Mississippi IDeA Conference

&

Mississippi EPSCoR

2022

Featuring

MISSISSIPPI HEALTH DISPARITIES

Thursday, July 28, 2022

Lake Terrace Convention Center

Hattiesburg, Mississippi

Hosted by

MississippiINBRE
IDeA Network of Biomedical Research Excellence

CEMOs
Center for Emergent Molecular Optoelectronics

Conference Agenda

<table>
<tr><td colspan="6">8:00-9:00 AM
Registration and Breakfast
Lobby / Exhibition Hall A</td></tr>
<tr><td colspan="3">STEM</td><td colspan="3" rowspan="2">Mississippi Health Disparities 2022</td></tr>
<tr><td>Cell Biology</td><td>Biomaterials</td><td>Materials</td></tr>
<tr><td>9:00-10:00 AM
Neurology
Chair: Dr. Vijay Rangachari
The University of Southern Mississippi
Forrest I/II</td><td>9:00-10:00 AM
Bioengineering
Chair: Dr. Tristan Clemons
The University of Southern Mississippi
Lakeview I</td><td>9:00-10:00 AM
CEMOs RFA 1 + 2
Chair: Dr. Neeraj Rai
Mississippi State University
Lamar I/II</td><td colspan="3">9:00-10:00 AM
Opening Session
Speakers:
Dr. Daniel Edney, Mississippi State Department of Health
Dr. Katherine Pannel, Right Track Medical Group
Exhibition Hall A</td></tr>
<tr><td colspan="6">10:00-10:15 AM Break</td></tr>
<tr><td>10:15-11:15 AM
Immunology
Chair: Dr. Fengwei Bai
The University of Southern Mississippi
Forrest I/II</td><td>10:15-11:15 AM
Biochemistry
Chair: Dr. Jacques Kessl
The University of Southern Mississippi
Lakeview I</td><td>10:15-11:15 AM
CEMOs RFA 3
Chair: Dr. Derek Patton
The University of Southern Mississippi
Lamar I/II</td><td>10:15-11:15 AM
Diabetes & Obesity
Chair: Dr. Michael A. Welsch
University of Mississippi Medical Center
Lakeview II</td><td colspan="2">10:15-11:15 AM
Women's Health
Chair: Dr. Mauda Monger
My Brother's Keeper, Inc.
Garden Room</td></tr>
<tr><td colspan="6">11:15-11:30 AM Break</td></tr>
<tr><td colspan="3">11:30 AM-12:30 PM
STEM Laboratory Research Posters
Exhibition Hall B&C</td><td>11:30 AM-12:30 PM
Environmental Health
Chair: Dr. Robert J. Griffitt
The University of Southern Mississippi
Lakeview II</td><td colspan="2">11:30 AM-12:30 PM
Innovative Community-Academic Models
Chair: Alicia Barnes
Open Arms Healthcare Center
Garden Room</td></tr>
<tr><td colspan="6">12:30-1:30 PM
Lunch
Exhibition Hall A</td></tr>
<tr><td>1:30-2:30 PM
Physiology
Chair: Dr. Vijay Rangachari
The University of Southern Mississippi
Forrest I/II</td><td>1:30-2:30 PM
Chemistry
Chair: Dr. Song Guo
The University of Southern Mississippi
Lakeview I</td><td>1:30-2:30 PM
CEMOs RFA 4
Chair: Dr. Santanu Kundu
Mississippi State University
Lamar I/II</td><td>1:30-2:30 PM
MHD2022 Posters
Exhibition Hall B&C</td><td>1:30-2:30 PM
COVID-19
Chair: Dr. Antonio J. Gardner
Mississippi State University
Lakeview II</td><td>1:30-2:30 PM
Mississippi Health
Chair: Dr. Jude Haney
William Carey University
Garden Room</td></tr>
<tr><td colspan="6">2:30-2:45 PM Break</td></tr>
<tr><td colspan="2" rowspan="2">2:45-4:00 PM
Faculty Meeting
Executive Boardroom</td><td>2:45-3:30 PM
Student Professional Development – Smart Goals and Professional Development Plan
Chair: Dr. Sarah Morgan
The University of Southern Mississippi
Exhibition Hall A</td><td rowspan="2">2:45-3:45 PM
Community-Engaged Research Approaches
Chairs:
Dr. Caroline Compretta
University of Mississippi Medical Center
Dr. Holly F. Huye
The University of Southern Mississippi
Lakeview II</td><td colspan="2" rowspan="2">2:45-3:45 PM
Rural Health & Geospatial Applications
Chair: Dr. Anne M. Cafer
University of Mississippi
Garden Room</td></tr>
<tr><td>3:30-3:45 PM Break</td></tr>
<tr><td colspan="2" rowspan="2">4:00-4:30 PM Break</td><td rowspan="2">3:45-4:30 PM
Student Professional Development – Establishing Your Brand
Chair: Dr. Melissa Moore
Mississippi State University
Exhibition Hall A</td><td colspan="3">3:45-4:00 PM Break</td></tr>
<tr><td colspan="3">4:00-4:30 PM
Closing Session
Speaker: Dr. Nelson Atehortua De la Pena
Mississippi State Department of Health
Lakeview II</td></tr>
<tr><td colspan="6">4:30-5:00 PM
Awards / Closing Remarks
Exhibition Hall A</td></tr>
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STEM

Cell Biology

9:00 AM – 10:00 AM

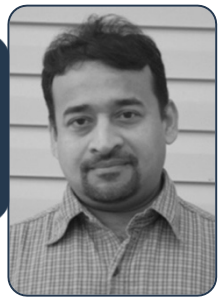
Neurology

Session Chair:

Vijay Rangachari, PhD

Professor of Biophysical Chemistry

The University of Southern Mississippi



Session Speakers:

Erik Bourassa

Meagan Stanley

Sweta Khanal

Farzana Nazneen

10:15 AM – 11:15 AM

Immunology

Session Chair:

Fengwei Bai, PhD

Associate Professor of Cell & Molecular Biology

The University of Southern Mississippi

Session Speakers:

Oluwaseyi Shofolawe-Bakare

Rabina Kumpakha

Abdulsalam Adogoke

John Vines

1:30 PM – 2:30 PM

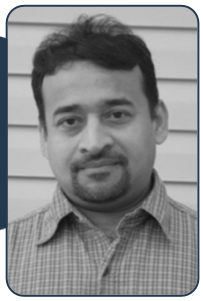
Physiology

Session Chair:

Vijay Rangachari, PhD

Professor of Biophysical Chemistry

The University of Southern Mississippi



Session Speakers:

Caixa Chen

Benjamin Onyeagucha

Leo Mei

Anna Scasny

Biomaterials

9:00 AM – 10:00 AM

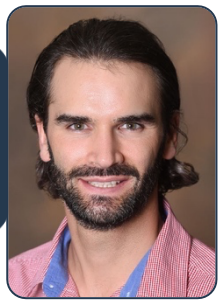
Bioengineering

Session Chair:

Tristan Clemons, PhD

Assistant Professor, School of Polymer Science & Engineering

The University of Southern Mississippi



Session Speakers:

Rajashekhar Kanchanapally

Ankita Bhattacharyya

Luke Tucker

Nicholas Kreis

10:15 AM – 11:15 AM

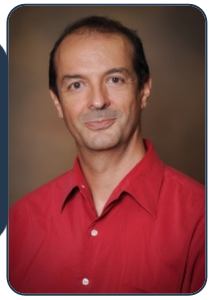
Biochemistry

Session Chair:

Jacques Kessl, PhD

Assistant Professor, School of Mathematics & Natural Sciences; Network Coordinator, Mississippi INBRE

The University of Southern Mississippi



Session Speakers:

Davida Crossley

Debarshi Roy

Tolga Catmakas

Jhinuk Saha

1:30 PM – 2:30 PM

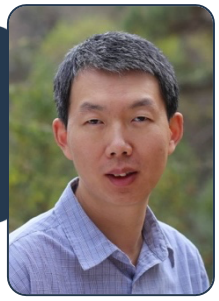
Chemistry

Session Chair:

Song Guo, PhD

Associate Professor, School of Mathematics & Natural Sciences

The University of Southern Mississippi



Session Speakers:

Gavin Rustin

Jesy Motchaalangaram

Francis Kekessie

Amin Mehrehjedy

Faculty Meeting
2:45 PM – 4:00 PM

All faculty are invited to a meeting to discuss the future of INBRE, STEM workforce development, and how to best leverage research infrastructure in Mississippi.

Materials

9:00 AM – 10:00 AM

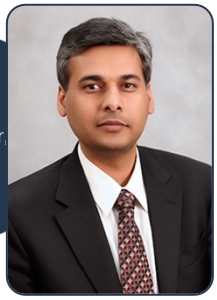
CEMOs RFA 1 & 2

Session Chair:

Neeraj Rai, PhD

Associate Professor, Ergon, Inc. Distinguished Professor, and Graduate Coordinator, School of Chemical Engineering

Mississippi State University



Session Speakers:

Jasmine Lim

Madhu Lakdusinghe

Xiagyu Zhang

Chinmoy Saha

10:15 AM – 11:15 AM

CEMOs RFA 3

Session Chair:

Derek Patton, PhD

Full Professor, Director, School of Polymer Science & Engineering

The University of Southern Mississippi

Session Speakers:

Jasmine Lim

Madhu Lakdusinghe

Xiagyu Zhang

Chinmoy Saha

1:30 PM – 2:30 PM

CEMOs RFA 4

Session Chair:

Santanu Kundu, PhD

Associate Professor & Southern Ionics Chair, Dave C. Swalm School of Chemical Engineering

Mississippi State University

Session Speakers:

Seth Darlington

Kevin Green

Iyanuoluwani Owalabi

Cameron Smith

2:45 PM – 3:30 PM

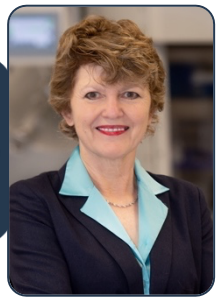
Student Professional Development

Session Chair:

Sarah Morgan, PhD

Executive Associate Director, School of Polymer Science & Engineering; Science Director, MS EPSCoR CEMOs

The University of Southern Mississippi



3:45 PM – 4:30 PM

Student Professional Development

Session Chair:

Melissa Moore, PhD

Department Chairperson; VBOC Team Member-Marketing; Kathy Moreton St. John Fellowship in Marketing, College of Business

Mississippi State University

MHD2022

Opening Session

9:15 AM – 9:30 AM

State of the State

Speaker:

Daniel Edney, MD, FACP, FASAM

Deputy State Health Officer

Mississippi State Department of Health

Mini Bio:

Before joining the Mississippi State Department of Health, Dr. Edney was in private practice in Vicksburg for more than 30 years. He received his M.D. from the University of Mississippi School of Medicine with residency in the University of Virginia's internal medicine program. He holds board certifications in Internal Medicine and Addiction Medicine and is a Fellow of the American College of Physicians.

9:30 AM – 9:45 AM

Mental Health in Mississippi Post-COVID

Session Chair:

Katherine Pannel, DO

Medical Director

Right Track Medical Group

Mini Bio:

Dr. Pannel is Medical Director of Right Track Medical Group. A native of Inverness, Mississippi, she has been a practicing psychiatrist in North Mississippi since 2010. She is certified by the American Board of Psychiatry and Neurology. She received her Bachelor of Science degree in Biology from Delta State University and Doctor of Osteopathic Medicine degree from Kansas City University of Medicine and Biosciences with residency in the University of Arkansas and University of Alabama.

