified the protein via anion exchange chromatography. The concentration of salt necessary to elute the protein is dependent on the purity and folding state of the protein, and must therefore be optimized once nucleic acid contamination has been eliminated, and denaturation conditions have been optimized. We will then disaggregate the peptide, and isolate monomeric Aβ using size exclusion chromatography to be used in our investigations.
1. Walsh, D. M.; Thulin, E.; Minogue, A. M.; Gustavsson, N.; Pang, E.; Teplow, D. B.; Linse, S., A facile method for expression and purification of the Alzheimer's disease-associated amyloid beta-peptide. The FEBS journal 2009, 276 (5), 1266-81.

P58 Renal sympathetic nerve contribute to high blood pressure in male PCOS offspring

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Prenatal factors may program elevated blood pressure in offspring of women with polycystic ovary syndrome (PCOS). We recently determined in an experimental model of PCOS that their male offspring have elevated blood pressure compared to offspring of controls. Existing evidence shows that PCOS

women may have increased renal sympathetic nerve activity (RSNA) which contributes to their elevated blood pressure. However, whether the elevated blood pressure in PCOS offspring is due to activation of the renal sympathetic nervous system (RSNS) remains undetermined. We hypothesized that activation of the RSNS contributes to the increase in blood pressure in male PCOS offspring. PCOS dams were treated with DHT pellets (DHT pellet 7.5mg/90d) beginning at 4 wks of age and continuing through pregnancy and lactation. Controls were given placebo pellets. Male PCOS offspring (mPCOS-off) and male control offspring (mCon-off), 20 weeks of age, were subjected to renal denervation (RD) (cutting renal nerves bilaterally and painting with 10% phenol in ethanol) or sham surgery (movement of the kidneys) (n=9/grp): mPCOS-off-sham, mPCOS-off-RD, mCon-off-sham, and mCon-off-RD, respectively. Baseline mean arterial pressure (MAP, telemetry) was significantly higher in mPCOS-off-sham than mCon-off-sham (124±1 mmHg vs. 119±1 mmHg; $p<0.05$). After recovery from renal denervation or sham and telemetry implantation for 14 days, MAP was decreased with renal denervation in mPCOS-off-RD (mPCOS-sham: 124±1 vs mPCOS-RD: 111±2 mmHg, $p<0.05$) but not in control offspring (mCon-off-sham: 119±1 vs mCon-RD: 118±3 mmHg; p=NS). Thus, male PCOS offspring have an increase in MAP compared to the male control offspring, and renal denervation reduced their blood pressure, suggesting that exposure to hyperandrogenemia in utero may activate the RSNS later in life, which could contribute to high blood pressure. These data suggest that children of women with PCOS should closely monitor their blood pressure as they age to maturity. Supported by AHA14POST18640015 (ROM) and P20GM121334 (ROM).

P59 Measuring Vulnerability and Developing Resiliency among the Vietnamese Population on the Mississippi Gulf Coast through Photovoice

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The Mississippi Gulf Coast's Vietnamese community (MSGCVC) has repeatedly experienced physical, psychological, and economic hardship from natural and man-made disasters and economic downturn. Approximately 28,067 Mississippians describe themselves as Asians, comprising less than 1% of Mississippi's total population. More than 7,408 of these individuals are Vietnamese living in Hancock, Harrison, and Jackson Counties. Literature suggests that economic strain is the greatest contributor to Vietnamese population vulnerability. Research suggests more beneficial approaches to decreasing vulnerability should focus on strength capacities to build culturally-appropriate interventions, including social support and acculturation as strong protective factors. Previous literature focused on the aftermath of Hurricane Katrina, BP oil spill, and urban communities, with little research considering vulnerability and resiliency, and developing interventions addressing health risks and strengths in rural communities. To address this gap, a CBPR health policy project was developed to determine how social, economic, cultural, and/or environmental policies (or lack of) impact the health of the MSGCVC to 1) measure causes and consequences of vulnerability and resilience by identifying sources of health strengths and resilience and health risks among individual, family, and other members of MSGCVC through photovoice; and 2) analyze the role of culture and social networks in vulnerability and resiliency by implementing and evaluating a volunteer CHA project to enhance community resiliency among MSGCVC. This presentation will document findings from photovoice discussions among first, second, and third generation MSGCVC. Findings will aid others exploring innovative approaches to addressing vulnerability and resiliency in underserved communities and applying photovoice as a research tool.
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P60 "Investigating the Association Between Household Income, Family Size, and Healthy Eating Behaviors in the Mississippi Delta"

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The Mississippi Delta, also known as "The Most Southern Place on Earth" (Cobb, 1992), is rich in history but poor in health outcomes. More than 32% of adults in the MS Delta report that they are obese and almost 12% suffer from diabetes. Poor dietary patterns and obesity have been linked to neighborhood deprivation, neighborhood minority composition, and low population density, all of which have been used to describe the MS Delta (Larson, et al. 2009). The purpose of this study was to investigate whether household income and family size were significant predictors of self-reported healthy eating behaviors/dietary among residents in the MS Delta. County-level and participant-level data were extracted from the 2015 Mississippi Statewide Health Assessment conducted by My Brother's Keeper, Inc. and analyzed to test the null hypotheses. The analyses revealed that average household income was not a significant indicator of healthy eating habits. An average of forty-one percent of respondents with household incomes at the highest level ($75,000 and over) reported healthy eating behaviors compared to an average of thirty-four percent of the respondents with incomes at the lowest levels (less than $14,000). Data also revealed that family size was not a significant indicator of healthy eating behaviors as positive behavior was reported by 32% of respondents with 1-2 family members, 34% of respondents with 3-4 family members and 35% of respondents with 5 or more family members. Study Limitations: The study relied on self-reported data (income, eating habits, and family size) to determine associations between variables. Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P61 "Synthetic Approaches to Photoactivatable Aromatic Heterocycles for Photoinduced Cell Death"

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N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. Applications of photoinduced cell death are found in Photodynamic Cancer Therapy. The efficiency of DNA cleavage is limited by weak ground-state association for the quinoline and isoquinoline derivatives. To increase cleaving efficiency, a DNA-binder (1,8-naphthalimide) has been synthetically attached. To further improve binding and cleaving efficiency, attempts to synthesize novel amino-heterocycles are undertaken. The goal is to shift the absorption maximum and have a flexible linker connection between heterocycle and naphthalimide. Our approach is to functionalize alkylquinolines or related heterocycles by radical bromination and then modify the products by various Grignard reactions or direct substitution with potassium phthalimide. Additionally, the use of some classical syntheses of heteroaromatic compounds

such as the Bischler-Napieralski and Döbner-Miller Synthesis are potentially yielding target molecules. The isolation of the alkylamine proved to be the most challenging step and it appears that alkaline work-up does not yield the desired product. Consequently, reaction such as the Delepine reaction, which require acidic conditions, are selected.
One focus is to use environmentally conscious synthetic routes to minimize impact. This includes avoiding halogenated solvents for the radical bromination. Several bromination methods have been suggested in the literature, including a photochemical flow-reactor.
DNA-binding is determined by spectroscopic titrations and DNA-cleaving is evaluated by gel electrophoresis.
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.

P62 "Assessing Health Literacy Levels and the Quality of Doctor-Patient Communication"

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Health literacy and doctor-patient communication play an important role when patients visit their doctor. The Institute of Medicine defines health literacy as the degree to which individuals can obtain, process, and understand the basic information and services they need to make appropriate health decisions. According to the National Assessment of Adult Literacy, 43% of adults have below basic or basic prose literacy; 34% of adults have below basic or basic document literacy; 55% of adults have below basic or basic quantitative literacy, and for all three categories, only 13% of adults have proficient skills. Therefore, patients do not understand the health instructions and services given by their doctors. The purpose of our research was to assess the relationship between health literacy levels and direct communication between doctors and their patients. We assessed health literacy levels of 70 patients using a 16-question health literacy survey on a 5-point Likert scale, followed by a validated health literacy measure, the Short Test of Functional Health Literacy in Adults. After administering surveys, data collected showed a mean score of 42.43% indicating that majority of patients surveyed had below average scores. This finding suggests that low health literacy levels and poor health outcomes may be due to a lack of doctor-patient communication. Researchers at the U.S. Department of Health and Human Services have developed an active plan to help improve low health literacy. Healthcare providers can also offer services and programs that promote effective communication to improve health outcomes for patients with low health literacy.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P63 Trans-eyelid application of triamcinalone protransfersome gel for improved and prolonged ocular delivery.

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Abstract
Drug delivery to the eye has been a complicated task due to various static and dynamic ocular barriers. Short pre-corneal residence and poor trans-corneal/scleral permeability of drugs from the topical ophthalmic products are the major constraints responsible for their low ocular bioavailability (<10%). In view of this, the current research was undertaken to develop and evaluate the triamcinolone acetonide (TA) loaded protransfersome gel (PTG), through the eyelid application, for enhanced and prolonged ocular pharmacotherapy. The melting point (Tm) of vesicle forming components (Phospholipid 90H, Cholesterol, Span 60) and an edge activator (TPGS) were obtained from differential scanning calorimetry. PTG was prepared by heating these excipients above their Tm to form a clear homogenous viscous liquid and then allowing to attain room temperature. The absence of pure TA birefringence in the gel formulations, under optical polarized microscope, suggested that the drug has transformed to molecular state. Microscopic studies confirmed the formation of transfersomes from the PTG. The gel system forming transfersomes of 125 ± 17 nm in size, – 21 mV ± 6 zeta potential and with 97.3 ± 2.1 % of drug entrapment, was optimized and evaluated for in vitro drug permeation through freshly excised eyelid from New Zealand Male Albino rabbit and, compared against the marketed (control) transdermal TA cream formulation. The results from these studies suggested a greater than 2-fold improvement in TA flux and permeability across the eyelid with the protransfersome gel formulation compared to marketed dosage form. Further, ocular distribution studies were conducted by applying an accurate amount of the PTG and control formulations on the eyelids in recently sacrificed rabbits and ocular tissue samples were collected 1h and 2h post application. TA levels in the conjunctiva, tear, cornea and sclera of the rabbits receiving the PTG were significantly higher and increased with time, in contrast to the control formulation. Remarkably higher trans-eyelid permeation and prolonged ocular distribution of TA with PTG- demonstrated the potential of transfersome forming gel system in enhancing the sustained drug delivery to the ocular surface and deeper tissues via the eyelid.