Track D

10:15 AM – 11:15 AM

Diabetes & Obesity

Session Chair:

Michael A. Welsch, PhD, FACSM

Director of Graduate Education, Professor of Population Health Science, The John D. Bower School of Population Health

University of Mississippi Medical Center

Session Speakers:

Mireya Alexander
Program Manager, Magnolia Medical Foundation, Mississippi Gulf Coast

Justice Nguyen
Project Evaluator, Magnolia Medical Foundation, Mississippi Gulf Coast

Kyskie Bolton, MS, RDN, LDN
Program Manager, G.A. Carmichael Family Health Center
Public Policy Coordinator, Mississippi Academy of Nutrition & Dietetics

Chris Fields, CEP, CPT-EIM
Founder/Executive Director, H.E.A.L. Mississippi

Sonja Fuqua, PhD, RN
Chief Clinical Services Officer, Community Health Center Association of Mississippi

Yolanda Davis
Community Health Director, G.A. Carmichael Family Health Center/MSDH

11:30 AM – 12:30 PM

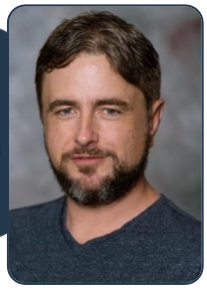
Environmental Health

Session Chair:

Robert J. Griffitt, PhD

Full Professor, School of Ocean Science & Engineering

The University of Southern Mississippi



Mini Bio:

Dr. Joe Griffitt is Professor in the School of Ocean Science and Engineering at the University of Southern Mississippi.
His research examines the environmental effects of anthropogenic contaminants to aquatic and marine organisms, focusing on effects at cellular and molecular levels. In particular, his current interests are in understanding the effects of the 2010 Deepwater Horizon oil spill on northern Gulf of Mexico species, focusing in particular on how multiple environmental parameters interact to modulate molecular responses. He has been interviewed by many national and international media outlets, including NPR, NBC, and the Washington Post, speaking about the effects of pollution on marine species, and is often invited to speak on his research to both scientific and non-scientific audiences. He has published over 50 peer-reviewed articles or book chapters in his career.
Dr. Griffitt has a PhD from the Norman J. Arnold School of Public Health at the University of South Carolina and spent two years as a postdoctoral research associate at the Center for Environmental and Human Toxicology at the University of Florida. He was hired at USM as an Assistant Professor in 2008.

Session Speakers:

Kristine L. Willett, PhD
Chair of BioMolecular Sciences, Professor of Pharmacology, Environmental Toxicology & Research Professor
Research Institute of Pharmaceutical Sciences, University of Mississippi

Erica Walker, ScD, MS
Assistant Professor of Epidemiology, Brown University

Dominika Parry, PhD
President/CEO, 2CMississippi

1:30 PM – 2:30 PM

COVID-19

Session Chair:

Antonio J. Gardner, PhD, MS CHES

Assistant Professor of Health Promotion, Department of Food Science, Nutrition, & Health Promotion

Mississippi State University

Mini Bio:

Dr. Gardner is an Assistant Professor of Health Promotion at Mississippi State University. His research interests are in health equity with a focus on rural and/or African American populations. His current research examines 1) the Black church's response to the Jackson Water Crisis 2) rural African American men's readiness to participate in barbershop-based HIV prevention programs, 3) COVID-19 disclosure decision-making among African Americans, 4) the effectiveness of food and health science curricula to stimulate interest in food and health-related careers, and 5) older rural African American adults' perceptions of well-being associated with attachment to place. Gardner has served on numerous committees at the local, regional, and national levels, and is currently serving a second term as the Trustee for Membership and Leadership within the Society for Public Health Education.

Session Speakers:

Mireya Alexander
Program Manager, Magnolia Medical Foundation, Mississippi Gulf Coast

Justice Nguyen
Project Evaluator, Magnolia Medical Foundation, Mississippi Gulf Coast

Jacquilyn R. German, MPH
Community Partnership Director, Jackson Heart Study
Community Engagement Center, Mississippi State Department of Health

Juanita Graham, DNP-RN, FRSPH
Adjunct Graduate Faculty
Purdue University Global

Caroline Compretta, PhD
Associate Professor, Departments of Preventative Medicine & Pediatrics
Co-Director, Community Engagement & Outreach Core, MCCTR
Center for Bioethics & Medical Humanities, University of Mississippi Medical Center

2:45 PM – 3:45 PM

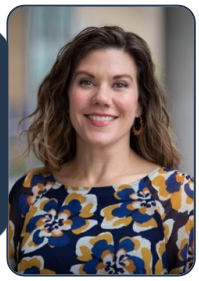
Community-Engaged Research Approaches

Session Chair:

Caroline Compretta, PhD

Assistant Professor, Departments of Preventative Medicine & Pediatrics, Co-Director, Community Engagement & Outreach Core, MCCTR, Center for Bioethics & Medical Humanities

University of Mississippi Medical Center



Mini Bio:

Dr. Gardner is an Assistant Professor of Health Promotion at Mississippi State University. His research interests are in health equity with a focus on rural and/or African American populations. His current research examines 1) the Black church's response to the Jackson Water Crisis 2) rural African American men's readiness to participate in barbershop-based HIV prevention programs, 3) COVID-19 disclosure decision-making among African Americans, 4) the effectiveness of food and health science curricula to stimulate interest in food and health-related careers, and 5) older rural African American adults' perceptions of well-being associated with attachment to place. Gardner has served on numerous committees at the local, regional, and national levels, and is currently serving a second term as the Trustee for Membership and Leadership within the Society for Public Health Education.

Session Chair:

Holly F. Huye, PhD, RD

Associate Professor, Co-Director, MCCTR Community Engagement & Outreach Core, School of Kinesiology & Nutrition

The University of Southern Mississippi

Mini Bio:

Dr. Huye is a registered dietitian and associate professor in the School of Kinesiology and Nutrition at the University of Southern Mississippi. She received her doctorate in nutrition and food systems from The University of Southern Mississippi in 2011. Since 2009, she has worked in community-engaged research in the Lower Mississippi Delta. Dr. Huye is experienced in both qualitative and quantitative research methods as well as in training research staff on program delivery and data collection procedures. She has worked on interdisciplinary teams including psychology, educational research, kinesiology, biology, and chemistry as well as with community partners to carry out research and publish peer-reviewed manuscripts. She has mentored several undergraduate and graduate students in their thesis and dissertation research and special problems research. Since 2017, Dr. Huye participated in the MCCTR Community Engaged Research Summer Institute as faculty helping to train junior researchers in design and implementation of community engaged studies. She is currently the MCCTR, Community Engagement and Outreach Core PI for the University of Southern Mississippi.

Session Speakers:

Sandra C. Melvin, DrPH, MPH
Chef Executive Officer/Founder, Institute for the Advancement of Minority Health

Lisa Haynie, PhD
Professor, School of Nursing, University of Mississippi Medical Center

Shanell Williamson
Community Health Worker, Southeast Rural Health Initiative

Track E

10:15 AM – 11:15 AM

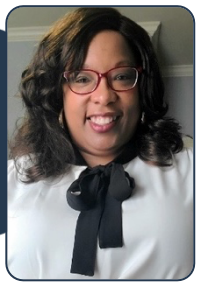
Women's Health

Session Chair:

Mauda Monger, PhD, MPH

CBA Clinical Manager, Chief Operating Officer

My Brother's Keeper, Inc.



Mini Bio:

Mauda Monger is a native of Jackson, Mississippi. She has a Bachelor of Arts in Economics/Business Administrations from Tougaloo College, and a Master's degree in Public Health, Health Policy & Management and a Doctoral degree in Higher Education Leadership from Jackson State University.
Dr. Monger serves as Chief Operating Officer at My Brother's Keeper, Inc. With more than 17 years of experience in HIV/AIDS and public health, she has worked on multiple levels of public health including state government, research, academia, and community. Monger has collaborated in numerous research projects reviewing and analyzing the quantitative and qualitative data and methods of collection surrounding communities of color, specifically of persons who are LGBTQ+., Dr. Monger's topics of focus include HIV prevention, stigma, social determinants of health, and special populations (racial, gender and sexual minorities).
Her passion and data drawn style of education and training, reinforces her goal of ensuring the clinical community recognizes how stigma and social determinants of health impact access to health care. She seeks to emphasize the importance of creating welcoming and inclusive clinical environments.

Session Speakers:

Nakeitra Burse, DrPH, CHES
Owner/CEO, Six Dimensions, LLC

11:30 AM – 12:30 PM

Innovative Community-Academic Models

Session Chair:

Alicia Barnes, MBA

Chief Operating Officer

Open Arms Healthcare Center

Mini Bio:

Alicia Barnes, MBA, is the Chief Operating Officer (COO) for Open Arms Healthcare Center. In her role as the COO, she oversees and directs all internal and administrative operations for Open Arms. While working at MBK/Open Arms, Ms. Barnes has also served as the Chief Information Officer (CIO) of The Center for Research Evaluation and Environmental Policy Change. Ms. Barnes has 15 plus years in healthcare systems change. This has been accomplished through the collaboration and partnership ofthe MS State Department of Health, federally qualified health centers, private clinics and healthcare professionals across the state of Mississippi and abroad. She has established a proven record of best practices in theintegration of health information technology in primary care with electronic medical records. Ms. Barnes possesses experience in business, operational development, information technology, quality improvement, and revenue cycle management. Ms. Barnes holds a bachelor's degree in Computer Science from Tougaloo College, a master's degree in Business Administration, and a Certification in Health Informatics/ Electronic Medical Records Implementation.

Session Speakers:

Marcus T. Johnson
Outreach Coordinator, Center for Community Based Programs, Open Arms Healthcare Center

Byron K. Buck, MPH, DrPH
Behavior/Clinical Research & Coordinator/Evaluator
Center for Research, Evaluation, & Environmental Change, Open Arms Healthcare Center

Shantoni Holbrook, MPH
Project Coordinator & Program Evaluator, My Brother's Keeper, Inc.

Joseph Lindsay
South Mississippi Program Manager, My Brother's Keeper, Inc.

Gerald Gibson
Mobile Clinic Manager, Open Arms Healthcare Center

1:30 PM – 2:30 PM

Health & Well-being of Mississippi's Future

Session Chair:

Jude Haney, PhD, MPH, RHIA

Associate Professor of Health Information Management,
Program Director of Health Information Management

William Carey University

Mini Bio:

Dr. Haney is originally from New Orleans, LA with over 18 years of experience in Public Health and Health Informatics. He is a Registered Health Information Administrator (RHIA) and has worked in a number of roles in the healthcare management field including Clinical Epidemiologist, Louisiana State Behavioral Risk Factor Surveillance System Coordinator, and Health Information Technology Director. Currently, Dr. Haney is the program director and assistant professor of Health Information Management at William Carey University.
Dr. Haney has academically prepared and helped place a number of HIM students in healthcare firms across Mississippi. Under his leadership, William Carey's HIM program has helped produce 15 RHIAs, most of whom are working in Mississippi. He has close ties with a number of health information directors and specialists throughout the region and continues to push for HIM to be known as a major career path for individuals looking for jobs in the healthcare industry.
Dr. Haney received his Bachelors of Science in Biology from the prestigious Morehouse College in Atlanta Georgia, his Masters in Public Health from the University of Illinois at Chicago, and a PhD from Southern University A&M in Baton Rouge, LA.

Session Speakers:

Lisa Ziegler, MS, CHES
Graduate Research Assistant , Mississippi State University Extension Service

Bobbie Jo Bensaid
Project Coordinator, Mississippi State University

Santee Ezell, MS, PCED, CHWI, CHES, CPM, CNP, CPT
Director of Health Promotion and Wellness, Mississippi State University

2:45 PM – 3:45 PM

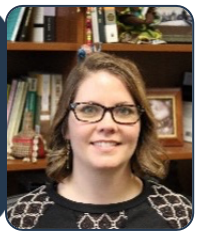
Rural Health & Geospatial Applications

Session Chair:

Anne M. Cafer, PhD

Co-Director, UM Community First Research Center for Wellbeing & Creative Achievement; Director, Center for Population Studies & State Data Center of Mississippi; Associate Professor

University of Mississippi



Mini Bio:

Anne Cafer serves as Director for the Center for Population Studies and State Data Center for Mississippi. She also co-Directs the Community First Research Center for Wellbeing (UM CREW). She holds a BS in both molecular biology and sociology, an MA in anthropology, and a PhD in Rural Sociology. She works primarily in Sub-Saharan Africa and the Mississippi Delta. Her research uses a systems approach to examine community resilience and systems integration, with a particular emphasis on food and health systems. She does this both domestically and internationally. These problems are complex in nature and require adaptive, context specific solutions, earning them the title “wicked” problems. To examine these problems and work toward sustainable solutions, Dr. Cafer consistently works across disciplinary boundaries—engaging plant scientists, geographers, veterinary medicine specialists, economists, and public health professionals. She also has an interest in scholarship of teaching, specifically the impacts of community engaged learning on both community and student outcomes. Her research informs her teaching, and she consistently works to bring research experiences and findings into the classroom. She also believes students learn best in an active learning environment guided by inquiry based teaching. Her goal is to help students develop a toolkit that includes critical thinking, logical reasoning, and a sociological imagination, regardless of background. Her advanced courses are community based participatory research courses in which students are actively involved with community stakeholders to explore collaborative solutions to non-resilient systems. Dr. Cafer is a former Borlaug Scholar in Global Food Security and a member of the prestigious Rollins Society at the University of Missouri. She is a 2019 Andrew Carnegie Fellow.

Session Speakers:

Devon Brenner, PhD
Director, Social Science Research Center. Professor, Curriculum, Instruction and Special Education, College of Education, Mississippi State University

David R. Buys, PhD, MSPH, CPH, FGSA
Department of Food Science, Nutrition, and Health Promotion, MSU Extension & College of Agriculture and Life Sciences, Mississippi State University

Meagen Rosenthal, PhD
Associate Professor, Department of Pharmacy Administration, School of Pharmacy, The University of Mississippi

Closing Session

4:00 PM – 4:30 PM

Eliminating Health Disparities in Mississippi: A Long Road Ahead

Session Chair:

Nelson Atehortua, MD, PhD, MPH

Director, Office of Health Data and Research

Mississippi State Department of Health

Mini Bio:

Our very own Dr. Nelson Atehortua De la Pena, known among colleagues and the community as Dr. A, is the Director of the Office of Health Data and Research for the Mississippi State Department of Health (MSDH).
Dr. A is a Medical Doctor – Doctor of Medicine (MD) - who graduated from the School of Medicine of the University of Cartagena (Colombia). He completed postgraduate training majoring in Health Services Management, minor in Management of Health Services Provider Institutions (HSPI), from the Universidad del Norte, Barranquilla, Colombia. He came to the US to earn a Master of Public Health (MPH) degree from Western Kentucky University and a Ph.D. degree from Texas A&M University.
In addition, he has rounded his scientific training with postdoctoral fellowships in Public Health Genomics, through the University of the Sciences in Philadelphia, Pennsylvania; in Leadership Education in Neurodevelopmental and Other Disabilities, through the joint LEND Program between Utah State University and the University of Utah; in Biomedical Research Excellence through the Mississippi Center for Clinical and Translational Research (MCCTR), a collaborative effort between the University of Mississippi Medical Center (UMMC) and the University of Southern Mississippi (USM); and more recently, as a fellow with the National Medical Fellowships on Diversity in Clinical Trials Research.
Before joining the MSDH family, Dr. Atehortua was an assistant professor in the Department of Environmental and Behavioral Health at the Jackson State University's College of Health Sciences; a CEPH accredited School of Public Health.

Oral Session Abstracts

STEM

• Cell Biology

• Neurology

9:00 AM- Erik Bourassa, PhD

Test Anxiety Coffee Talk: Neither Anxiety Nor A Problem With Testing. Discuss!

Research in our lab focuses on test anxiety (TA), a common but poorly understood phenomenon. TA is not a recognized disorder, so our research had been focused on showing that it was similar to other anxiety disorders. In a Go/No-Go task, we found that TA students failed to have an error-related negativity (ERN, a negative deflection seen on EEG following commission of an error); typically, anxious individuals have an exaggerated ERN. In a follow-up Go/No-Go task with negative performance feedback, TA students had neither an ERN nor a feedback-related negativity (FRN); again, an atypical finding in anxiety. Taken together, this indicated that TA is actually an inability to identify error production or improve performance based on feedback, suggesting that TA may be better conceptualized as a learning disability. To show that TA students would be slower to learn a novel task, participants did a time-estimation task with and without feedback. TA students learned the task just as quickly and had better performance during the recall phase of the task compared to non-test anxious students. The TA students also had exaggerated ERNs during both learning and recall, but failed to have an FRN. Our current hypothesis is that TA is a type of learning disability characterized by a lack of FRN and an ERN that appears and disappears, depending on the task. Future work will be geared towards determining what factor(s) contribute to the appearance and disappearance of the ERN in TA as well as if the FRN can be induced to reappear in this population.

9:15 AM- Meagan Stanley

Oxime-Functionalized Coumarin Probes for the Detection of Organophosphorus Nerve Agents and Their Mimics

A coumarin-oxime probe for the rapid detection of organophosohporus (OP) nerve agents was synthesized. Three bases (Hunig's, Verkade's, and P4 phosphazene) were studied to determine the most appropriate base for deprotonation of the oxime. Formation of the coumarin-oximate provided a significant spectroscopic response. A bathochromic shift (Δ = 25 nm) was observed in the UV-vis, and fluorescence was quenched via a photoinduced electron transfer (PET) mechanism. Oximates are highly reactive towards OP compounds, and upon reaction with diisopropyl fluorophosphate (DCP) an "off-on" fluorescent response was observed when the OP adduct was formed. A coumarin-methyloxime probe was also synthesized as a control and displayed no spectroscopic changes when a base was added. A polymerizable moiety was incorporated into the structure of the probe to allow for incorporation into fluorescent materials.

9:30 AM- Sweta Khanal

microRNAs (miRNAs) are well-established regulators of gene expression that are generated through a variety of pathways. Mirtrons are a class of non-canonical miRNA produced via splicing that after lariat

debranching become substrates for dicer and then loaded into Argonaute protein complexes. Although a large collection of mirtrons have been identified within mammalian genome, their functionality remains to be elucidated. Here we study miR-1017, a 3' tailed mirtron, which is highly expressed and conserved in Drosophila. We found that miR-1017 targets its host transcript acetylcholine receptor Da2. Ectopic expression of miR-1017 within an Alzheimer's disease fly model improved neurological function and extended lifespan of the flies. To further elucidate the role of miR-1017 we generated three different mir-1017 mutant fly lines using CRISPR/Cas9 system. We observed that mutant females have reduced lifespan as compared to the wildtype. RNA Sequencing data further revealed that mir-1017 targets are upregulated in mutants and mutations within the mir-1017 hairpin leads to aberrant splicing of host gene. This suggest that miR-1017 functions to prolong life span by modulating acetylcholine receptors and also act cis-regulatory element for splicing of host gene. This study will validate insight into the functional significance of non-canonical miRNAs within gene regulatory networks.

9:45 AM- Farzana Nazneen

An effective live-attenuated Zika vaccine candidate with modified 5' untranslated region

Farzana Nazneen[1] , E. Ashley Thompson[1] , Faqing Huang[2] , Fengwei Bai[1]
[1]Cell and Molecular Biology Program, [2]Chemistry and Biochemistry Program, Center for Molecular and Cellular Biosciences, The University of Southern Mississippi, Hattiesburg, MS 39406, USA.

Zika virus (ZIKV) is a mosquito-transmitted flavivirus that caused devastating congenital Zika syndromes (CZS), including microcephaly, congenital malformation, and fetal demise in human newborns in recent epidemics. ZIKV infection also causes Guillain-Barré syndrome (GBS) and meningoencephalitis in adults. Despite intensive research in recent years, there is no approved vaccine or antiviral therapeutics against CZS and adult Zika diseases. We developed a novel live-attenuated ZIKV strain (named Z7) by inserting 50 RNA nucleotides (nt) into the 5' untranslated region (UTR) of a pre-epidemic ZIKV Cambodian strain, FSS13025, which is attenuated in neurovirulence, immune antagonism, and mosquito infectivity compared with the American epidemic isolates. Our data demonstrate that Z7 replicates efficiently and produces high titers without causing apparent cytopathic effects (CPE) on Vero cells or losing the insert sequence even after ten passages. Significantly, Z7 induces robust humoral and cellular immune responses that completely prevents viremia after a challenge with a high dose of an American epidemic strain (PRVABC59) in type I IFN receptor A deficient (Ifnar1-/-) mice. Moreover, adaptive transfer of plasma collected from Z7-immunized mice protects Ifnar1-/- mice from ZIKV infection. These results suggest that modifying the ZIKV 5′UTR is a novel strategy to develop live attenuated vaccine candidates for ZIKV and potentially for other flaviviruses.

- **Immunology**

10:15 AM- Oluwaseyi Shofolawe-Bakare

ROS -responsive glycopolymeric nanoparticles for enhanced delivery to macrophages

10:30 AM- Rabina Kumpakha

Occidiofungin-mediated disruptions to Candida biofilm development

Invasive Candida infections can be severe in immune-compromised individuals such as HIVAIDS patients and those undergoing long-term antibiotic and/or steroid therapy. Opportunistic fungal infections are also a health complication associated with Diabetes mellitus. Diabetic patients have higher colonization of Candida spp. than healthy individuals, leading to biofilm formation in the mucosa. Oral candidiasis is a common Candida biofilm-based infection in diabetic patients due to high glucose levels promoting yeast adhesion to epithelial cells, poor oral hygiene, and loss of

neutrophil activity. Strategies to prevent, disrupt, and eradicate C. albicans biofilms are therefore needed for effective treatment options. Our study aims to determine the efficacy of a novel antifungal compound, occidiofungin, against Candida biofilms using an in vitro biofilm model. For this, we determined the minimum concentration of occidiofungin required to prevent biofilm formation at different stages of development for both C. albicans and C. tropicalis. In parallel, viable cell number following occidiofungin exposure was measured by colony forming unit and XTT assays. Change in biofilm organization post-antifungal treatment was identified by confocal microscopy using calcofluor white and concanavalinA-FITC staining. Our findings suggest that occidiofungin can effectively reduce biofilm formation by preventing initial cell surface attachment while also targeting cells in a mature biofilm. Structurally, C. albicans biofilm treated with occidiofungin was found to contain a smaller number of hyphal cells, a major contributor in pathogenesis and biofilm formation. Together these data suggest that occidiofungin may be an effective antifungal agent for the prevention and treatment of C. albicans biofilm-associated infections.

10:45 AM- Abdulsalam Adegoke

Deciphering the role of Amblyomma maculatum hemocytes during Rickettsia parkeri infection

Abdulsalam Adegoke* and Shahid Karim
School of Biological, Environmental, and Earth Sciences, the University of Southern Mississippi, Hattiesburg, MS 39406

The increase in tick-borne diseases significantly threatens public health without preventive measures. The innate immune system of hematophagous ticks is divided into two primary mechanisms of immune defense: soluble effector molecules that mediate humoral responses and cellular immune responses such as phagocytosis that promote pathogen killing. Immune cells, referred to as hemocytes, are a critical component of the immune system and produce immune factors that either facilitate or suppress pathogen development in a tick. Despite their importance in pathogen development, understanding their basic biology and molecular mechanisms is limited. In this study, a combination of pharmacological and molecular tools was utilized to investigate the functional role of tick hemocytes in rickettsiae infection. In Amblyomma maculatum, four groups of distinct morphological types of hemocytes were classified according to their defined cytoplasmic projections, intracytoplasmic granules, and the nuclear-cytoplasmic ratio. Phagocytosis assay led to identifying phagocytic and non-phagocytic populations of hemocytes. Clodronate liposome was used to deplete phagocytic hemocytes and elucidate their role in immune response and survival against bacterial infection. Finally, we conducted a comprehensive mRNA profiling of Am. maculatum hemocytes with and without Rickettsia parkeri infection. Bulk RNA sequencing of hemocytes revealed a total of 39,249 mRNA transcripts, with 11,301 identified as immune-related. Using a reverse genetic approach (RNAi), we functionally characterized two differentially expressed marker genes in hemocyte phagocytosis. Together, these results significantly advance our understanding of the basic biology of tick hemocytes and their role in the tick immune response.

11:00 AM- John Vines

Differential regulation of Mast Cell exocytosis by signaling lipids

Mast cells are an important class of innate immune granulocytes whose functions include host defense against parasites, wound healing, tissue remodeling, and angiogenesis, however, they are one of the primary contributors to allergic disorders. Mast cells direct immune responses to various antigens through the secretion of either pre-formed mediators (histamine, serotonin, tryptase, chymase, beta-hexosaminidase, and TNF) or de-novo synthesized mediators (TNF, IL-6, PGD2, LTC4) in response to cell surface signals. The FcεRI-mediated signaling cascade results in the mass secretion of preformed and de-novo synthesized mediators (a.k.a. degranulation) as well as the liberation of fatty acid signaling molecules from membrane phospholipids. The roles of these signaling

lipids in degranulation are poorly understood. The purpose of this presentation is to present potential roles for two signaling lipids: sphingosine and arachidonic acid, in regulating mast cell exocytosis. RBL-2H3 cells were utilized to study the effects of exogenous sphingosine and arachidonic acid on beta-hexosaminidase and TNF secretion. We found that the addition of exogenous sphingosine produced a concentration-dependent decrease in both FceRI- and ionomycin-mediated beta-hexosaminidase secretion. Our data also suggest that sphingosine downregulates ionomycin-mediated production of TNF while having no significant effect on its secretion. We found that arachidonic acid stimulates FcεRI-mediated beta-hexosaminidase secretion in a concentration-dependent manner while having no effect on FcεRI-mediated TNF production or secretion. On the other hand, the addition of arachidonic acid to ionomycin-stimulated cells reduced beta-hexosaminidase secretion at low to medium concentrations (25-100 uM) while a high concentration (200 uM) significantly stimulated beta-hexosaminidase secretion. Further study of these phenomena could improve our understanding of the signaling cascade leading to degranulation, and potentially reveal some of the mechanisms used by mast cells to differentially secrete certain mediators in response to specific cell-surface signals.