P64 "STEMI Summer Workshop Anatomy Experiences with Clinical Relevance to Mississippi Healthcare Disparities Increase High School Teachers' Skills"

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Currently, the state of Mississippi is a national leader in diseases such as obesity, type II diabetes, cardiovascular disease, and stroke in which major disparities of incidence, severity, and mortality are found. As a result, there is a persistently critical need to educate Mississippians, beginning in secondary schools, about these conditions and about the practices necessary to prevent or manage them. The Science Teaching Excites Medical Interest (STEMI) project brings basic scientists, clinical anatomy students, and high school teachers together with the goal of training teachers in design and implementation of flipped

classroom modules that incorporate active learning strategies and healthcare disparity content. STEMI began in 2016 with a cohort of master teachers (Cadre Prime) who helped mentor the first cohort of teacher trainees (Cadre 1) during the 2017-2018 school year. Since then, a second cohort of teacher trainees (Cadre 2) has been recruited for the 2018-2019 school year. Both of these training periods commenced with a one-month summer workshop featuring a series of lectures, seminars, and active learning sessions that provided the teachers with the basic knowledge and tools necessary to develop novel flipped classroom modules. During one week of the workshop, teachers (n=13, 2017; n=13, 2018) participated in active learning sessions and demonstrations concerning topics of histology and tissue preparation, electron microscopy, gross anatomy, and pathology. In these sessions, teachers learned about normal and abnormal anatomy and the impact of specific healthcare disparities on human anatomy, gaining content for lessons to bring back to their classrooms. Ultimately, the experiences were rated highly by the participating teachers. In 2017, when asked in a mid-term survey what they liked most about the STEMI Institute so far, many of the participants mentioned the gross anatomy and histology lab experiences as the highlights. In 2018, 100 % of the participants strongly agreed that the gross anatomy lab experience increased their skills while over 82 % either somewhat agreed or strongly agreed that the histology and electron microscopy lab experiences increased their skills. Incorporation of high quality anatomic materials and interaction with graduate students and faculty members offers benefits in empowerment and knowledge exposure that will be incorporated into high school classroom experiences.
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P65 Functional role of tick α-D-Galactosidase in Carbohydrate Metabolism and red meat allergy

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The lone-star tick (Amblyomma americanum) is a blood-feeding arthropod vector known for its ability of introducing pathogens and foreign macromolecules to various hosts while parasitizing. Tick bites from 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 elucidate the function of α-D-galactosidase, an enzyme responsible for cleaving terminal alpha-galactosyl moieties from glycoproteins and glycolipids during prolonged tick feeding on the host. A reverse genetic approach was utilized to characterize the functional role of α-D-Galactosidase in carbohydrate metabolism and link to red meat allergy. We hypothesize that silencing of this enzyme will have deleterious effects on carbohydrate metabolism in ticks. Our results from targeted gene silencing showed a significant increase in tick weight, supporting a critical functional role in energy utilization. Furthermore, assays are being conducted to elucidate the implications alpha-galactosidase has on the tick-host interaction.
Acknowledgement: 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.

P66 "Optimizing in vitro Biofilm Analysis in Xenorhabdus nematophila"

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Bacterial biofilms can pose a significant risk to human health, particularly in hospital and clinical settings. Multiple species of bacteria are capable of forming biofilms on nonliving and living surfaces such as medical equipment and the human urinary tract, therefore it is important to study the role of biofilms in host association. The gram-negative bacterium Xenorhabdus nematophila is an ideal model to study biofilms because it participates in a mutualistic relationship with the entomopathogenic nematode Steinernema carpocapsae, while also acting as a pathogen of a variety of Lepidopteran insect larvae. In vitro studies of X. nematophila have shown that the bacteria produces biofilms: aggregated bacterial cells within a gelatinous matrix, usually composed of carbohydrates, nucleic acids, and/or proteins. X. nematophila produced both attached biofilms, which adhere to surfaces, and pellicles, which occur at the liquid-air interface of a liquid culture. We are interested in analyzing the effects of biofilm formation on host association; however there is currently no quantitative method for comparing pellicle formation, making it difficult to isolate and study mutants with pellicle-specific phenotypes. In this study, we developed a method to quantitate pellicle formation by X. nematophila using fluorescence intensity as a relative measure of biofilm mass. Assays using this method may influence the direction of future studies regarding the relationships between X. nematophila, S. carpocapsae, and insect hosts.

P67 "The Invasion of CaCO2 Epithelial Colon Cells in Anaerobic, Microaerophilic, and Aerobic Conditions by L. Monocytogenes Strain F2365 and Mutant Strain PdeD"

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Listeria monocytogenes is a gram positive bacterium accountable for the severe food borne illness listeriosis. Capable of infecting the immunocompromised, the elderly, pregnant women, and neonates, L. monocytogenes can cause septicemia and infections of the nervous system such as encephalitis. Through the process of internalization, L. monocytogenes invades epithelial cells of the generally uninhabitable inner gastrointestinal tract. Indications from previous studies have shown that the proliferation of L. monocytogenes cells within the colon can differentiate due to variations in oxygen levels causing the bacteria to react pathophysiologically. Recently, our laboratory has identified that L. monocytogenes deficient in pdeD, which is involved in regulation of intracellular concentrations of cyclic-dimeric GMP, has a reduced ability to survive in the presence of stressors encountered within the gastrointestinal tract, but this reduction varies depending upon oxygen availability. Therefore, the hypothesis for this project was that invasion of L. monocytogenes into colon epithelial cells will vary between a wild-type and a mutant strain of pdeD in variations of oxygen availability. Initial data indicate that pdeD is in fact needed for invasion of the colon epithelial cells and that oxygen availability influences this invasion potential. Further research is needed to determine whether the invasion is related to an alteration in the expression of invasion associated genes by c-di-GMP.

P68 "Embedding Multiwalled Carbon Nanotubes in Natural Polymer Nanofibrous Mats"

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In recent years, healthcare systems across the globe have begun searching for an alternative to the common wound wrappings and bandages used today. While most of the fibers used to protect open abrasions to the human body perform reasonably well at protecting against infection, emerging superbugs are becoming increasingly able to penetrate and establish themselves in covered wounds. To combat these superbugs and provide a more biocompatible healing patch, natural polymers, such as alginate and chitosan, are being sought for spinning into nanofibrous mats that can be placed over an open lesion. It has also been found that carbon nanotubes greatly enhance the ability of natural polymers to deliver antimicrobial drugs and the ability of natural polymers to remain rigid yet flexible within the body. By performing this experiment, multiwalled carbon nanotubes will be successfully intertwined with both alginate and chitosan polymers by the process of electrospinning. The precise ratio of nanotubes to natural polymer will be determined, and the resulting fibers will be examined using a scanning electron microscope to determine the efficiency of each ratio. Antimicrobial drugs will also be loaded into the nanotubes to assess their efficiency at delivery of the drug. Also, in doing so, data will be collected for a drug release profile library in order to preserve the rates and efficiency of the carbon-nanotube-embedded natural polymer fibers.

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P69 "Increasing the Sustainability of Youth Serving Organizations Teen Pregnancy Prevention Initiatives by Providing Structured, Evidenced- Based Capacity Building"

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Mississippi ranks second highest in Teen Pregnancy nationally with a prevalence of 50.2 per 1000 female adolescents ages 15-19 years. According to the 2014 County Health Rankings & Roadmap, the average teen birth rate in the Central-Southwest Mississippi River Region is 71.8 per 1,000 adolescent females ages 15-19, which exceed the national average (26.6 per 1,000 adolescent females, ages 15-19). MBK provided a total of 14 population-focused, programmatic and organizational capacity building assistance (CBA) services to 12 youth-serving organizations in the Central-Southwest Mississippi River Region, (which includes the following six counties: Issaquena, Warren, Claiborne, Jefferson, Adams, and Wilkinson) to build their capacity to develop, manage and implement evidence-based TPP programs. This study examines how Capacity Building Assistance trainings' impacted knowledge and efficacy of youth-serving organizations in the Central-Southwest Mississippi River Region. Providing Conducting an array of CBA services and trainings to the selected cohort of organizations resulted in the implementation of twenty-four, 8- hour Teen Pregnancy Prevention trainings to a total of 446 adolescents in the Central-Southwest

Mississippi River Region. Evaluation data obtained from these CBA trainings found a significant increase in subject matter knowledge, awareness and future utilization of information.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P70 The msaABCR Operon Regulates Oxidative Stress Defense Mechanism in Staphylococcus aureus

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Staphylococcus aureus, a notorious human pathogen, has a complex regulatory network that controls multitude of defense mechanisms to withstand the deleterious effects of the oxidative stress inside host immune cells leading to recalcitrant infections. We characterized msaABCR operon that regulates virulence, biofilm development, antibiotic resistance and tolerance. Transcriptome data shows downregulation of more than 10 oxidative stress protective genes in the msaABCR operon mutant. This led us to hypothesize that the operon is involved in oxidative stress defense mechanism and facilitate persistence infections. Here, we report that overnight growth of ΔmsaABCR stationary phase cells were abolished with 25mM hydrogen peroxide while isogenic wild type USA300 LAC and complementation could grow as comparable to the unstressed cells. Likewise, significantly decreased survival of the ΔmsaABCR cells as compared to the wild type was observed in whole blood survival assay. Chromatin Immunoprecipitation assay revealed that MsaB protein directly binds the promoter region of OsmC/Ohr family protein (SAUSA300_0786) that is involved in resisting the oxidative stress. Moreover, significantly downregulated transcript of OsmC/Ohr family protein in ΔmsaABCR suggests MsaB as an activator of this protein. Taken together, these results suggest that msaABCR operon is involved in oxidative-stress-defense mechanism possibly via regulation of OsmC/Ohr family protein facilitating persistent and recurrent infections. Further, we plan in-vivo study for understanding this mechanism underlying intracellular persister development and consequently overcome treatment failures of staphylococcal infections.

P71 "Characterizing the Bile Induced Membrane Damage in *Listeria monocytogenes"*

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Listeria monocytogenes is a Gram positive, facultative intracellular organism responsible for the foodborne disease listeriosis. *L. monocytogenes* must survive a variety of stressors encountered within the gastrointestinal (GI) tract, including variations in pH, oxygen availability, and bile. Bile induces membrane damage by causing disruption of cell membrane, dissociation of membrane proteins, induction of DNA damage and oxidative stress. Research from our lab has shown bile causes alterations to the cell membrane. Moreover, DNA repair and oxidative stress response proteins were also found to be upregulated following exposure to bile. Studies have shown that exposure to bile may regulate virulence factors in *L. monocytogenes*. However, the link between the bile stress response and virulence in *L. monocytogenes* is poorly understood, especially under physiologically relevant anaerobic conditions. This study tested the hypothesis that bile induces membrane damage that alters the integrity of *L. monocytogenes* and that strains considered virulent have greater resistance against bile induced oxidative damage. To test this hypothesis, protein oxidation and lipid peroxidation in two different strains of *L.*

monocytogenes (HCC23, and F2365) were analyzed under both aerobic and anaerobic conditions, with and without exposure to bile. Protein carbonylation was measured using the Protein Carbonyl Content Assay (Sigma Aldrich). Results suggested that under aerobic conditions bile caused an increase in protein carbonyl content in F2365. Lipid peroxidation was determined by measuring the quantity of the reactive aldehyde malondialdehyde (MDA) in bile treated cultures of F2365, and HCC23 under both aerobic and anaerobic conditions using the Lipid Peroxidation Assay kit (Abcam). Results suggest there was no peroxidation of the lipids, possibly due to lack of unsaturated fatty acids. Further investigation of DNA damage under aerobic and anaerobic conditions needs to be completed to analyze the effect of bile on *L. monocytogenes.*

P72 "Drug Release Studies for Ciprofloxacin Loaded Alginate- and Chitosan-Based Electrospun Nanofibers"

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Electrospinning natural polymers is a developing interest in the field of biomaterials. Electrospun nanofibers have been shown to facilitate tissue regeneration and emulate body tissue, making them ideal for modern wound healing dressings. Two water soluble natural polymers, alginate and chitosan, have also shown promise as drug delivery vehicles. However, many biopolymers including the two in question are inherently charged, making the formation of nanofibers difficult. To help counteract the innate charges of the natural polymers, co-polymers were investigated at various concentrations with the natural polymers. Additional electrospinning parameters including voltage and polymer flow rate were also altered in order to achieve optimal fiber formation. Once ideal fibers were formed, multi-walled carbon nanotubes were incorporated into the polymer solution. Carbon nanotubes exhibit a high tensile strength and electrical conductivity making them an advantageous addition to the alginate- and chitosan-based fiber mats. The small drug molecule ciprofloxacin was also introduced into the polymer solution to create drug-loaded nanofibers. Once finalized, these parameters coupled with release rate studies of the drug-loaded fibers have been used to create a catalog of small molecule release profiles. The cataloged profiles can be applied in the further development of biomaterials used in drug delivery and modern wound healing dressings.
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P73 Expression of SNARE Proteins Involved in Mast Cell Degranulation

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Mast cells are crucial to many immune, cardiovascular, allergic, and cancerous diseases. Mast cells release granular contents, or degranulate, via the fusion of vesicular/granular membranes with the plasma membrane. This membrane fusion process is mediated by Soluble NSF (N-Ethylmaleimide-Sensitive Factor) Attachment Protein Receptor (SNARE) proteins. One R-SNARE (Vamp 2, 3, 7, or 8) on the vesicular membrane interacts with two Q-SNAREs (SNAP-23, Syntaxin-3, or Syntaxin-4) on the plasma membrane to form a four-helical structure called the trans-SNARE complex. The complex initiates degranulation and causes allergic inflammation. We are expressing SNARE proteins in order to purify them

and observe how Q-SNAREs and R-SNAREs interact in an artificial environment. We hypothesize that adding IPTG to E. coli with the gene of interest will induce protein expression by triggering the lac operon. To test this hypothesis, we added IPTG to Terrific Broth containing E. coli and allowed the broth to incubate at 37^{O}C for 4 hours or 16^{O}C overnight. Next, we ran SDS-PAGE gel of the cell pellets with and without IPTG induction. Afterward, we stained the SDS-PAGE gels with Coomassie Blue staining solution in order to confirm the protein expression by IPTG. The protein bands were at the proper molecular weight and showed clear expression. Our study demonstrated that IPTG induced the lac operon which coded for the gene of interest and expressed the recombinant SNARE proteins. 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.

P74 Regulation of programmed cell death by msaABCR operon during biofilm formation.

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Staphylococcus aureus is an important human pathogen and is a leading cause of both nosocomial and community-associated infections. Staph infection is becoming increasingly challenging to treat because of the emergence of several antimicrobial drug-resistant strains, such as methicillin-resistant S. aureus (MRSA). The ability of S. aureus to cause chronic infections due to the formation of biofilms has become a large and growing concern. Major constituents of the biofilm extracellular matrix have been shown to be released via programmed cell death (PCD) of a subpopulation of the biofilm. In recent studies, it has been shown that deletion of the msaABCR operon in S. aureus cells causes a decrease in biofilm thickness and an increase of cell death relative to wild-type. However, the mechanism behind unregulated cell death in msaABCR mutants' biofilm is still unknown.

We hypothesized that the defective biofilm formation and increased cell death in the msaABCR mutant strains may be due to unregulated programmed cell death mechanism. To understand the mechanism of PCD by the msaABCR operon, we performed late stationary phase survival assays for 5 days in tryptic soy broth (TSB) supplemented with/without 35mM glucose in both USA300 LAC and UAMS-1 strain backgrounds. Under excess glucose conditions, S. aureus culture supernatants are acidic due to the buildup of acetic acid which ultimately leads to the generation of reactive oxygen species (ROS) and the potentiation of PCD. The acidic pH microenvironment within the biofilm is important to trigger PCD. Indeed, the msaABCR mutant exhibited an increased rate of cell death in stationary growth phase compared to the wild-type strain under both normal and excess glucose condition. In addition, the pH of msaABCR mutant growth medium decreased at a greater rate compared to both wild type and complement, thus suggesting that more acetate is produced by mutant.

Major overflow metabolic pathways involving cidABC, alsSD and lrgAB operons, were shown to regulate PCD within a biofilm microenvironment. Therefore, we seek to define the role of the msaABCR operon in regulating these genes directly or indirectly and to show its effect on PCD in S. aureus.

P75 Influenza B Antibodies in the General Population

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Influenza A and B viruses are major human pathogens capable of infecting a significant proportion of the human population each year. Influenza A viruses are typically the main cause of recurrent seasonal epidemics and pandemics, but, according to CDC data, there were numerous influenza B infections nationwide in the winter of 2017-18. Two genetically distinct lineages (Victoria and Yamagata) cocirculate. Both are represented in the "quadrivalent" influenza vaccine. Influenza B vaccines used for the current flu season have been in use for three years (Yamagata lineage) and nine years (Victoria lineage), respectively. We hypothesized that, within the general population, there is either a lack of pre-existing immunity to the influenza B virus, or that the existing immunity has failed to recognize the influenza B virus that circulated in 2017-18. If the latter is true, this could be due to a genetic mutation in the virus strain that has rendered the vaccine ineffective. To test our hypothesis, hemagglutination inhibition (HAI) assays were performed on 148 discarded, deidentified human sera to determine whether or not each serum possessed neutralizing antibodies, and found all sera had HAI activity. Twenty sera were chosen for further characterization and found to have HAI titers between 1280 and 5120, and to inhibit virus growth at serum dilutions up to 1:10000. These data suggest that these antibodies were accumulated either through vaccination or through direct exposure by infection. Our study thus far has demonstrated high levels of neutralizing antibodies against influenza B in a randomly selected local population.
Acknowledgement: This work was funded by Mississippi INBRE through the NIH-NIGMS grant number P20GM103476.

P76 "Benzodiazepine Response in Rhesus Macaques with Polymorphisms L293Q and M155V"

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Cytochrome P450 (CYP) is a gene that produces enzymes responsible for the metabolism of many drugs, including benzodiazepines. Benzodiazepines are a class of psychoactive drugs used to treat a range of conditions, including anxiety and insomnia. To investigate whether the behavioral differences observed in rhesus macaques when administered drugs midazolam and alprazolam under controlled conditions can be explained by single nucleotide polymorphisms (SNPs), we analyzed 18 DNA samples from rhesus macaques that have data on benzodiazepine response. Using polymerase chain reaction (PCR) and sequencing, we established the complete sequence of exon 7, 8, and 10 from CYP3A4 and exon 6 and exon 11 from CYP3A5 in each DNA sample. Because human and rhesus macaque genes share 97.5% similarities, the behavioral responses and their correlated SNPs in the rhesus macaques will have paralleled functional effects in humans. The sequenced data revealed two statistically significant SNPs: 878T>A and 463A>G. 878T>A changes a Leucine to a Glutamine (L293Q) and 463A>G changes a Methionine to a Valine (M155V). We are currently looking for patterns in behavioral responses that can be attributed to the SNPs. Findings in this experiment can be utilized in clinical practice to help providers prescribe personalized medicine.