- **Physiology**

1:30 PM- Caxia Chen, PhD

TBA

1:45 PM- Benjamin Onyeahgucha , PhD

Emerging insights on SCUBE3 as a novel target for triple negative breast cancer

2:00 PM- Leo Mei

Association of DCLK1 isoform 4 with tumorigenesis of colorectal cancer

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Human double cortin like kinase 1 (DCLK1) is a microtubule associated serine threonine kinase and it has 5 isoforms. Up-regulation of DCLK1 is correlated with progression and poor prognosis of multiple malignant cancers, but the role of individual DCLK1 isoforms during tumorigenesis is unclear. We want to identify the function of DCLK1 isoform 4, which is also named as calcium/calmodulin-dependent protein kinase-related peptide (CARP), in the tumorigenesis of colorectal cancer. In order to achieve our goal, we established isogenic CARP over-expressing cells using HCT116 cells, a human colorectal cancer cell line. Spheroid formation assay, proliferation assay, migration and invasion assay, and clonogenic capacity assay were applied to assess the effects of CARP on the stemness of cancer cells. Our results demonstrated that over-expression of CARP increased the number of spheroids, but decreased the proliferation rate in comparison to parental control HCT116 cells. CARP did not change the migration/invasion capability and chemosensitivity of the cancer cells significantly. In conclusion, CARP can increase the self-renewal capability of cancer cells under spheroid formation conditions, but can also inhibit cell proliferation under normal cell culture conditions. However, CARP did not change other characteristics associated with stemness of cancer cells. CARP may be used to develop a therapeutic target for cancer treatment.

2:15 Anna Scasny

Investigation of the Pathological Consequences Caused by Oxidation of Hemoglobin by Streptococcus Pneumoniae Produced Hydrogen Peroxide

Streptococcus pneumoniae (Spn) is a gram-positive organism capable of enticing meningitis, otitis media, and pneumonia. Pneumococcal pneumonia caused by Spn can lead to invasive pneumococcal disease (IPD) causing severe bacteremia and septicemia. In aerobic conditions, Spn utilizes its glycolytic pathway to produce H_2O_2 and ATP as a byproduct through two enzymes, pyruvate oxidase (SpxB) and lactate oxidase (LctO). During colonization, the lung is a provider of glucose, O_2, and hemoglobin (Hb) allowing for an ideal environment for the growth of Spn and its production of H_2O_2. In a similar in-vitro environment, Spn-H_2O_2 is known to cause cytotoxicity in cultured alveolar cells leading to apoptosis (1). Much less is known about host cell cytotoxicity caused by Spn-H_2O_2 in the presence of host endogenous Hb, a heme compound found in high amounts in the lung. In preliminary experiments observing the role of Hb, Spn-H_2O_2 was found to autoxidize hemoglobin from oxy-Hb (Fe^{2+}) to met-Hb (Fe^{3+}) (2). My studies focus on the cytotoxicity of host cells caused by oxidation of Hb, and other heme containing proteins, through Spn-H_2O_2. I have demonstrated that in the presence of Spn-H_2O_2, after oxidation of hemoglobin, heme (Fe^{3+}) is released and further degraded. Further experiments indicate increased cytotoxicity to host alveolar cells in H_2O_2 producing strains of Spn (wild type (WT) strains) compared to those strains that were deficient for producing H_2O_2 (ΔspxBΔlctO) Spn strains. Overall, H_2O_2 produced by Streptococcus pneumoniae leads to an increase in cytotoxicity during in vitro and ex vivo pneumoniae models.

(1) Rai P, Parrish M, Tay IJ, et al. Streptococcus pneumoniae secretes hydrogen peroxide leading to DNA damage and apoptosis in lung cells. Proc Natl Acad Sci U S A. 2015;112(26):E3421-E3430. doi:10.1073/pnas.1424144112
(2) McDevitt E, Khan F, Scasny A, et al. Hydrogen Peroxide Production by Streptococcus pneumoniae Results in Alpha-hemolysis by Oxidation of Oxy-hemoglobin to Met-hemoglobin. mSphere. 2020;5(6):e01117-20. Published 2020 Dec 9. doi:10.1128/mSphere.01117-20

- # Biomaterials

  - ## Bioengineering

9:00 AM- Rajashekhar Kanchanapally

Intercalation of Paclitaxel into tumor-derived exosomes augments apoptosis in breast cancer cells

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In 2022, more than 43,000 people will die of breast cancer-related malignancies, in the Unites States alone. Delivering water-insoluble, but effective, therapeutics like Paclitaxel at the tumor site with minimal side effects is a great challenge. Exosomes, by the virtue of their size and payloaddelivering ability, has emerged as a safe drug-delivery agent. Here we explored the applicability of cancer cell-derived exosomes as delivery agent of Paclitaxel to breast cancer cells. We have prepared exosomal Paclitaxel by co-incubating MDA-MB-231 and MCF-7 cells with Paclitaxel. Exosomes from the spent media were extracted using a commercially available exosome isolation kit. Extracted exosomes were characterized for their size and molecular markers (CD9 and CD63). Further, the ability of exosomal Paclitaxel to inhibit the growth of breast cancer cells is evaluated by comparing to that of liposomal Paclitaxel and free paclitaxel. Our results demonstrate that exosomal Paclitaxel is superior to liposomal and free Paclitaxel in inducing apoptosis in breast cancer cells. Further, it is revealed that the ability of exosomes to deliver higher amounts of Paclitaxel intracellularly is the reason for the observed enhancement of anti-cancer activity of Paclitaxel.

9:15 AM- Ankita Bhattacharyya

An insight into the phenazine synthesis, regulation, and resistance pathways in Burkholderia lata 383

Phenazines are colored microbial secondary metabolites that are structurally diverse but share a common nitrogen-containing tricyclic core. They act as molecular signals and extracellular electron shuttles that support the ecological fitness of the producer organism. They undergo redox cycling to generate reactive oxygen species that inhibits other microorganisms. The study of the diverse biological role of phenazines has been mostly confined to Pseudomonas aeruginosa, a model opportunistic pathogen. These aspects are still lagging in other economically important groups of microorganisms. Burkholderia are Gram-negative bacteria that encompass saprophytes, nitrogen-fixers and species associated with nosocomial infections. Our recent studies showed that multiple species in the B. cepacia, B. pseudomallei and B. glumae/B. gladioli clades carry phenazine biosynthetic genes. In this study, we determined genes involved in the production and regulation of phenazines by subjecting B. lata 383 to transposon mutagenesis with Tn5. The screening of 15,000 mutants yielded 32 mutants deficient in phenazine pigmentation. The mapping by arbitrarily primed PCR and sequencing revealed transposon insertions in genes encoding transcription factors, membrane transporters, and quorum sensing pathway components. The screen also identified genes that function in the synthesis of chorismic acid, a precursor of phenazine biosynthesis. The effect of these mutations was assessed by RT-qPCR. This project will also characterize soxR, which regulates a multidrug efflux pump that presumably neutralizes phenazine toxicity. This study will provide new insights into the phenazine biology of Burkholderia spp.

9:30 AM- Luke Tucker

Chitosan hydrogel and polylactic acid particles loaded with fosfomycin for localized treatment of osteomyelitis

Tucker, Luke J.; Difiore, Julia; Roux, Bailey; Gautreaux, Malley A.; Priddy, Lauren B.
Mississippi State, MS, USA

Chronic osteomyelitis is a painful and persistent infection of bone. To combat osteomyelitis, infected tissue is removed, and systemic antibiotics are administered for two to six months, which can cause systemic toxicity and increase the risk of new antibiotic-resistant bacteria. To address this challenge, we developed a local delivery system for fosfomycin antibiotic: an injectable, antimicrobial chitosan hydrogel and/or polylactic acid (PLA) particles, a bioresorbable polymer used to prolong availability of fosfomycin. The chitosan hydrogels were either left blank or loaded with: (i) fosfomycin, (ii) PLA + fosfomycin, or (iii) a combination of fosfomycin and PLA + fosfomycin (combo) and tested against Staphylococcus aureus (S. aureus) in vitro and in vivo. In a modified Kirby Bauer assay, the addition of chitosan helped retain the antibiotic compared to fosfomycin-loaded phosphate buffered saline. The biomaterials were then used to treat implant-related osteomyelitis in the rat, where blood haptoglobin concentration and relative bone density were used to longitudinally determine antimicrobial efficacy. There were no differences between treatment groups for either outcome measure. Haptoglobin levels were higher from day 1 to day 14 compared to pre-surgery values but returned to baseline by day 21. Relative bone density decreased from day 8 to day 14 but began to stabilize by day 21 in all groups containing fosfomycin. Ex vivo bacterial load in bone and soft tissue will provide further information about the antimicrobial efficacy of these hybrid, chitosan-based therapeutics.

9:45 AM- Nicholas Kreis

Coupling Sequential Micro-doping with Kelvin Probe Force Microscopy to Study the Effects of Doping P3HT Nanowire Networks

The doping of semi-conducting materials is an integral process for the fabrication of electronic devices. It is particularly important for organic semi-conductors (OSCs) due to them having lower

conductivities than their inorganic counterparts. Probing the doping of OSCs is complicated by their heterogeneous structures when cast as thin films as they are comprised of both amorphous and crystalline domains which interact with dopants differently. Although it is believed that both domains are required to achieve the best charge separation, it is of interest to elucidate how dopants interact with the different domains differently. In this work we investigate the well-studied semi-conducting polymer and dopant pair: poly (3-hexylthiophene) and F4TCNQ. By pre-aggregating P3HT into nanowires, which are comprised of crystalline-like domains, the OSC thin film system can be simplified as the amorphous domains have been effectively removed. Using 1-Pass Kelvin Probe Force Microscopy (KFPM) we can observe the changes in morphology and surface potential upon sequentially doping the P3HT nanowires with F4TCNQ. By using low dopant concentrations (micro-doping) we can observe the change in physical and electrical properties of the nanowires at the local scale. Additionally the effect of different dopant solvents was studied by using solvents that are orthogonal (acetonitrile) or non-orthogonal (chloroform) to the nanowires. Interestingly, it was observed that the two solvents lead to different doping processes due to their preferences in interacting with the P3HT nanowires.

- **Biochemistry**

Shailendra Dhakal

TDP-43 polymorphs can be generated by heterotypic interaction with α-Synuclein

Shailendra Dhakal, Vijayaraghavan Rangachari
Department of Chemistry and Biochemistry, Center for Cellular and Molecular Biosciences, University of Southern Mississippi, Hattiesburg MS 39406, USA

Many neurodegenerative diseases are accompanied by amyloid deposits of pathological proteins in the brain. One of these proteins include- α-Synuclein (αS) and transactive response DNA-binding protein 43 kDa (TDP-43), implicated primarily in Parkinson's disease and amyotrophic lateral sclerosis (ALS), respectively. Like other amyloid proteins such as- tau and amyloid-β, these proteins are not limited to a specific pathology and are co-observed in a broadspectrum of neurodegenerative diseases. Previous studies including ours have established the synergistic interaction of αS and TDP-43 in driving pathological aggregation and their codeposition in the post-mortem brains. This led us to investigate whether αS can induce distinct polymorphic strains of TDP-43 prion-like domain (TDP-43 PrLD) aggregates, and if so, whether these are structurally and functionally different. For this, we generated homotypic TDP-43 PrLD fibrils, hybrid fibrils by incubating equimolar αS and TDP-43 PrLD monomers, and αS fibril (αSf)-seeded TDP-43 PrLD heterotypic fibrils. Examining the fibrils using battery of biophysical tools show differences in intrinsic tryptophan fluorescence, amyloid dyes binding, proteinase K (PK) stability, and SDS-induced thermal denaturation. Moreover, these fibrils reveal differences in core-structure of TDP-43 PrLD in 2D 13C13C solid-state NMR spectra. Intriguingly, both αS and TDP-43 PrLD colocalize in the SH-SY5Y neuroblastoma cells, and TDP-43 PrLD heterotypic fibrils selectively induces synaptic dysfunction in primary cortical neurons. Thus, these findings highlight the biophysical and structural insights on how α-synucleinopathies can result in the generation of TDP-43 polymorphic strains that might correlate to pathological and clinical heterogeneity.