P77 "The Histoplasma capsulatum DDR48 protein confers partial antifungal drug resistance"

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Histoplasma capsulatum (Hc) is a systemic, dimorphic, fungal pathogen. Hc grows as a multicellular mold at environmental temperatures (25˚C) and can transform into unicellular, pathogenic yeast upon inhalation into a mammalian host (37˚C). This mold-to-yeast shift is required for pathogenesis. Our research aims to characterize the DNA damage-responsive protein DDR48, an Hc homolog sharing sequence similarity to C. albicans DDR48p. Previously in our lab an allelic replacement deletion-mutant was generated (ddr48Δ) to elucidate the function of HcDDR48. Interestingly, DDR48 is constitutively expressed in the mold-phase of Hc growth, 6-fold greater than expression in the yeast-phase. However, DDR48 expression can be modulated in the yeast-phase under stressful conditions (e.g., oxidants, antibiotics, DNA damage, heat shock). This study focuses on analyzing DDR48 expression and its role in conferring antifungal resistance. We found that in the yeast-phase of Hc, the addition of ketoconazole and amphotericin-B up-regulate DDR48 expression at least 4-fold using qRT-PCR, while no significant difference in DDR48 expression occurred in the mold-phase after antifungal addition. The presence of DDR48 also appears to play a regulatory role in the synthesis pathway of the membrane sterol, ergosterol, and even in macrophage infection and survivability. Research is ongoing to further elucidate the role of DDR48 in the synthesis and maintenance of the cell membrane of the fungus.

P78 Towards High-Throughput Fast Photochemical Oxidation of Proteins: Quantifying Exposure in High Fluence Microtiter Plate Photolysis

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Protein structural analysis by mass spectrometry has gained significant popularity in recent years, including high resolution protein topological mapping by fast photochemical oxidation of proteins (FPOP). In the conventional FPOP setup, the samples are passed individually through the capillary and exposed to laser irradiation to generate the free radicals. While this method offers flexibility, this method is time consuming and not ideal in cases where a large number of samples needs to be oxidized. Batch photolysis in a vessel with a single laser shot has also been reported, but the radical production capabilities of these setups has not been thoroughly probed. Here we are reporting a method for protein oxidation to probe protein surface in microtiter plates. Each well of a tapered well microtiter plate contained between 8.5 uM and 10 uM myoglobin, 8.5 uM GluB, 50 mM phosphate buffer (pH 7.4) containing 1 mM adenine, 17 mM glutamine and 100 mM hydrogen peroxide. The samples were oxidized with one laser pulse produced by Compex Pro 102 F excimer laser at a fluence from 2.78 to 4.44 mJ/mm^2. The reaction was immediately quenched by catalase and methionine amide. The myoglobin was denatured by heating at 90 ^{0}C for 10 min in the presence of 50 mM Tris buffer and 5 mM DTT and digested by trypsin overnight at 37 ^{0}C. The resulting peptides were separated on a nano-UPLC system coupled to a high-resolution Orbitrap Fusion mass spectrometer.

We tested our adenine dosimeter in a microtiter plate to compare with the conventional flow FPOP experiment. The adenine absorption data at 260 nm was plotted against different laser fluence ranging from 2.78 to 4.44 mJ/mm^2. The linear plot shows a decrease in adenine absorbance as laser fluence increases.

When compared with traditional flow FPOP taken at higher fluence (9.44 to 15.74 mJ/mm^2), microtiter FPOP shows a slightly higher change in adenine absorbance, reflecting a slightly higher effective radical dose for the microtiter plate under considerably lower fluence than the FPOP flow system. We prepared a static FPOP sample with [Glu]1-fibrinopeptide B and exposed the peptide to radical using four different laser fluences to test static FPOP peptide oxidation. We calculated the static FPOP oxidation of GluB in different samples and compared the result with the oxidation level of GluB in a flow FPOP setup. The average oxidation events per peptide for the GluB peptide for static FPOP ranged from 0.176 to 0.216 with fluences of 2.78 to 4.44 mJ/mm^2. In flow FPOP, the average oxidation events per peptide were 0.18 to 0.24 with fluence of approx. 8.39 to 12.59 mJ/mm^2, indicating comparable peptide oxidation at much lower light fluence in the microtiter static FPOP. Finally, we tested the ability of microtiter FPOP to perform hydroxyl radical protein footprinting of a model protein, myoglobin. We exposed myoglobin to microtiter static FPOP at a range of fluences ranging from 2.78 to 4.44 mJ/mm^2 and did in-plate quenching, denaturation and digestion. We obtained a sequence coverage of 92%, with twelve peptides detected as oxidized. It was observed that the oxidation of each peptide increases with the increase of laser fluence. We are currently comparing the oxidation profile between flow FPOP and microtiter static FPOP to determine consistency between the two methods.
Validation of microtiter-based static FPOP HRPF for incorporation into a high-throughput workflow
Acknowledgement: This research was funded by the National Institute of General Medical Sciences (NIH), Center for Research Excellence in Natural Products Neuroscience (P20GM104932).

P79 Acrylate and Vinyl Sulfone-Based Inhibitors of Venezuelan Equine Encephalitis Virus Cysteine Protease

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Abstract: Venezuelan equine encephalitis virus (VEEV) is a highly aerial infectious “New World” alphavirus of the Togoviridae family. This arthropod-borne (arbovirus) can be transmitted via mosquitos to birds, horses, rodents and can cause severe encephalitis in humans. The virus is not only neuroinvasive but neurotropic; it replicates in the brain and lymphoid tissue. VEEV possess a nonstructural protein 2 (nsP2) cysteine protease that is vital to viral replication and is associated with the cytopathic effect (CPE) of the virus. Due to its role in the virus’s ability to replicate, it is a potential target for drug development and clinical intervention. Recently, a series of acrylate and vinyl sulfone-based inhibitors were identified as VEEV inhibitors, and we hypothesized that the molecular mechanism of the compounds is via inhibition of nsP2. The goal of this project is to test that hypothesis. To accomplish this, VEEV nsP2, and a FRET-based protein substrate (CFP-YFP) were recombinantly expressed in E. coli. The proteins were purified and used for FRET-based inhibition assays, as well as SDS-PAGE gel-based enzyme assays. The results showed that the compounds are indeed nsP2 inhibitors. The molecular interactions between the protease and the inhibitors are currently being investigated using X-ray crystallography. Future work will focus on structure-based optimization of the compounds’ antiviral activity.

P80 "HIV Risk Factors among women utilizing the Open Arms Healthcare Center in Jackson, MS"

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Approximately one in four people living with HIV are women. In 2016, women made up 19% of new HIV diagnoses in the United States. Despite having about only 37% of the country's population, the South accounts for 44% of all people in the U.S. living with an HIV diagnosis. This retrospective clinical chart review will examine the HIV risk factors for women that utilized Open Arms Healthcare Center (OAHCC) from January 1, 2013 through April 30, 2018 in Jackson, MS. The presence of risk factors such as gonorrhea, chlamydia, syphilis, herpes, trichomoniasis, risky sexual activity, multiple sex partners, serodiscordant, and unprotected sex were recorded. The most prevalent HIV risk factors among the women were chlamydia, unprotected sex, and illicit drug use. Women in the Jackson Metropolitan Statistical Area are at risk for HIV but have not received much needed attention and intervention regarding HIV prevention methods. In this study about 58% of women utilizing OAHCC possessed risk factors for HIV, however, only 1% of all women in the study were found to be on HIV pre-exposure prophylaxis (PrEP). Further research is needed regarding acceptability of oral and topical PrEP and other HIV prevention methods among women in this community.

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P81 "The loss of function of DDR48 results in impaired growth of Histoplasma capsulatum in murine macrophages"

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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 unicellular, pathogenic yeast. Our research aims to elucidate the numerous stress response pathways (e.g., oxidative stress and DNA damage) that Hc utilizes to survive in the ever-changing host-environment. Specifically, we are characterizing the DNA damage-responsive protein DDR48, an Hc homolog sharing sequence similarity to C. albicans DDR48. Previously in our lab, an allelic replacement deletion-mutant was generated (ddr48Δ) to aid in characterizing DDR48. Upon analysis, we found that DDR48 is required for resistance to numerous cellular stressors such as oxidative stress, DNA damage, heat shock, and antifungal drugs. This study focuses on elucidating what roles, if any, DDR48 plays in vivo. To accomplish this, we infected murine macrophages (MF) at a multiplicity of infection (MOI) of 1:1, 1:10, and 1:50 respectively with Histoplasma yeast and measured Histoplasma survival 24 hours post-infection. We have found that DDR48 is required for optimal survival of Hc within murine macrophages. A 50% decrease in Hc survival within macrophages was observed in the ddr48 deletion strain. Research is ongoing to unveil the intricate role DDR48 is playing in sensing and responding to cellular stress to possibly providing resistance to host-mediated stressors.

P82 Amyloid-β (Aβ) oligomerization in the presence of anionic phospholipids

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Self-replicating, low-molecular weight Amyloid-β (Aβ) oligomers have emerged as primary toxic species involved in the Alzheimer disease (AD) pathogenesis. Heterotypic interaction of Aβ peptides with other macromolecules could generate conformationally diverse Aβ oligomers. Growing evidence indicate that distinct oligomeric strains give rise to specific clinicopathololgic phenotypes in the AD-brain suggesting a prion-like progression. Fatty acids bearing anionic head-groups are the building blocks of cellular membranes and their interaction with various amino acid residues of the Aβ peptide can lead to the genesis of oligomers that have distinct conformation. We investigated the characteristics of Aβ oligomers generated in the presence of various anionic phospholipid micelles in-vitro. We found that oligomers thus formed are parallel β-sheet rich with similar melting temperatures indicating that they have similar conformation and that these may be a part of a distinct class of oligomer strain. These findings strengthen the hypothesis of ability of Aβ to form a class of oligomers bearing a unique conformation in presence of fatty acids that can lead to a distinct AD phenotype.