Debarshi Roy, PhD

TBA

Tolga Catmakas

Mass Spectrometry Based Analysis of HIV-1 Integrase and Viral RNA Interaction

HIV-1 integrase (IN) is a viral protein that facilitates viral DNA insertion into the host genome. It was shown that, IN binds to the viral RNA and the interaction between the two is essential to produce infectious virions. Performing structural analysis on IN is limited due to its' poor solubility and tendency to aggregation. Therefore, we utilized a mass spectrometry based approach to identify amino acid residues that interact with the viral RNA. These findings will broaden our understanding of HIV-1 IN function and its' interactions throughout the life cycle of HIV-1

Jhinuk Saha

Vesicular membrane composition dictate amyloid-β (Aβ) oligomerization and pore formation

Jhinuk Saha[1] , Priyankar Bose[3] , Shailendra Dhakal[1] , Preetam Ghosh[3] and Vijayaraghavan Rangachari[1,2†]
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[2]Center for Molecular and Cellular Biosciences, University of Southern Mississippi, Hattiesburg MS 39406, USA.
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Deposition of extracellular plaques of amyloid-β (Aβ) is one of the major hallmarks of Alzheimer disease (AD). Clinical subtypes of AD seem to correlate with polymorphism in fibril structure of Aβ. Fibrils are known to generate from low molecular weight oligomeric species of Aβ which grow in a templated mechanism. Therefore, it is important to understand and investigate the factors that affect the oligomerization of (Aβ) in the cellular environment. Different lipid components of cell membrane are some of the key factors that modulate oligomerization of Aβ, that can cause membrane disruption. We have earlier demonstrated that micellar model membranes of lipids with different surface charge, composition and chain length catalyze the generation of conformationally distinct Aβ oligomers. In this work, we extended our investigation into liposomal model membranes by using large unilamellar vesicles (LUVs) of total brain extracts (TBE), reconstituted lipid rafts (LRs) or 1,2-dimyristoyl-sn-glycero-3-phosphocholine (DMPC) to observe their effect on Aβ oligomerization. We varied the percentage of GM1 gangliosides added as a constituent in the vesicles. We observed the catalysis of toxic and isolable Aβ oligomers in the presence of liposomes enriched in GM1. Importantly, our data suggests membrane disruption and Aβ oligomerization on the GM1 enriched membrane are cooperative processes. Numerical simulation on our data showed that twice as many numbers of pores are formed by Aβ on GM1 containing surfaces as compared to surfaces without GM1. Overall, this study indicates the mechanism of cooperativity involved in oligomerization and membrane damage, and reestablishes the importance of oligomeric intermediates of Aβ in polymorphism, toxicity, and propagation of pathology in AD.

- **Chemistry**

Gavin Rustin

Investigation of N-Sulfonyliminium Ion Cyclization Reactions for Piperidine Ring Synthesis

Piperidines are a privileged scaffold in drug design targeting many therapeutic areas. Given their commonality, there still exists many challenges in synthesizing multi-substituted piperidines. As the number of substituents on the ring increases so does the complexity in controlling the stereochemical relationships among them. This poster highlights two methods for the construction of nitrogen heterocycles utilizing an N-sulfonyliminium ion intermediate to initiate a cyclization event. The first method examines the Pictet-Spengler reaction to form tetrahydroisoquinolines while the second method examines an aza-Prins/Ritter sequence to form 1,2,4-trisubstituted piperidines. We hypothesize that each mechanism proceeds through an N-sulfonyliminium ion. In the Pictet-Spengler this intermediate is formed by condensation with a secondary sulfonamide. Whereas in the aza-

Prins/Ritter it is formed by protonation of the vinylogous carbamate. Extensive characterization of the products by spectroscopy has given credence to this mechanistic reasoning.

Jesy Motchaalangaram

Aggregation Induced Electrogenerated Chemiluminescence Mechanism of 9,10-Dipheteroarylanthracene

Jesy Alka Motchaalangaram, Kathryn Aumick, [1] and Wujian Miao[2]
Department of Chemistry and Biochemistry, The University of Southern Mississippi, Hattiesburg, MS 39406.

Electrochemiluminescence (ECL) is technique where light emission happens through oxidation or reduction of luminophores at the electrode surface. The majority of polyaromatic ECL luminophores have low solubility, unstable radicals in aqueous solution, and quenches at very high concentrations. Aggregation induced emission (AIE) is an intriguing photophysical phenomenon where luminogens were found to be highly emissive in their aggregated than the isolated ones. In this work, we synthesized a series of 9,10-diphenylanthracene (DPA) derivatives by introducing different heterocyclic rings (pyridine, thiophene, imidazole) to 9,10-position. The aim of this work is to explore the absorption, fluorescence, electrochemical, and ECL properties of monomers and aggregates Our initial study demonstrated 9,10-heteroarylanthracene endow them with twisted conjugated conformation which obstructs strong intermolecular interactions providing enhanced emission in aggregated state. Thus, fine tuning of DPA derivatives could act as potential candidates for highly sensitive ECL biosensors with excellent fluorescence and ECL quantum yields.

Francis Kekessie

Development of an Asymmetric Organocatalyzed Nucleophilic Addition to 1,3-Diarylpropenes

Francis K. Kekessie, Billie Jean Brashears, Julie A. Pigza

Noncovalent interactions (NCIs) are the collection of both favorable and unfavorable interactions between molecules and include hydrogen-bonding, ion-dipole, and π-π interactions. These interactions are at the core of asymmetric catalysis using chiral catalysts to convert an achiral or prochiral substrate to a chiral product. Squaramide organocatalysts (SQs) are a privileged type of catalyst that can catalyze a wide variety of reactions by taking advantage of NCIs via one of two main modes of activation – either dual activation or chiral anion catalysis. The latter type involves a chiral ion pair and has been of interest recently based on the discovery of a chiral, SN1-type alkylation of a highly stabilized cation. We are interested in extending this system to other allylic and propargylic substrates and a variety of nucleophiles. This presentation will describe the results of the screening of various Lewis acids and achiral squaramide organocatalysts with 1,3- diarylpropenes containing a leaving group to more cost effectively screen reactions and probe reactivity. The products generated are small, chiral building blocks that provide a valuable derivatization of petroleum feedstocks for synthesis.

• Materials

• CEMOs RFA 1 & 2

Jasmine Lim

Conjugated Polymers Enabling Infrared Detection in Devices

Madhu Lakdusinghe

Nanoscale Self-assembly of Poly(3-Hexylthiophene) Assisted by a LMWG towards Large-scale Fabrication of Electrically Conductive Networks

Xiagyu Zhang

Cosolvency Induced by Preferential Adsorption

Mixed solvents are extensively utilized in solution processing of polymers. In solvent mixtures, polymers are often observed to exhibit highly non-trivial behaviors. One example is co-solvency --- polymers that collapse in two different poor solvents become soluble in their mixtures. Explanations based on chemistry-specific arguments are less than satisfactory in carving out a clear physical picture of this intriguing phenomena. In this study, we conduct theorical calculations and computer simulations based on a generic polymer solution model in order to offer a clear account of the driving mechanism of co-solvency. We show that co-solvency results from the composite nature of polymer-solvent interactions, made up of the van der Waals type interactions and associations such as hydrogen bonding. Competition of the two effects gives rise to collapsed conformation when polymers are mixed with each solvent individually. In binary solvent mixtures, cross competitions among the four factors can lead to a swollen polymer conformation at suitable solvent compositions. Implications of the predicted collapse-swelling collapse transition on the bulk solution phase behavior is further explored using the generic model. The obtained phase diagram compares well with existing experiment data.

Chinmoy Saha

Self-assembly of donor-acceptor conjugated polymer in the condensed phase

Chinmoy Saha[1] , Md Masrul Huda[1] , and Neeraj Rai[1]
[1] Dave C. Swalm School of Chemical Engineering and Center for Advanced Vehicular Systems, Mississippi State University, Mississippi State, MS-39762

Organic electronic materials have many desirable properties such as flexibility, ease of tunability, and low-cost solution processibility. Among organic semiconductors, donor-acceptor conjugated polymers (DACPs) have drawn a greater attraction due to the easy tunability of the band-gap. The performance of the semiconductor devices is highly dependent on the self-assembly of the thin polymer films. Although several studies have been performed to understand the self-assembly of DACPs in the condensed phase, atomic level interaction that controls self-assembly is not clearly understood. One of the most important factors that control the charge transfer in the self-assembled thin film is the πstacking between polymer chains. π-stacking orientation also determines the device type, such as – edge-on orientation is preferable for transistor-like devices, and the face-on orientation is suitable for photovoltaic devices. In this work, cyclopentadithiophene (donor) – benzobisthiadiazole (acceptor) (CPDT-BBT), which shows a high-spin ground state electronic configuration, is considered as a prototypical DACP in chloroform solvent. CPDT-BBT shows distinct magnetic properties and a lower band-gap with a broader wavelength absorption near-infrared (NIR). Here, we examine the effects of oligomer chain-length, side-chain, and processing temperature on self-assembled π-stacking, with molecular dynamics (MD) simulation. We find that the oligomer chains with staircase π-stacking pattern display extended configurations in the solution and around 3.38 Å π-stacking distance. We also show details of the local solvation of these polymeric chains through careful structural analysis.

- **CEMOs RFA 3**

Yifang Qi

Evaluation of the Passivation Effects of PEDOT:PSS on Inverted Perovskite Solar Cells

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Poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate) (PEDOT:PSS) is one popular hole transport material in perovskite solar cells (PSCs). However, the devices exhibit large open-circuit voltage (Voc) loss and low efficiency, which is attributed to mismatched energy level alignment and the poor interface of PEDOT:PSS and perovskite. We design three polymers Carbazole (P1), Phenoxazine (P2) and Phenothiazine (P3) with similar organic functional groups, similar structures, and different energy levels to modify the interface between PEDOT:PSS and the perovskite layer, to improve the device performance. Three effects of the polymers are demonstrated including work function adjustment, perovskite growth control, and interface modification to increase the methylammonium lead iodide (MAPbI3) device performance. The low bandgap Sn-Pb-based PSCs are also fabricated to confirm the positive effects of the polymers. Three effects are evaluated through the comparison study of PEDOT:PSS-based organic solar cells (OSCs) and MAPbI3 PSCs based on the PEDOT:PSS modified by P1, P2 and P3. The contribution order of the three effects is work function adjustment>surface modification>perovskite growth control. MAPbI3 PSCs exhibit an open-circuit voltage (Voc) of 1.13V and a power conversion efficiency (PCE) of 21.06% caused by the combination of the three effects. This work provides the fundamental understanding of the interface passivation effects for PEDOT:PSS-based optoelectronic devices.

Taylor Santaloci

Automated Generation and Theoretical Predictions for Dye Sensitized Solar Cell Molecules

Taylor J. Santaloci, Austin M. Wallace, Jared H. Delcamp, and Ryan C. Fortenberry

Dye-sensitized solar (DSCs) are a tunable and affordable 3rd generation solar cell technology that is a competitive alternative to silicon solar cells. Differently, DSCs are flexible and easily repaired making them more ideal candidates for both extreme environment applications and for more traditional terrestrial use, but they suffer from reduced efficiency compared to silicon solar cells. Current DSC technologies could be improved by creating new dye molecules that produce longer wavelength absorption. One means of exploring molecular dyes for DSCs is by exploring combinations of electron donors, π bridge, and electron acceptors to create the D-π-A molecular dye design. Computational chemistry has the capability to automate production of D-π-A molecular dye design by combining the three structures virtually and to provide the optical properties for the resulting dyes. The present work has analyzed 2600 potential dyes in such a process, and 684 dyes absorb farther into the near-infrared (NIR) than the current state-of-the-art. In this work, after the D-π-A dye combinations are defined via SMILES strings and converted to Cartesian coordinates, theoretical dyes undergo B3LYP/6-311G(d,p) geometry optimizations, and the absorption properties are computed with time-dependent CAM-B3LYP/6-311G(d,p), BHandHLYP/6-311G(d,p) and PBE0/6-311G(d,p). In nearly every instance, CAM-B3LYP excitation energies are lower in energy than the given benchmark, and PBE0 values are higher. Therefore, a least squares fitting of CAM-B3LYP and PBE0 minimizes the error with respect to experiment. While only a handful of the 2600 molecular dyes have overall properties better than or on par with the current best performing benchmark molecular dyes, the use of such quantum chemical approaches promises to provide a quicker and cheaper method for understanding the photophysics of potential dye molecules. Moreover, this computational

methodology opens the door for faster utilization in novel applications such as human spaceflight and environmentally-friendly energy production.