P83 "Studies on Bound and Unbound Water in Human Tissues using Dual Excitation Raman Spectroscopy"

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Raman spectroscopic analysis was performed on several human teeth samples as well as dry and wet chicken and pork skin. The goal was to determine the levels of both tightly bound water and unbound water in the enamel portion of the teeth as well as the skin tissue. Dual excitation Raman spectroscopy was pertinent for this study in order to achieve a greater range in wavelength, hence revealing the region where water could be detected in the enamel via -OH bonding. Fluorescence emitted from proteins is a common issue when probing biological tissues, however, the NIR illumination of Raman spectroscopy greatly reduces the auto-fluorescence of biological samples such as chicken and pork skin. Additionally, dual excitation will allow the detection of protein structure change from wet to dry skin. The patterns in the results reveal that a higher right shoulder in the C-H region of the skin is associated with a greater -OH intensity, meaning a larger content of unbound water. Furthermore, healthy enamel contains both bound and unbound water while the decayed enamel or lesions mainly has a reduced amount of unbound water. These parameters can successfully be exploited to study the differences between healthy and unhealthy tissues and provide a noninvasive way to analyze the tooth integrity.
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P84 "Graphene Oxide Helps in Increasing Bioavailability of Flavonols"

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The polyhydroxy phenolic componds, flavonoids are ubiquitous in plants. They have wide range of therapeutic activities with high potency and low systemic toxicity. Despite their vast medicinal importance, flavonoids are sparingly water soluble. In this exploratory study, graphene oxide (GO) has been used as the transporter of three flavonols fisetin (3, 7, 3', 4'-OH flavone), quercetin (3, 5, 7, 3′, 4′-OH flavone), and morin (3, 5, 7, 2′, 4′-OH flavone) for the physiological target DNA. Calf thymus DNA is chosen as the model physiological target. Characterization of GO is performed using FTIR, Raman and dynamic light scattering (DLS) spectroscopy. The strong absorption peak at 1730 cm^{-1} indicated the presence of carbonyl groups (C=O) of carboxylic acid and carbonyl groups present at the edges of GO. The presence of sp^3 carbons due to oxidation of sp^2 carbons in GO is further proved by Raman spectroscopy. DLS provided the average size of the GO particles to be ~ 9 μm. The dual luminescence behavior of the flavonols has been useful in this study for noninvasive sensing of the GO-flavonol and GO-flavonol-DNA interactions and the selectivity of GO for one flavonol over other. Furthermore, circular dichroism (CD) indicated that the optical activity of GO undergoes drastic change in their conjugated states. Molecular modeling corroborated the findings from fluorescence studies.

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P85 The Animal Behavior Core (ABC) of the COBRE Center for Psychiatric Neuroscience (CPN)

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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. The fee schedule is available at http://www.umc.edu/Administration/Centers_and_Institutes/Center_for_Psychiatric_Neuroscience/Animal_Behavior_Core.aspx. Supported by P30 GM103328 and the University of Mississippi Medical Center.

P86 "Investigating the effects of Vascular Smooth Muscle Cell Calcification on Media pH"

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Cardiovascular diseases are the leading cause of death globally. Vascular calcification (VC), which is a consequence of cardiovascular disease, is characterized by calcium and phosphate minerals being deposited along the vascular walls. These minerals that are deposited along the vascular walls are also known as hydroxyapatite crystals, which can also be found in bones. Elevated calcium levels promote phenotypic changes in native cells, causing stiffness. Although there are many factors that can affect VC, substrate mechanics are significant in determining how cells calcify. There has been evidence to show that cells are able to recognize the mechanical aspects of the environment in which they are growing in, then grow accordingly. In this study, vascular smooth muscle cells will be cultured in normal and calcifying media to determine the effect of surface stiffness on the calcification process. By taking the pH of cells after 24 hours, 3 days, and 7 days, the health and viability of cells will be tested to determine which surface is more conducive to cell growth and proliferation. The MTT assay will also be done at all three time points to determine cell count. By understanding the relationship between pH and calcification, we can have more knowledge to design future studies.

P87 Effect of Selenium on Honey bee Gene Regulation and Survivorship

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Abstract: The honey bee Apis mellifera L. is a major pollinator insect indispensable for agriculture production and the ecosystems. Bee populations are currently in decline due to multiple factors that affect their health and survival. Honey bees provide many products which have beneficial medical applications such as honey, venom and propolis that provide a source of anti-inflammatory agents, antioxidant, and stimulates immunity. Selenium (Se) is a metalloid easily found in the soil and flowers of the environment. Although this element is considered a nutrient in trace amounts, higher concentrations can be toxic and induce harmful behavioral and physiological effects to honey bees. In this study, we tested the effect of Se-enriched diets on honey bee behavior, determined lethal concentrations of Se for honey bees, and examine the transcriptional expression of antioxidant genes in honey bee. One-day old bees were fed varying concentrations of Se through tainted sugar syrup for 8 days. Syrup consumption and bee mortality were recorded for each concentration. Samplings of ten bees were collected every two days throughout the experiment. RNA extractions were performed on those samples at different tissue levels, and multiple antioxidant genes were studied using qRT-PCR. Our results showed that selenate is more toxic to bees than selenite at similar concentrations. Selenate concentrations (60, 600) µg/mL are over lethal and killed all bees in less than 24h, while bees survived (6, 0.6) µg/mL concentrations throughout the experiment. Catalase was down-regulated in bee heads at day 2 of exposure to Selenate, and up-regulated in their thorax only at day 8. Analysis of other genes are still ongoing.

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P88 Investigating the Role of Polymers in Anhydrobiosis

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Organ and tissue donations are essential to transplant patients who are in critical need of these vital parts. As soon as the organ is removed for transplant the viability can only be maintained for 4 to 72 hours on ice. One possible approach to solve this issue is by incorporating the method of anhydrobiosis into organ preservation. Anhydrobiosis means "Life without water" and is a process used by certain organisms to preserve cells during desiccation. It is currently believed that certain molecules play an important role in anhydrobiosis by replacing water in a cell. However, the molecules needed to preserve a mammalian cell to induce anhydrobiosis is enough to kill it. A possible solution to this problem is to incorporate polymers into the system with the anhydrobiosis molecules to stabilize the cell membrane and hold on to a minute amount of water that the cell can use to maintain viability. This research will investigate the individual roles that the molecules and polymers play in anhydrobiosis by observing their behavior both inside and outside of a cell. Fourier Transform-Infrared Spectroscopy, Scanning Electron Microscopy, and Optical Fluorescent Microscopy will be used to analyze the behavior of molecules and polymers in different combinations inside and outside of a cell.

P89 "Altered miRNA Expression in Hippocampus in Major Depressive Disorder"

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Major Depressive Disorder (MDD) is a common psychiatric disorder where less than half of patients respond to available medications. Blood flow to the hippocampus is significantly altered in MDD, and hippocampal volume is decreased with increasing duration of illness. Decreased hippocampal volume in MDD may be related to altered neuro-inflammatory gene expression in the dentate gyrus in MDD. We tested the hypothesis that altered expression of miRNA is differentially expressed in the hippocampus in MDD. Tissue punches were collected from postmortem hippocampal dentate gyrus from 23 subjects with MDD (17 suicides, 6 non-suicide) and 23 normal, age- and gender-matched control subjects (14 males and 9 females per cohort). Whole transcriptome small RNA sequencing was performed using Illumina TruSeq Small RNA pipeline. For each sample, raw sequencing reads underwent quality control (QC30 and adaptor trimming) and were aligned to the miRDeep2 reference genome. Comparative analyses for differential expression between the cohorts were performed with DESeq2 (FDR<0.05). Integrative miRNA and mRNA expression analysis was performed (TargetScan, v.7.1). Seven to 12 million reads were obtained/sample with most samples mapped successfully ~90% to the miRDeep2 reference genome. There was a significant increase in expression of miR-486 (family and precursor group) in depressed vs. control females. Expression of miRNA-379 was significantly decreased in depressed (non-suicide) vs. control subjects. TargetScan analysis predicted that: miR-486 regulates 168 genes and Ingenuity Pathway

Analysis (IPA) predicted that these genes regulate IL-2, IL-3, immune response of microglia, PI3K/AKT signaling related to cell proliferation, and iCos-iCosL signaling of T-helper cells; and that miR-379 regulates 119 genes and IPA predicted that these genes regulate GADD45 stress signaling, Wnt/Ca^+ pathway (involving CamKII and PKC), TSP1 regulation of angiogenesis, and STAT3 pathway (regulating IL-6 and 5HT transporters). TargetScan predicted that miRNA-379 regulates EDN1 (endothelin-1, a potent vasoconstrictor). The down-regulation of miRNA-379 observed here in MDD (non-suicide) corresponded to a 3-fold increase in EDN1 mRNA (Mahajan et al. 2017). Altered expression of miRNA-379 and EDN1 may be related to altered blood flow in the hippocampus in depression. Further studies in human tissue and animal models are needed to implicate specific miRNA in the pathology of MDD. Supported by P30GM103328, P20GM103476, P20GM121334, and P20GM104357.