Udara M Kuruppu

Optical Properties of Mn-doped 2D Phenethylammonium Lead Bromide (PEA2PbBr4) Single Crystals

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2-Dimensional (2D) perovskites exhibit exceptional optoelectronic properties such as high emission quantum yields with high color purity and strong exciton confinements etc. The emission is tunable across the wavelengths with changes in the composition of A, B, and X ions. Here, we employ manganese (Mn2+) as a B-site dopant ion in phenylethylammonium lead bromide (PEA2PbBr4) 2D perovskites to alter the optical and electronic properties of perovskites. Our findings reveal that Mn doping does not affect the crystal structure of 2D perovskites; however, the optical properties are significantly affected after Mn doping. The emission spectra show two peaks after doping; one corresponds to the perovskite host, and the other is from Mn states due to the effective exciton to dopant energy transfer. In this presentation, I will discuss the effect of Mn doping on 2D perovskite crystal structure and optical properties in detail.

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Sonia Stanciu

Design and Application of Singlet Sink for the Facilitation of Photon Upconversion via Triplet-Triplet Annihilation in Glassy Polymer Films

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Institution: University of Southern Mississippi, Polymer Science and Engineering Department

Photon upconversion via Triplet-Triplet Annihilation (TTA-UC) demonstrates great success operating under non-coherent, polychromatic excitations analogous to solar irradiances. While extremely promising for applications in solar harvesting, oxygen-sensing, etc, TTA-UC suffers a tenfold decrease in efficiency when transitioning from a solution-based medium to a glassy motif due to decreased translational mobility of the triplet sensitizer and triplet annihilator required to facilitate upconversion. Recent studies indicate that decoupling the annihilation and emission mechanism by introducing a highly emissive singlet sink moiety dramatically improves the quantum yield of solid-state TTA-UC by preventing parasitic decay of upconverted singlets to the sensitizer. Here we report the rational design and application of a novel singlet sink in tandem with prominent upconverting pair palladium (II) octaethylporphyrin (PdOEP) and diphenylanthracene (DPA). This three-part chromophore system was incorporated into commercial poly(methyl methacrylate) (PMMA) by high-temperature processing techniques to fabricate bulk amorphous films. Films containing the three-part system displayed significantly brighter green-to-blue transitions when compared to traditional two-part systems. Applications of TTA-UC are further hindered in bulk mediums due to aggregation-induced quenching of aromatic chromophores. Characterization of upconverting films by Wide-Angle X-Ray Scattering (WAXS) confirms that a low degree of crystallinity is attainable by fine-tuning processing temperature and kinetics. Continuing efforts surround the incorporation of chromophores directly onto the polymer chain to create ordering of distinct chromophore domains towards optimal exciton diffusion.

- **CEMOs RFA 4**

Seth Darlington

Biocompatible Ionic-Liquid Encapsulated NIR Dyes for Bloodstain Detection

Donovan S. Darlington, Ember Y. Suh, Allison N. Mahurin, William E. Meador, Jared H. Delcamp, Eden E. L. Tanner

The thorough analysis of any bodily fluids deposited at the scene of a violent crime is the primary focus of forensic serology labs and can provide valuable information to crime scene investigators. Focusing on blood, the luminol test has been the predominantly used presumptive test for many years. Luminol undergoes chemiluminescence in the presence of blood due to an oxidation reaction that is catalyzed by the heme iron. Despite its widespread use, the luminol test faces a few challenges: 1) The chemiluminescent lifetime of the reaction is

Kevin Green

Self-assembly of glucose and galactose containing Janus-type linear dendritic block copolymers for utilization in drug and dye delivery

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The visualization of tumors and organs through noninvasive bioimaging has become critical in biomedical research for the diagnosis and treatment of many diseases including cancer. Typical noninvasive bioimaging techniques, such as X-Rays and MRI, suffer from a lack of image resolution, typically requiring increased radiation exposure. The utilization of near infrared (NIR) fluorophore dyes has shown promise as an alternative in bioimaging as they offer increased tissue penetration depth as well as the potential for internal specificity. However, most NIR dyes are not water-soluble and can sometimes contain toxic components. The self-assembly of highly branched Janus dendrimers (JD) into Janus dendrimersomes (JDS) comprised of a hydrophilic/hydrophobic bilayer has enhanced the capabilities for small molecule drug/dye encapsulation and transport. Traditional JD hydrophilic segments, like polyamidoamine (PAMAM), at higher concentrations and degrees of generation have proved to be cytotoxic. To improve biocompatibility, JDs have been decorated with saccharide groups which upon self-assembly form non-toxic Janus glyco-dendrimersomes (JGDS). It has been seen that, due to distinct peptide/polymer hydrogen bonding interactions, saccharide stereochemistry plays an important role in carbohydrate functions such as biological recognition, protein binding, and peptide aggregation pathways. Thus, the stereospecific arrangements of the pendant saccharide groups may be used for cell targeting, lectin specific binding in the body, and to mimic the biological glyco-clustering effect. This work explores the use of synthetic glycopolymers as the hydrophilic layer of JGDS to amplify the structures' hydrogen bonding capabilities, potentially enhancing the self-assembly and structural stability. Linear glycopolymers were synthesized through reversible addition fragmentation chain transfer (RAFT) at different target molecular weights (DP 14 and DP 33) and with different pendant saccharide groups (glucose and galactose), and subsequently characterized using nuclear magnetic resonance (NMR) spectroscopy and gel permeation chromatography (GPC). The glycopolymers were then photo-coupled to polylactic acid (PLA) dendrons. Following nanoprecipitation, the resulting nanostructures were characterized through dynamic light scattering (DLS), transmission electron microscopy (TEM), and atomic force microscopy (AFM).

Iyanuoluwani Owalabi

Assessment of Nanoparticles Cytotoxicity and Distribution in Mammalian Cell Culture Systems

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Nanoparticles (NPs) are at the forefront in the field of nanotechnology as they are indispensable and valued in many areas of research for their unique properties. In the past, NPs were explored for basic research owing in part to their size-dependent physical and chemical properties. Nowadays, the plethora of NP application cuts across diverse fields in medicine and biosciences for biomedical imaging, bio-detection, drug and gene delivery, diagnostic biosensing, and many more. Whilst NPs are employed as small probes to spy cellular machineries, it is pertinent that their interference in biological systems are verified before they are made commercially available and accessible. In biosciences, the hallmark of a good nanomaterial includes its nontoxic nature for biomedical use, invitro specificity to target site, and efficiency. In this study, we assess the above-mentioned parameters in mammalian cell culture systems through evaluation of membrane integrity, NP distribution and cellular uptake. By quantifying movement of molecules in and out of cells across membranes, we analyzed cytotoxicity of nanomaterials to test the optimal concentrations required for safe usage in the cells. In addition, cellular uptake of NPs was measured through imaging of NPs with STED confocal microscopy. Results of fluorescence studies, as well as cytotoxicity assessments revealed that while different NPs have different uptake efficacy into the cells, cell viability across different NPs concentration appear uniform. This study therefore provides information regarding the safety and efficacy of NPs.

Cameron Smith

With an ever increasing interest in extending bio-imaging capabilities into the NIR-II region, the pursuit for organic small molecule dyes with emissive properties past 1000 nm has become a primary topic of research. Given the numerous and diverse approaches that exist for addressing the shortage of efficient dyes with emissive properties in this region, it is vital that the dyes be efficiently and precisely measured to quantify the spectroscopic properties of novel dyes. Specific interest will be given to the process of measuring fluorescent quantum yields and transient absorption lifetimes.

Poster Session Abstracts

STEM

A.1 Saadman Alamgir

Use of Organic Electrochemical Transistors (OECTs) for the Selective Detection of Dopamine

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Due to their low operation voltage, high transconductance, and aqueous compatibility, Organic Electrochemical Transistors (OECTs) have been used for the sensing of small redox active analytes such as dopamine (DA). The detection of dopamine can be difficult due to the fact that many analytes such as Ascorbic Acid also have very similar redox potentials. To increase selectivity towards dopamine detection, Molecularly Imprinted Polymers (MIP) were deposited on the Platinum (Pt) gate electrode, but the sensitivity of the device decreased. Vg,m is the potential in which the OECT device has the highest transconductance. The Vg,m of the MIP functionalized Pt gate electrodes show a shift to lower values, which could be a cause for the decreased sensitivity. For the deposition of the polypyrolle MIP film, cyclic voltammetry was conducted. By changing the number of CV cycles, the thickness of the thin film was changed. Transfer curve measurements were conducted to test the effects of the thin film thickness on the Platinum gate electrode and the effect of binder, (3-glycidyloxypropyl)- trimethoxysilane (GOPS), on the Source/Drain electrode on Vg,m. The results show that different thicknesses of the MIP/Pt gate electrode and using GOPS on the Source/Drain electrode have varying effects on transconductance and Vg,m. As the thickness of the thin film increases, we see a shift to lower Vg,m values which could be due to the change in capacitance of the platinum electrode. GOPS stabilizes the PEDOT:PSS on the Source/Drain electrode, causing a Vg,m shift to higher values.

A.2 Christopher Alford

Using Cannabinoids as a Potential Novel Therapeutic to Treat Pain

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Chronic pain in America is most often treated with prescription strength opioids which have a high potential for adverse side effects and abuse. Hence, efforts have been made to develop novel therapeutics which would reduce or eliminate these side effects. Cannabinoids have shown to bind cannabinoid receptors type 1 and 2 (CB1 and CB2), which activate many anti- inflammatory pathways. The purpose of this experiment was to determine the potential analgesic properties of the minor cannabinoid cannabichromene (CBC) as an effective analgesic devoid of abuse potential by finding an effective dosage against pain and an appropriate method for voluntary oral drug delivery. C57BL/6J mice were acclimated for 30 minutes before being given an intraperitoneal injection (IP) of a random cannabinoid drug in a blind assay ranging from 2.5 mg/kg to 20 mg/kg. They were then placed in their home cages for a second 30-minute interval. Afterwards, the mice were given another IP injection of 0.7% acetic acid on the opposite side and immediately placed in a clear acrylic cylinder for an additional 30 minutes under video surveillance. An additional set of mice were

gathered and tested for their preference of cereal in order to determine a voluntary oral dosage amount. Results for the acetic acid writhing test show minimal writhing across all drug doses and types. Studies are still ongoing for oral drug delivery. Going forward, a full acetic acid dose response curve is needed.

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A.3 Faith Anderson

Genetic Control of *Streptococcus pneumoniae* Morphology and Impact on Immune Evasion

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Streptococcus pneumoniae is a Gram-positive commensal organism which causes life-threatening infections such as pneumonia, meningitis, and sepsis. The mechanisms that cause S. pneumoniae to become pathogenic or avoid the host immune response are not well understood. Research indicates that shorter chain length increases survivability in the blood due to reduced surface area. We hypothesize that variations in pneumococcal morphology influence the ability to cause disease. Morphology of a diverse set of 96 pneumococcal strains was examined through brightfield microscopy. Image analysis was performed with ImageJ plugin MicrobeJ and values for area, length, width, and chain length were obtained. Interaction with immune proteins was tested through flow cytometry after incubation with human serum and probing with fluorescently labeled antibodies. Whole genome sequencing of the 96 strains was performed using paired-end Illumina sequencing for genome wide association study (GWAS). We determined that there is significant variation in the different pneumococcal morphologies that can be grouped into large and small categories. Likewise, there were high and low binders for all serum proteins tested, CLEC3b, ceruloplasmin, HFE2, vitronectin, haptoglobin, and serum amyloid P. Whole genome sequences will be used for future GWAS analysis. This study identifies genomic variations that influence the morphological differences observed in different pneumococcal strains. The changes in morphology also correlate to interaction with host immune factors and can alter virulence. Future work will validate genotype correlation to phenotype and be used as a potential screening method to predict the invasive potential of colonizing strains of S. pneumoniae.