P90 "Development and characterization of an 8-aimnoquinoline derivative loaded Nanostructured lipid carrier for improved oral delivery"

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NPC-1161 B (NPC) is a new 8-aminoquinoline compound currently in late preclinical development for radical cure *of Plasmodium vivax* caused malaria. The aim of the current study is to prepare and optimize the NPC-1161B loaded nanostructured lipid carrier (NLC) formulations. The selection of lipids used for the NLC formulations were based on the solubility of NPC in different lipids. NPC-NLCs were then prepared by ultra-probe sonication method, using different drug loading (0.3 to 1.5%). The NPC loaded NLCs were evaluated for size, poly dispersity index (PDI,) and zeta potential (ZP), using a Zetasizer, as well as entrapment efficiency and assay of NPC in the formulation by high pressure liquid chromatography. Physical stability studies of the optimized NPC-NLC formulation was conducted at refrigerated and room temperature for one month. Furthermore, the effect of cryoprotectants on lyophilization of NLC were studied. From the solubility studies, combination of Compritol® 888 ATO and Castor oil (3:1) was selected as the lipid phase for the NLC. An optimized NPC-NLC formulation was achieved using NPC (1.2%), Compritol® 888 ATO (4.5%), Castor oil (1.5%), Tween® 80 (1.5%), Poloxamer 188 (0.25%), glycerin (2.25%), probe sonication for 10 min at 40% amplitude and 20 sec pulse on and 10 sec pulse off rate. The optimized characteristics of the NPC-NLCs were: particle size 357 ± 10 nm, PDI 0.573 ± 0.14, ZP of 30.2 ± 1.9 mV, assay 102%, and entrapment efficiency 98%. The NPC-NLC formulation was physically stable at refrigerated and room temperature over a four-week period. After reconstitution of NPC-NLC lyophilized product, particle size and PDI increased two-fold and ZP was reduced. Therefore, the results demonstrate the feasibility of preparing NPC loaded NLC formulations with favorable particle size, ZP, assay, and physical stability profiles, showing promise for an oral delivery platform for NPC 1161B. Acknowledgement: This work was funded by National Health Institute from the NIAID under grant number 1R01AI132579-01.

P91 "A descriptive analysis of the Open Arms Healthcare Center's Becoming a Healthier U (BHU) Preventative Health Screening Program"

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The BHU program is a community-based initiative that provides sexual health screenings to patients of Open Arms Healthcare Center (OAHCC) in order to identify those people at greatest risk for sexually transmitted infections (STI's) and HIV infection and link them to treatment and preventative services. The focus of this study was to identify and describe the trends among patients enrolled in the BHU program. This retrospective clinical chart review analyzed electronic health record data of patients who participated in the BHU program from February 1, 2013 to January 31, 2018 to describe the prevalence of sexual health risk factors. Data analysis was conducted using IBM SPSS Software. Of the BHU participants (n=1,913), a majority were male, African-American, Non-Hispanic, Heterosexual, and without insurance. About 45.8% of patients reported having unprotected sex. During the BHU screenings, 12% of patients tested positive for chlamydia, and 2.4% tested positive for HIV. Those who had positive screens were linked to care, however, a majority of patients who tested negative did not return for follow up preventive care. The BHU Program is a useful tool for identifying patients with STI's and linking them to treatment; it is also able to serve those without typical means of access to care due to lack of insurance. However, more efforts should be placed on follow up care and utilization of preventative services as part of a comprehensive prevention and control program.

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P92 "Optimization Of Western Blotting For The Detection Of Proteins Of Different Molecular Mass"

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BACKGROUND AND OBJECTIVES: Western blotting is a common procedure for the detection of specific proteins in a complex mixture. SDS-PAGE, transfer of proteins to a solid membrane surface using Towbin's transfer buffer (TTB), blocking of membranes, and detection of proteins using specific antibodies are major steps in this technique. Some of the key factors in obtaining optimum protein-specific signal can be, type of membrane, blocking agent, and concentration of methanol used in TTB. Aim of this study is to obtain optimal signal for proteins of different molecular mass using combination of these variables. In this study we have used CFTR (MW ~170 kDa) and Rab11 (MW ~25 kDa) as markers of high and low molecular mass proteins. METHODS: Cell lysates prepared from a lung epithelial cell line (CFBE) were subjected to SDS-PAGE and transferred to nitrocellulose (NC) or PVDF membrane as per the standard procedure. These membranes were blocked with a variety of blocking agents (BSA, gelatin, non-fat dry milk, FBS, or their equimolar mixture). Optimum conditions were identified, and subjected to another set of experiments to determine the effects of methanol concentration (0-20%) in TTB on protein-specific signals. RESULTS: Optimum protein-specific signals can be obtained when NC membrane was used and blocked with a mixture of various blocking agents. Presence of methanol in TTB appears to have little to no effects on protein signals. Additionally, mixture of blocking agents appears to have strong effect on signal of low molecule weight protein like Rab11. CONCLUSIONS: NC membrane and mixture of blocking reagents can significantly enhance the western blotting signal of both high and low molecular weight proteins. Further,

methanol, a toxic substance, can be removed or reduced from TTB without compromising with the enhanced protein-specific signals.
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P93 "The Future of HealthCare: How Does the Cost of Health Insurance Affect Access to Affordable Healthcare Services?"

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The Affordable Care Act (ACA) gained historical recognition by extending Medicaid coverage and providing Marketplace subsidies for individuals below 400% of poverty. Currently, 28 million Americans are uninsured due to cost, unemployment, ineligibility, etc. Mississippi ranks 50th when it comes to accessibility and affordability to medical care. The purpose of this study is to examine the number of individuals that are currently uninsured or insured to improve access to healthcare services. We conducted a community survey amongst individuals seeking healthcare services. The survey contains a range of questions pertaining to uninsured status, reasons for being uninsured, and whether or not income prevents accessibility and affordability of healthcare. Upon completion of survey collection, surveys were entered into Microsoft Excel and analyzed using SPSS. According to data analysis, there are an equal number of individuals that are insured or uninsured. There is a significant association between income and insurance status. Findings show that most individuals are ages 19-29 with average incomes ranging between less than $15,000 to $25,000 annually. Therefore, concluding that most individual who stated they did not have insurance reasoning that they are uninsured due to affordability. Individuals that do have insurance also stated that the cost of health insurance, co-pay, and deductibles sometimes prevent them from receiving healthcare services regularly as well.
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P94 Health Perspectives of Males vs. Females

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Body image is the perceived mental and physical status of one's self and can be an indicator of health. If one would perceive themselves as obese they could either be extremely motivated or unmotivated, depending on their personal beliefs, to maintain a healthy physique and lifestyle. The perception of what is a healthy physique varies as well, and we investigated how current body image compares to the ideal body image between males and females.
Using surveys to conduct our study, we sampled individuals throughout several counties in southeast Mississippi. From the dataset (n=145), 143 participants met eligibility criteria (over the age of 18). Participants ranged from 18 to 84 years of age, with the majority of participants (n=99) reporting as female, and covered multiple races, incomes, education levels. 37% of participants reported they had 'Good' physical health and 20% said they had 'Very Good' physical health, while 36% reported 'Good' mental health and 40% reported 'Very good' mental health.

Using the data we collected, we analyzed the perception of current vs ideal body image between men and women. With our data set covering many counties and other factors, such as race, income, and education, we believe that accounting for a wide variety of factors adds to the uniqueness of our findings. Previous literature implies that the ideal body image for males is generally the same despite their current body images, and the same can be said for females. However, the ideal BMI is higher in the ideal male body image than it is for females. In our discussion, we compare our findings to those of previous records.

P95 The Influence Of Anaerobic And Aerobic Conditions On Biofilm Formation Amongst Various Strains Of Listeria Monocytogenes

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Listeria monocytogenes is a facultative bacterium that has the capability of persisting in a variety of environments. These bacteria have the ability to create biofilms that are found frequently in food processing plants and are resistant to antimicrobial disinfectants making them a serious threat to the immunocompromised, pregnant women, neonates, and the elderly. Previous research in our lab has indicated that certain strains of L. monocytogenes are more resistant to stressors under anaerobic conditions. The expression of putative oxygen sensors correlated with this increase in resistance. As biofilm growth is an important aspect of the pathogenesis of L. monocytogenes, the objective of this project was to determine whether oxygen availability influenced biofilm growth among different strains of L. monocytogenes and whether biofilm growth correlated with the expression of the oxygen sensors. In this experiment, 19 L. monocytogenes isolates of different divisions and serotypes were tested to determine whether biofilms were formed differently under aerobic or anaerobic conditions. Results confirmed our hypothesis that Listeria monocytogenes biofilms formed more viable biofilms in anaerobic conditions rather than aerobic conditions. Of the 19 strains, we found that the strains 2011L-2663, 2011L-2676, 2011L-2625, 2011L-2626, 2011L-2624 produced the most proficient biofilms. This is important to note as these were strains isolated from the recent cantaloupe outbreak. Further research is needed to determine why these particular strains are the most virulent and their mechanisms.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P96 "Binding of Flavonol with Protein: A Thermodynamic Characterization"

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Plant flavonoids are ubiquitous in plant of higher genera, and are widely studied for their high therapeutic potency and low systemic toxicity to treat a wide spectrum of diseases which include cancers, neurodegenerative disorders, and atherosclerosis. The present study is focused on a common flavonol morin (3, 5, 7, 2′, 4′-OH flavone), which is widely present in citrus fruits. Till date, there is not enough literature data on the behavior of morin in physiological environment. Hence, an exploratory study on morin has been performed in protein microenvironment. Human serum albumin (HSA) is chosen as model for macromolecule. HSA is the natural carrier of drugs/small molecules in physiological system. Absorption,

fluorescence, and circular dichroism (CD) spectroscopic measurements have been carried out at five different temperatures, 15, 20, 25, 30 and 37 °C to observe the influence of the structure of HSA on its binding with morin. Studies indicated morin binds in the hydrophobic cavity of HSA. Usually flavonols with a 5-OH group show fluorescence emission only when they are bound with a rigid environment. Morin's emission is distinctive from the well known flavonols fisetin (3, 7, 3', 4'-OH flavone), quercetin (3, 5, 7, 3′, 4′-OH flavone) because the 2'-OH of morin makes an intramolecular H-bond with the -O- of chromone. Studies of morin with HSA at multiple temperatures indicated that structure of the protein influences the thermodyamics of the binding process.
Acknowledgement: 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.

P97 "Using Zebrafish for Epilepsy Drug Development"

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Epilepsy affects around 50 million people in the world and more than 60,000 Mississippians. Dravet syndrome is a pharmaco-resistant form of epilepsy wherein ~80% of the patients carry a mutation in the voltage-gated sodium channel Nav1.1 (*scn1a*). It is imperative that new more effective and safe treatments be found. Our research goal is to identify effective drug leads for the treatment of epilepsy by considering both anti-seizure activity and potential for developmental toxicity. We utilized chemically- (pentylenetetrazole; PTZ) induced and *scn1a* null (Dravet syndrome) zebrafish seizure models to screen natural compounds including cannabidiol, CBD, and *Tapinanthus globiferous*, TG, extracts for their antiseizure activity. At 5 days post fertilization (dpf), zebrafish larvae were exposed to CBD (0.075 and 0.3 mg/L) or TG (0.2, 1, and 5 mg/L) for 24 hr in both models. Seizure activity was measured at 6 dpf with the Viewpoint Zebrabox for 15 min in 100% light. In the chemically-induced model, two TG extracts (1 and 5 mg/L) significantly reduced seizure activity, however, CBD was ineffective at reducing seizures. When *scn1a*$^{-/-}$ zebrafish were treated with CBD (0.075 and 0.3 mg/L) seizure activity was significantly reduced relative to untreated controls. This study validates zebrafish for use in both generalized and genetically-based epilepsy drug discovery.
Acknowledgement: This work was funded by National Institute of General Medical Sciences (P20GM104932) and the National Institute of Drugs of Abuse (R21DA0447301).

P98 Liver ischemia/reperfusion injury and inflammatory responses in obese female rats

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Liver ischemia/reperfusion injury (IRI) occurs in clinical situations like transplantation. Obesity with hepatic fat accumulation (steatosis) exaggerates the risk for liver IRI via inflammatory mediators, including tumor necrosis factor-alpha (TNF-α). Males have higher incidence of fatty liver disease. Although steatotic males have exaggerated liver IRI, less is known about whether this occurs in females. We tested the hypothesis

that liver IRI and TNF-α levels are exaggerated in obese female rats. Obese melanocortin-4 receptor (MC4R)-deficient or lean wild-type (WT) female rats were subjected to 45" of 70% warm liver ischemia with plasma and liver tissue harvested at 24 hours of reperfusion or Sham surgeries. EchoMRI revealed that liver fat was greater ($P<0.05$) in obese (7 ± 1%) versus lean rats (2 ± 1%). Plasma levels of the liver injury marker, alanine aminotransferase (ALT), were exaggerated ($P<0.05$) in obese (I/R: 6,621 ± 1,922 vs. Sham: 55 ± 25 IU/mL) over lean rats (I/R: 1,185 ± 389 vs. Sham: 69 ± 21 IU/mL). Although hepatic TNF-α levels were lower in obese compared to lean Shams (6.8 ± 1.1 vs. 13.7 ± 3.1 pg/mg, $P<0.05$), liver IRI increased ($P<0.05$) TNF-α in obese (10.0 ± 1.8 pg/mg) but not lean rats (11.6 ± 1.9 pg/mg). Indeed, the % change in hepatic TNF-α levels following IRI was -15 ± 14% in lean and 47 ± 26 in obese rats ($P<0.05$). In conclusion, these data implicate increased inflammatory responses in mediating exaggerated liver IRI in obese female rats.
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P99 "The Histoplasma capsulatum DDR48 protein modulates the ergosterol biosynthesis pathway in response to 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) and can transform into unicellular, pathogenic yeast upon inhalation into a mammalian host (37˚C). This mold-to-yeast shift is required for pathogenesis. Our research aims to characterize the DNA damage-responsive protein DDR48, an Hc homolog sharing sequence similarity to C. albicans DDR48p. Previously in our lab an allelic replacement deletion-mutant was generated (ddr48Δ) to elucidate the function of HcDDR48. Interestingly, DDR48 is constitutively expressed in the mold-phase of Hc growth, 6-fold greater than expression in the yeast-phase. However, DDR48 expression can be modulated in the yeast-phase under stressful conditions (e.g., oxidants, antibiotics, DNA damage, heat shock). This study focuses on analyzing DDR48 expression and its role in conferring antifungal resistance to amphotericin-B. We found that in the yeast-phase of Hc, the addition of amphotericin-B up-regulates DDR48 expression at least 4-fold using qRT-PCR, while no significant difference in DDR48 expression occurred in the mold-phase after antifungal addition. The presence of DDR48 also appears to play a regulatory role in the synthesis pathway of the membrane sterol, ergosterol, by modulating transcription of numerous genes in the ergosterol synthesis pathway. Research is ongoing to further elucidate the role of DDR48 in the synthesis and maintenance of the cell membrane of the fungus.

P100 Allosteric Protein Targets for Breast and Prostate Cancers

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Acquired hormone therapy resistances in ERα positive breast and AR-A positive prostate tumors are believed to be due to developed hormone independent pathways to transcription. The presence of ERα and AR-A isoforms, an increased level of signal transmitting calcium binding protein Calmodulin (CaM), and

CaM complexes with ER and AR in these malignancies bolster this hypothesis. Performing atomistic molecular dynamics simulations of protein-protein and protein-DNA complexes of ERα and AR-A and structural analysis of the trajectory, we identify crucial hydrogen bonding residues and key sequence motifs on these proteins that are responsible for protein dimerization and/or DNA recognition. Using Protein BLAST on these sequence motifs, we then validate protein targets which could be used as templates for drug designing. The key amino acids of a validated sequence motif are then grafted on stable helices so as to develop structurally resilient peptide-based inhibitors without altering the pharmacophore. Our designer peptides to inhibit ERα dimerization – an essential process in ER mediated transcription – is tested in-vitro in MCF-7 cell lines and found to inhibit ER signaling significantly. Currently, we are optimizing the functionality of the designer peptides without altering the pharmacophore by targeted mutations of non hydrogen bonding residues in the sequence motifs. The drug designing scheme is also being employed in hormone therapy resistant AR-A positive prostate tumors.

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P101 "Preparation and characterization of solid lipid nanoparticles, nanostructured lipid carriers and nanoemulsion of primaquine for oral delivery.

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Malaria is one of the most severe public health problems today. There were 216 million cases of malaria worldwide reported in 2016. An estimated 445000 people died from Malaria. There are four different species of Plasmodium that have been recognized to infect humans: Plasmodium vivax, Plasmodium falciparum, Plasmodium malariae, and Plasmodium ovale. In the case of P. vivax, some of the tissue stage parasites persist in the liver in the form of dormant hypnozoites, which are capable of causing relapse periodically. Primaquine (PQ) is the only available drug till date to eliminate liver stages of the parasite and prevent relapse. However, PQ can cause dangerous dose-limiting side effects in certain patients who are deficient in in glucose-6-phosphate dehydrogenase (G6PD). Thus, we hypothesize that selective targeting PQ to the hepatic tissues by incorporating it into the lipid-based solid lipid nanoparticles (SLN), nanostructured lipid carriers (NLC) and nanoemulsion (NE) would possibly improve therapeutic index and safety.

In the present study, we have developed primaquine loaded SLN, NLC, and NE. The lipid-based primaquine formulations were prepared by the hot homogenization coupled with probe sonication method. Briefly, the lipid phase was melted at a temperature above the melting point of the solid lipid. The surfactant solution was heated to the same temperature as the lipid phase and added to the melted lipid phase under stirring; then the premix was subjected to high-speed stirring by using an Ultra-Turrax T25. This hot pre-emulsion was further processed by an Ultrasonic Processor (Sonics, USA). The lipid dispersion was cooled to room temperature and solidified to obtain the SLN, NLC, and NE formulations. Particle size, polydispersity index, and zeta potential were determined by using a Malvern Zetasizer Nano ZS (Malvern Instruments, UK). Entrapment efficiency and assay were measured by HPLC.

The results showed that the physical characteristics of primaquine loaded SLN, NLC, and NE products were found to be stable without significant release in a one-month stability test. The effect of lipid matrix composition causes a significant difference in particle sizes. Compritol® 888 ATO was used alone as the solid lipid for SLN, which showed the biggest particle size (728 nm). The particle size shrunk to 318 nm when 25% w/w of the solid lipid was substituted with liquid lipid in the case of NLC, and the smallest particle size was obtained in the case of NE (137 nm). The effect of lipid matrix composition on the particle's size could be related to the crystallization of lipids and the interaction between lipids and surfactants. For SLN, NLC, and NE formulations prepared with different levels of drug concentration, it was observed that at a higher drug concentration, excess amounts of primaquine were able to induce particle aggregation and cause instability. PDI remained within the acceptable range (<0.3) for most of the formulations except for formulations at high drug concentrations. Zeta potential (ZP) values were in the range of -17 to -33 mV, which indicated a high degree of stability. Entrapment efficiency ranged from 63 % to 90%. These primaquine-loaded lipid formulations have potential to be orally administered for malaria treatment.
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P102 Adipose Tissue Androgen Synthesis in Polycystic Ovary Syndrome

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Polycystic Ovary Syndrome (PCOS), the most common endocrine disorder in females, is characterized by hyperandrogenemia and ovarian dysfunction. Several metabolic derangements such as obesity, insulin resistance and hypertension are frequently presented in PCOS women. In the US, the prevalence of obesity in PCOS women is up to 80%. Obesity plays a major role in the clinical manifestations of the syndrome, since weight loss is associated with improved fertility and reductions in metabolic derangements in PCOS patients. We have established an animal model of PCOS that mimics many of the metabolic and cardiovascular abnormalities of women with PCOS, such as increased food intake, subcutaneous adipose tissue mass, insulin resistance, obesity, and elevated blood pressure. We recently found that the 17β-hydroxysteroid dehydrogenase (17β-HSD) type V, a key enzyme in androgen production by the adipose, is upregulated in subcutaneous and visceral fat in the PCOS model. Furthermore, the upregulation of the 17β-HSD type V persists in subcutaneous tissue 6 months after androgen withdrawal. Our data highlight the critical role of adipose tissue-generated androgens in mediating the cardiometabolic complications associated with PCOS. The 17β-HSD type V enzyme could be a novel therapeutic target to treat the cardiometabolic complications in PCOS.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM121334.