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A.4 Aswin Arunachalam

Enhanced Susceptibility to Ischemic Stroke-Induced Brain Injury and Neurobehavioral Dysfunction in Adult Rats following Intrauterine Growth Restriction

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Low birth weight children, the main outcome of intrauterine growth restriction (IUGR), has the highest occurrence in Mississippi of over 11% in the past 20 years. Epidemiological and experimental studies suggest a link between IUGR and an increased risk to develop diseases later in life. Previous studies have established that IUGR rats have increased susceptibility to hypoxicischemic insult which leads to neurodevelopmental deficits, but there is still little evidence indicating whether IUGR individuals have increased susceptibility for ischemic brain injury. The objective of this study was to investigate the link between reduction in uterine perfusion (RUP)- induced IUGR and the increased risk of developing ischemic brain injury later in life. During late gestation (G14) of the rat dam, RUP was utilized to induce IUGR in the offspring. At 5 months, middle cerebral artery occlusion (MCAO) was used to induce ischemic stroke in IUGR and control groups. 24 hours post-stroke, motor, sensory, and neurobehavioral tests were assessed, and subjects were euthanized to collect brain tissue samples for analysis of ischemic damage. Hypomotor activity, hyperalgesia, allodynia, and decreased brain volume were observed in IUGR rats as compared to control rats. Assessment by the neurological severity score found that IUGR rats displayed more motor and sensory deficits compared to control rats after MCAO. The current study suggests that RUP-induced IUGR enhanced susceptibility of MCAO-induced ischemic brain injury and neurobehavioral dysfunction in adult rats. Our model may be practical in creating a better understanding of ischemic brain insult and guiding future studies for potential treatments.

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A.5 Kathryn Aumick

Deciphering Aggregation Induced Electrochemiluminescence Mechanism of 9,10-Diphenylanthracene Derivatives

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In electrochemiluminescence (ECL), light emission happens through electron transfer between electrochemically generated species. Many ECL luminophores suffer from aggregation caused quenching. Aggregation caused quenching causes enhanced emissions in dilute concentrations, but in the solid state there is little to no emissions which can put limitations on the abilities of these materials; however, aggregation induced emission has enhanced emission in their solid state. 9,10-diphenylanthracene (DPA) is an organic emitter often studied in ECL; however, neither DPA nor its derivatives have been used in biological applications due to its poor solubility and unstable radicals in aqueous solution. For successive application in ECL, the ECL emitter should work in solution, solid state, and as thin films. The aqueous nanoparticles suspension of various DPA derivatives with different acceptor strength was prepared using reprecipitation technique. With the molecules synthesized, absorption, fluorescence, and ECL properties were studied. The potential application of these molecules includes metal ion sensors and stable aggregation induced polymer films for ECL.

A.6 Landon Bello

Indole is increased in response to AKI during pregnancy

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For pregnant women with acute kidney injury (AKI) there is a risk for the development of chronic kidney disease (CKD). In non-pregnant individuals indoxyl sulfate (I.S.), precursor indole, is believed to contribute to the development of CKD. Despite the link between AKI during pregnancy (NP+AKI) and CKD, the presence and increase in indole is not known. The objective of the current study is to determine if indole is increased in response to AKI during pregnancy and in the postpartum period. On gestational day (GD) 18, pregnant rats underwent 45-minutes of renal ischemia to create AKI. Circulating indole levels were measured 24hrs (n=3-4) and 15weeks post AKI (n=2- 4) via a commercially available assay. 24hrs post AKI, NP+AKI rats had significantly increased indole levels compared to control (NP) rats (57.27+5.4 vs. 34.35+5.4μM; p=0.03). Similar results were seen in CKD rats with NP rats having 20.4+5.4μM vs. 91.57+48.56μM in CKD rats. Studies are currently being conducted to determine if the addition of oral activated carbon, AST-120 to food chow during the post-partum period decreases indole. To conclude, results show that the increase in circulating indole leads to an increase in I.S. and downstream endothelin activation, all of which contributes to the development of CKD.

A.7 William Brumm

Impacts of Processing on Crystallinity of Poly(3-hexylthiophene) Thin-Films via X-ray Scattering

William Brumm, Kundu Thapa, Prof. Xiaodan Gu

Conjugated polymers (CPs) are organic semiconductors that are alternatives to traditional semiconductors, such as Silicon and Germanium. CPs are lighter, flexible, low-cost, and renewable, yet less conductive when compared to their inorganic counterparts and hence, further work is necessary to reach as high as inorganic semiconductors. In electronic applications, CPs are often made into thin films, around one hundred nanometers thick, which have different properties than bulk samples. By adjusting processing conditions, which affect the morphology, such as crystallinity and packing orientation, the electrical and physical properties of CPs can be tuned for desired applications. In this study, Poly(3-hexylthiophene) (P3HT), one of the most highly researched in its family, was used to investigate the effects of processing conditions on the crystallinity of thin films. Thin films in this study were produced using spin coating with varying processing parameters, like spin rate, solvent, and annealing time and temperature. The crystallinity of bulk and thin film samples was determined by wide-angle X-ray scattering (WAXS) in transmission and grazing-incident modes, respectively. The relative crystallinity of the thin films was found to be lower as compared to the bulk sample's crystallinity. This study found that the processing conditions, especially annealing, significantly impact the crystallinity of the P3HT thin film. Our findings can provide the processing-property relationship and guide the manufacture of CPs in the future.

A.8 Christopher Bruni

Influenza Neuraminidase and Esterase as Tools for Understanding and Treating Glioblastoma

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Glioblastoma is one of the most common types of malignant brain tumors in adults, having an average five-year survival rate of 9%. Although there have been advances in treating brain cancers, there is still no known cure. Glioblastoma has been shown to contain abundant gangliosides (sialic acid containing glycolipids) on the surface of the cell. Influenza virus has been shown to preferentially bind to sialic acids present on the surface of a cell to enter the cell and start the infection. The focus of this project is to analyze how the neuraminidase and esterase enzymes of differing flu strains affect the

gangliosides present on the surface of differing glioblastoma cell lines and further analyze the types of gangliosides that are present on the surface of these cells. Previous studies indicated treatment of glioblastoma cell lines with a variety of influenza viruses inhibited cell growth, and this effect can be partially reversed with treatment of neuraminidase inhibitors. We wish to test the hypothesis that this growth inhibitory effect is due to the action of neuraminidase on gangliosides. Preliminary data indicate a potentially uncharacterized activity of these influenza glycoproteins. Our investigation into whether influenza can preferentially bind and inhibit glioblastoma cells may lead to new treatment options for glioblastoma patients.

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A.9 Cameron Butler

Converting commodity polypropylene to reprocessable networks with enhanced thermal and mechanical properties

In the past decade plastic production has increased dramatically, with polyethylene (PE) and polypropylene (PP) being at the forefront of production. Today over 80% of generated plastic becomes waste, and less than 10% gets recycled. Despite PE and PP making up the majority of production, they are not easily recyclable. PE and PP are difficult to separate in recycling facilities because they have similar densities, but their immiscibility creates significant phase separation, resulting in poor mechanical properties. Upcycling plastic waste to reprocessable networks provides a viable alternative to address this challenge because of their adaptability, especially in controlling materials properties by altering crosslinker chemistries and matrix materials. This work uses poly(ethylene glycol)diglycidyl ether (PEGDGE) as the crosslinker, and Zn(acac)2 as the catalyst, to formulate reprocessable networks from polypropylene-graft-maleic anhydride (PP-g-MA). By varying the crosslinker loading levels, it was observed that while the melting and crystallization temperatures of the resulting networks remained constant consistent with neat PP-g-MA, the toughness can increase with increasing PEGDGE1000. However, at a certain maximum crosslinker loading point, the material properties became significantly downgraded. This work demonstrates a broadly application platform for converting plastic waste with poor material properties to tough reprocessable networks simply, via reactive extrusion.

A.10 Sarah Crowsey

Investigating Biofilm Formation on Polymer Surfaces via Flow Cells

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William Carey University[1] , The University of Southern Mississippi[2]

Biofilms are colonies of bacteria that form on surfaces and secrete a matrix composed of nucleic acids, proteins, lipids, and other molecules, that grants them increased antibiotic resistance and greater adhesion to surfaces. Biofilms pose a serious medical problem as they play a role in a significant portion of antibiotic-resistant infections that stem from growth on the surfaces of polymer-based medical devices e.g., catheters, gastric mesh, etc. This project involved using bacteriophages, which are highly specific viruses that target bacterial cells, to control and prevent biofilm formation by coating polymeric surfaces with bacteriophages. This was done by attaching maleic anhydride (MA) to medical grade polypropylene and ultra-high molecular weight polyethylene to act as a binding agent between the protein head of the bacteriophages and the polymer surface. Next, carbodiimide coupling chemistry was used to attach the bacteriophages to the MA. Petri dishes and flow cells were used to observe the efficacy of these bacteriophage-coated surfaces at controlling biofilms in both static and dynamic fluid conditions, respectively. Attenuated total reflectance Fourier transform infrared

spectroscopy (ATR-FTIR) was used to evaluate the attachment of MA to the surfaces, and crystal violet staining combined with light microscopy and confocal microscopy was used to evaluate the formation of biofilms on the polymeric surfaces.

A.11 Ronnie Cunitz

Peptide-Decorated Block Copolymers for the Targeted Delivery of mRNA in Cancer

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Current methods of cancer treatment, including chemotherapy, are accompanied by debilitating side effects primarily due to the lack of specificity these treatments have for cancer cells. Polyplexes for the non-viral delivery of nucleic acid payloads have proven promising in recent years as alternatives to these treatments. These polyplexes protect nucleic acid payloads from enzymatic degradation and offer the opportunity to target these payloads directly to the cell of interest. In this project, a peptide-based monomer has been developed to be incorporated into a block co-polymer that self-assembles into a micelle in the presence of mRNA, creating a delivery vector that can be used for targeted cancer treatment. Solid-phase peptide synthesis was used to synthesize the GE11 peptide-based monomer that has previously been shown to target the Epidermal Growth Factor Receptor (EGFR), a receptor highly overexpressed in a number of cancers. This monomer was synthesized and purified to greater than 95% purity as verified by liquid chromatography mass spectrometry. Next, Photoinduced Electron/Energy Transfer Reversible Addition-Fragmentation Chain Transfer (PET-RAFT) polymerization was utilized to prepare cationic diblock copolymers of polyethylene glycol methyl ether methacrylate (PEGMA) and 2-(dimethylamino)ethyl methacrylate (DMAEMA) designed for complexation with mRNA. The pPEGMA chain was first synthesized, then chain-extended to add a cationic block of pDMAEMA with a target block co-polymer composition of p(PEGMA45-b-DMAEMA130). Micelle self-assembly of the non-targeted block copolymer, in the presence of mRNA, will be investigated by Dynamic Light Scattering (DLS) and Transmission Electron Microscopy (TEM). Future works will investigate in vitro cytotoxicity of the polyplex delivery vehicles, and incorporation of the GE11 targeting monomer within the pPEGMA block during polymerization.

A.12 Renee Dupre

Kinetics Analysis of Homotypic α-Synuclein and TDP-43 Aggregate Formation

Neurodegenerative diseases, such as Parkinson's Disease and Amyotrophic Lateral Sclerosis, which arise due to the loss of structure and function in neurons in the nervous system, are more prevalant due to the increased population of people over 65. This staggering rise in prevalence turns attention to addressing the causes of development. A major hallmark of these diseases includes the mispositioning of amyloid aggregates such as **α**-Synuclein (**α**S) and tar-DNA binding protein (TDP-43) that form from misfolding of disordered proteins that do not possess a definite secondary structure which results in alterations in the phenotype of the proteins in question. Such proteins aggregate from monomers into soluble oligomers and neurotoxic fibrils that lead to neurodegeneration. To examine aggregation, amyloid seeding was utilized using sonicated fibrils to expand the potential for attachment of monomers and initiate aggregation. Thioflavin T fluorescence was used to study the kinetics of the aggregation reaction where preliminary results suggest that both the addition of **α**S fibrils to **α**S monomers and TDP-43 fibrils to TDP-43 monomers decreased the lag time of aggregation in a concentration dependent manner

A.13 John Li

The Effects of Intranasal Insulin on Lipopolysaccharide-induced Reduction in Pre-social Interaction and brain inflammation in neonatal rats

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Inflammation and oxidative stress play important roles in neonatal brain damage in neonatal human and animal models. Our previous studies have shown that systemic administration of lipopolysaccharide (LPS) induces brain damage and neurobehavioral dysfunction in neonatal rats, which is associated with the production of pro-inflammatory cytokines and oxidative stress. Recent studies suggest that intranasal insulin treatment could be a neuroprotective agent in adult animals. Therefore, the objective of this study was to determine whether intranasal insulin treatment reduces LPS-induced brain inflammation and oxidative stress, as well as neurobehavioral dysfunction in neonatal rats. LPS (2 mg/kg) or sterile saline was administered via intraperitoneal (i.p.) injection in postnatal day 5 (P5) Sprague Dawley rat pups, and fluorescence-tagged insulin (Alex-546-insulin)/vehicle, human insulin (25 μg), or vehicle was administered to each nostril 5 min after LPS injection. Behavioral tests were carried out 24 hours (P6) after LPS exposure and brain tissues were collected to determine pro-inflammatory cytokine interleukin-1β (IL-1β) and lipid peroxidation. Shortly after administration, widespread Alex-546- insulin-binding cells were detected in the brain. ELISA results demonstrated measurable insulin levels in the brain following 15 min after insulin administration. Our results showed that intranasal insulin reduced LPS-induced hypothermia, allodynia, hyperalgesia, reduction in pre-social interaction (ultrasonic vocalization), and sensorimotor neurobehavioral deficits in P6 rats. Intranasal insulin also reduced LPS-induced increase in levels of IL-1β and thiobarbituric acid reactive substances (TBARS) contents, suggesting anti-inflammatory and anti-oxidative effects. Our study suggests that intranasal insulin affords a broad neuroprotection by targeting multiple signaling pathways including inflammation and oxidative stress.