P103 "Developing a STD Risk Profile Among MS Residents"

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Sexually Transmitted Infections (STI's) are currently a significant health disparity, with the most vulnerable groups affected being young adults ages 15-24, pregnant women, and men who have sex with men. The spread of STI's in the state of Mississippi are directly affected by economic, social, and behavioral factors, and have been increasingly rising since 2015. Reasons for the increasing rates include decreasing condom usage, a lack of awareness among doctors and patients, and a falling number of STD clinics. Mississippi ranked 5th in chlamydial infections and ranked 3rd in gonorrheal infections in 2015. The purpose of this study was to identify the "risk-profile" of individuals who tested positive for STI's at Open Arms Healthcare Center. For this research, we accessed the Electronic Health Records at Open Arms Healthcare Center. From this we first identified patients who tested positive for STI's within the past two years. We also highlighted key demographics, including their year of diagnosis, multiple STI diagnoses, and their status of insurance. We then entered the patient data into SPSS for further descriptive analysis. Results showed an increase in the cases of all STIs over the past two years. African-American males, who have sex with men were shown to be the primary population of those tested positive with STI's within both years. Further research revealed that multiple cases of STIs occurred beyond the Jackson-Metro during the 2017-2018 sampling. Findings from this current research project indicated that African American men in the age range of 20-30 who also engages in the sexual behavior of men who have sex with men (MSM) were shown to have more cases of STI infections than any other group. Future STI prevention methods should gear towards African American men who have sex with men (MSM) between the ages of 20 to 30 years old.
Acknowledgement: This work was funded by an Institutional Development Award (IDeA) from the NIGMS under grant number P20GM103476.

P104 "N-substituted Isoquinolines as Photoactivatable Compounds for DNA-Cleavage "

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N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. Applications of photoinduced cell death are found in Photodynamic Cancer Therapy. The efficiency of DNA cleavage is limited by weak ground-state association for the quinoline and isoquinoline derivatives. To increase cleaving efficiency, a DNA-binder (1,8-naphthalimide) has been synthetically attached. To further improve binding and cleaving efficiency, attempts to synthesize novel amino-heterocycles are undertaken. The goal is to shift the absorption maximum and have a flexible linker connection between heterocycle and naphthalimide.
Isoquinolines are aromatic heterocycles that can be synthesized by the Bischler-Napieralski Synthesis. Here an phenetylamine reacts with an acid chloride to produce an amide. This is then cyclized with a Lewis acid to yield 3,4-dihydroisoquinolines. Subsequent oxidation gives the isoquinolines. Functionalization via bromination of alkylisoquinolines and reaction with hexamine allows for conversion to the alkylaminoisoquinoline which is stable in its deprotonated form. Condensation with 1,8-naphthalic anhydride, N-oxidation and alkylation yields the desired bifunctional compounds

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P105 "Synthesis of copper doped polydopamine nanoparticles for photothermal therapy and potential positron emission tomography imaging"

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Cancer is the second leading lethal disease in United States and major public health problem worldwide. For the later stage of cancer, radiotherapy and chemotherapy are usually needed. Unfortunately, due to non-specific properties of these traditional therapy approaches, the patients usually suffer from severe side effect, immune depression, and an increased incidence of second cancers.
Photothermal therapy is a new noninvasive treatment technique, which employs light absorbers to convert light energy into heat. In the search for biocompatible platform with photothermal properties, melanin-like nanoparticles have caught great interests. Melanin-like polymer nanoparticles have been used as photothermal agents because they can efficiently convert light energy to heat. The photothermal conversion efficiency is reported to be comparable to that of gold nanorods. Meanwhile, melanin-like biopolymers are biodegradable.
Imaging guided therapy, theranostics, can further improve the outcome of cancer treatment. Imaging can evaluate disease before therapy and monitor the prognosis of the treatment. Through the imaging guided therapy, therapeutical strategies will be optimized. The toxicity of the therapy will be further reduced. Among different imaging modalities, positron emission tomography (PET) has emerged as one of the most frequently used techniques for early stage diagnosis and staging of cancer and other diseases. PET is non-invasive, highly sensitive nature, and high patient compliance. To the best of our knowledge, no study has been conducted for imaging guided therapy for synthetic polydopamine NPs with PET.
In this study, polydopamine nanoparticles with different size will be synthesized. The surface of nanoparticles will be PEGylated to improve the colloidal stability in media. After labeled with copper, polydopamine nanoparticles will be studied for the size effect on photothermal therapy and possible PET imaging.
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P106 "Implementing Basic Research Technique Workshops at Tougaloo College"

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While cultural diversity has been predicted to be a key component in establishing a successful STEM pipeline, a decrease in African Americans prepared for STEM courses and graduating in STEM disciplines has been witnessed. At Tougaloo, we have noted that less than 20% of freshman STEM students are prepared to handle the rigor of college-level science courses. This is further compounded by the fact that approximately 50% of those taking introductory-level biology or chemistry may fail the course. Of note, half of those who fail these classes will eventually change to a non-STEM major and/or leave the college

altogether. Our curriculum need to be changed to adapt to new environment and current generation of students. We hypothesized that early exposure to a hands-on research program enhances retention rate of underrepresented minority students in the STEM fields at first two years and increases their confidence in doing biomedical research. The one day workshops in genetics, forensic science, microbiology and immunology were implemented during 2017-2018 academic year and opened to all STEM majors. There were total about 100 participants. The most significant results we found is that the retention rate for these group of participants is 90% which is much higher than the typical numbers. Both students and faculty considered that the workshops were best modules for STEM students to have hand-on research experiences with real life applications. Biology department will adopt the modules in the curriculum and introduce them to the Natural Science Division.
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P107 "Toxicity of Metal Oxide Nanomaterials in Nanomedicine"

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Nanomedicine is a very promising method for the infectious disease and cancer treatment due to the exclusion of surgical excision and radiation therapy and elimination of serious collateral damage of the rest of the body. Metal oxide nanomaterials in nanophotodynamic therapy lead to cell destruction under the light irradiation caused by reactive oxygen species from nanomaterials. The toxicity of metal oxide nanomaterials is very critical in nanomedicine. We use this course to show the students the metal oxide nanomaterial synthesis by electrospinning method with different sizes, morphology and structures and the toxicity of metal oxide nanomaterials in lab sections. The knowledge of the course is presented by lection sections. The students who select this course learn the hands-on skills of nanomaterial synthesis and characterization, which help them in the competition in the job market. The knowledge showed in this course enhances their understanding of some concepts such as nanomedicine, biomedical applications and photodynamic therapy, which improving the minority undergraduate student education. In addition, this course is incorporated into Jackson State University (JSU) biomedical program which can help those students who will go to graduate school after they graduate from JSU.
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P108 Molecular Biology Course Enrichment for Students at Rust College

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The Molecular Biology course is very important for undergraduate students majoring in biology and chemistry. Rust College has about two hundred students majoring in biology, pre-medical, pre-nursing, and chemistry. Among these students more than 30% will continue their studies in graduate in graduate or professional schools in biological disciplines. Therefore, we plan to change Macular Biology course from an elective to the core course. In this project, we plan to infuse more concepts into the lecture portion, and more importantly, set up more laboratory activities, and carry out mini research projects. We organized a workshop for 12 faculty members in our division. We concentrated on student learning outcomes and

evaluation procedures. Attendees also participated in two mock laboratory exercises: DNA extraction and agarose gel electrophoresis to separate DNA fragments. We opened pilot lecture and lab courses for summer school, 2018 . We organized biology faculty committee revising the Molecular Biology syllabus and laboratory manual. As a result, toward integration of Molecular Biology into the core biology curriculum, we revised the course syllabus and expected student learning outcomes. Feedback from the faculty workshop and summer pilot course confirmed that scientific teaching and laboratory exercises in this area are important for our students, especially for those who intend to pursue graduate study. In addition , our division purchased three pieces of equipment (a real-time PCR meter, a micro-centrifuge and ultra spectrometer) as well as laboratory supplies to update the laboratory. This will provide useful tools to help students carry out mini project for scientific research. In future, we will design and carry out research project in molecular biology discipline for our students.

P109 Developing high throughput and sensitive Starch Stabilized Gold Nanostructure platform for SKBR3 sensing

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A method for gold nanoparticle (AuNP) synthesis from buffered starch solution has been developed and the particles investigated by UV-Vis spectroscopy, transmission electron microscopy (TEM) and atomic force microscopy (AFM). For the synthesis of AuNPs, we used rice (Sella) starch as the unique reducing and stabilizing agent, chloroauric acid ($HAuCl_4 \cdot 3H_2O$, A) as the metal precursor, and deionized (DI) water ($\rho > 18.2$ MΩ cm) as dispersing medium. Among several inorganic and biological Good's buffers, phosphate and MES buffers give the best results with quite uniform AuNPs. Typical AuNP diameters from MES and phosphate buffers (PB) are 4 ± 1 nm and 13 ± 2 nm with plasmon band peaks at 521 nm and 523 nm, respectively. The role of the phosphate buffer is mainly to control the pH, while MES is also a synergist with more composite function. TEM confirms the crystalline structure of the AuNPs, meaning that the AuNP surfaces are low-index single-crystal facets such as (100), (110) and (111). Surface of obtained AuNP was conjugated with S6 and HER2 antibody for breast cancer cell (SKBR3) binding and screening. Primary result revels the sensitivity of the system up to ~60 cell/mL, and found to efficiently enhance sensitivity and selectivity only for SKBR3 cell avoiding any other biological cells available in the mixture. "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."