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A.14 Honor Elchos

Designing a Perfusion-Compression Bioreactor for Culture of Bone Explants

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Better understanding of how bone develops is crucial to designing more effective implants for bone healing. Bioreactors serve as a physiologically relevant ex vivo system for studying bone formation. We have developed and validated a compression-perfusion bioreactor system for trabecular bone explant culturing. The compression system involves a stepper motor linear actuator in line with a load cell to measure forces applied, and a displacement sensor to measure the resultant displacement of

the sample. The compressive loading system was validated across varied materials, including common polymers PLA and ABS, Sawbones synthetic bone foam, magnesium, and trabecular bone. A static pre-load was first applied to the top of the sample to establish full contact between the loading piston and the sample. The displacement sensor was then adjusted to a relative zero point. A LabVIEW program was used to cyclically load the sample as well as collect and visualize the compression and displacement values. Preliminary results indicate that the system enables measurement of minute displacement values known to induce bone formation. Target compressive load values were consistently within the assigned ranges over many loading cycles (300). The dynamic culturing system has been validated to perform the accurate and repeatable loading and perfusion conditions necessary for future studies focused on inducing bone formation and osseointegration, bone formation around an implant, in the system.

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A.15 Faith Fountain

The Role of RNase P in the Processing of 5'-Tailed Mirtrons

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The mammalian genome has a large number of 5'-tailed mirtrons, such as miR-5010, that are produced by the non-canonical pathway of microRNA (miRNA). There is also evidence that these mirtrons are overexpressed in some tumors, making them clinically significant. To gain a better understanding of this variety of miRNA, the processing of 5'-tailed mirtrons was examined. In this study, we analyzed the effects of RNase P, an enzyme that was found to be responsible for processing a 5'-tailed mirtron, and the sites of its cleavage. In our first experiment, we cloned a GNRA loop onto the 5' end of the mirtron and used four other samples: control, insert, wildtype, and poly G. We transfected or inserted the samples onto a 6-well plate of human embryonic kidney (HEK) cells. RNAs were isolated and northern blot was performed to observe the expression of miR-5010 in the constructs. Furthermore, RNase P was pulled off from HEK cell lysate through immunoprecipitation and treated with miR-5010 intron to further confirm its involvement in mirtron processing. We anticipate seeing hairpin and mature miR-5010 in all constructs. We also expect that the RNase P subunits should cleave the 5'-tail of the in vitro transcribed miR-5010 intron. The control group should not exhibit any cleavage at all.

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A.16 La'Kedric Fultz

The Effects of NPY Y1 Antagonist on Pain and Gait following Chronic Constriction Nerve Injury in a Rat Model

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Chronic pain is a condition in which pain progresses from an acute to chronic state and persists beyond the healing process interfering with the patient's quality of life. Chronic constriction injury (CCI)

of the sciatic nerve is a peripheral nerve injury widely used to induce mononeuropathy and create chronic pain. Injuries to the sciatic nerve can result in changes in gait, coordination, and balance and is a sensitive way to determine if treatments are effective. We have shown, in our lab, increased neuropeptide Y levels and increased Y1 receptor following CCI in the forming neuroma. The objective of our current study was to administer a Y-1 antagonist to reduce pain and improve functional sciatic index (an assessment of gait). Methods: Twelve Sprague Dawley rats were divided into three groups. Baseline measurements for pain and gait were assessed prior to surgery. The sciatic nerve in all animals was exposed. In the sham control, no constriction was applied, and in the experimental groups, four sutures were placed around the sciatic nerve. Results: Four days following surgery, pain and gait were assessed, then the experimental groups were given either saline (VEH) or Y1R-ANT for 7 days, and re-assessed for pain and gait. Our data showed a significant reduction in pain and effective (25%) improvement in the sciatic functional index score (SFI) in the group receiving the Y1R-ANT compared to animals receiving VEH only. Conclusion: The use of a selective Y1-R ANT may offer significant improvement for neuropathic pain following nerve injury.

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A.17 Shaunna George

Layered Polymeric Drug Delivery System for Automated In Vitro Fertilization Medications

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For over 40 years, In Vitro Fertilization has been used to allow women who struggle with the effects of infertility and other health problems have another chance at childbirth. This process is a reproductive technology that consists of a long journey of medications, surgical procedures, patience, and hope. Day one starts with planning and mapping out the perfect time frame where the female's body and bodily conditions are ideal for carrying a full-term baby. Along with the physical strain of the process, one can also be affected mentally. Current methods of administering medications during IVF include subcutaneous injections to the body. Subcutaneous injections are used for the administration of the agonist Lupron- a drug that reduces the amount of the hormones that stimulate ovarian stimulation, the luteinizing hormone and the follicle stimulating hormone. It is typically administered in higher doses and lowered as ovarian stimulation occurs. For most people, the idea of needles and injecting themselves can be mentally taxing. This is where the advantage and benefits of layered device drug delivery technology comes in. A layered device consists of a desired number of active and blank layers, constructed to efficiently deliver medication over a specific period of time. Cellulose acetate phthalate and pluronic were both foundational materials used in the layers. Active layers also include rhodamine, and it is also the layer where medication is loaded. Blank layers act as layers that dissolve over long periods of time and hinder the subject from receiving too much medication. It can be seen as clear or white in the layered device. After many weeks of optimizing the drug dosage, device geometry, and layering scheme, release studies were conducted to determine the kinetics of leuprolide acetate release from these biodegradable drug delivery systems.

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A.18 Kyleigh Hankton

Progesterone reduces inflammation, markers of endothelial dysfunction and maternal blood pressure in response to preeclampsia

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Preeclampsia (PE) is characterized by new onset hypertension during pregnancy, inflammation and endothelial dysfunction. The best treatment remains early delivery of the feto-placental unit. Progesterone is essential in the initiation and maintenance of pregnancy. Normal pregnancy (NP) is associated with elevations in progesterone and T helper 2 (TH2) favoring immune tolerance of the fetus. Activated lymphocytes during NP express progesterone receptors, which stimulate a protein called Progesterone Induced Blocking Factor (PIBF). UMMC PE patients have lower progesterone compared to normotensive pregnant women. This study was designed to test the hypothesis that 17-hydroxyprogesterone caproate (17-OHPC) treatment reduces inflammation, markers of endothelial dysfunction and blood pressure in response to PE. PE participants received 17-OHPC injections (250 mg, I.M.) with blood draws before and after injection. Progesterone and PIBF levels were 332+/- 65 ng/mL (n=7), 18.6 +/-1.0 pg/mL (n=4) in NP, 15.4+/-45.6 (n=12, $p<0.05$), 14.5 +/- 1.0 pg/mL in PE (n=10, $p<0.05$), and increased to 155+/-57.0, 15.78 +/-0.85 in PE+17-OHPC (n=6). TNF-alpha levels were 32.0 +/- 3.4 pg/mL (n=8) in PE, which decreased to 21.1+/-5.5 in PE+17-OHPC (n=5). CD4+ T cells were 18.23 +/-4.8 in PE (n=4), 14.4+/-1.2 % gate in PE+17-OHPC (n=5). Endothelin-1 and sFlt-1 measured in HUVECS media treated with PE sera were 68 +/- 22 pg/mg of protein, 750+/-181 in PE, which reduced to 57 +/-19, 564+/-90 in PE+17OHPC (n=6). Systolic blood pressure was 151 +/- 5 mmHg in PE (n=19) and 137+/-4 in PE+17-OHPC (n=13). 17-OHPC reduced inflammation, markers of endothelial dysfunction, lowered blood pressure in response to PE.

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A.19 Tizon Harris

Raman Spectrocopy: The Eggshell Powder

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Eggshell membrane is a significant enhancement in the individual consideration and makeup industry on the grounds that its fundamental part is collagen sort of protein. The expansion of eggshell layer powder in food-band refreshments has a high potential to advance joint wellbeing. The utilization of hardshell membrane is earning more respect in plugs for normally obtained fixings that return high value. Gathering eggshell membrane requires division of membrane layers from eggshells (hard shell), in a perfect world, the eggshell layer supplement item ought to just hold back the powders produced using the unadulterated membrane, i.e., the hard shell of the eggshell is totally eliminated. Nonetheless, in a new examination of business eggshell layer powder, we tracked down the presence of hard-shell debasements. In this review, we will direct a Raman spectroscopy to concentrate on eggshell membrane powder to gauge the degree of hard-shell impurities in the business powder quantitatively. In particular, we contrasted the business eggshell layer powder and the eggshell film powder ready in the lab with different known degrees of impurities. The known degree of impurities are ready by blending the unadulterated layer powder with hard shell powder at various mass proportions. Our outcomes show the mass proportion of contamination to the layer is somewhere in the range of 0.2 and 0.5.

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A.20 Randria Haynes

Proteolytic Digestion of HIV-1 Integrase for Mass Spectrometry Analysis

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Studies have been conducted to test the optimal conditions for the proteolytic digestion of the Human Immunodeficiency Virus (HIV-1) Integrase (IN). Specific regions in the sequence of the protein can be difficult to detect with mass spectrometry, due to high numbers of Lysine and Arginine when traditional Trypsin digestion is used. Therefore, we have utilized endoproteinase Lys-C which cleaves peptide bonds at the carboxyl side of lysine. Different reaction conditions, enzyme concentrations, and digestion methods were tested to identify a suitable sample preparation method for mass spectrometry analysis. Our findings will provide a sample preparation method that can yield peptides rich in Arginine and Lysine amino acids, and easily detectable by mass spectrometry.

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A.21 Benjamin Hemming

Expression and purification of highly positively charged DNA-binding protein Protamine

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Membraneless organelles formed by a process called liquid-liquid phase separation (LLPS) often between proteins and RNA, show ubiquitous presence in cytoplasmic and nuclear mileu. These transiently formed foci enriched in proteins and nucleic acids accomplish sequestration and concentration of these biomolecules, which are key during cellular stress and other processes. Commonly, proteins containing low complexity sequecnes, abundant in select disorder-promoting amino acids seem to be prone for LLPS. Cysteines, which can reversibly form redox-sensitive covalent disulfide bonds are often considered order-promoting, and thus are seldom observed in phase separating proteins. In this context, the protein protamine is unique in that it contains canonical low complexity sequence enriched in positively charged arginines but also interspersed with orderpromoting cysteines. Protamine are synthesized during late stage spermatids in plants and animals and bind DNA compacting the chromatin during spermatogeneis. Protamine binds to during spermatogenesis in the place of histones and we hypothesize that it cocacervates with DNA by LLPS during this mechanism. In order to better understand the role of cysteines in the LLPS and to gather insights into the mechanisms of protamine, here we recombinantly express and purify protamine in E.coli. We show that high arginine content, DNA-bidning capability and aggregation propensity of protamine makes it difficult to express. My results show the methods by which these difficulties can be overcome to obtain pure protein for biophysical and biochemical analysis.

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A.22 Meredith Hetrick

Assessment of Fluorescent Dye Cytotoxicity

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Metal ions play a vital role in environmental and biological processes as catalysts, protein binders, and regulators of neurodegenerative disorders. Tracking metal ions within the cell is crucial to better understand their purpose and provide insight into manipulating them. Six coumarin-enamine fluorescent dyes have been synthesized to react and fluoresce with a select group of metal ions, such as Zn2+ and Cd2+ . For clinical applications, it is critical that dyes remain nontoxic when used for detection. This study seeks to investigate the cytotoxicity of these dyes in varying concentrations while concurrently examining their cellular distribution. A lactate dehydrogenase (LDH) cytotoxicity assay was performed on a culture of human embryonic kidney (HEK) cells to establish the threat of these dyes to healthy human cells. Compared to a positive control of lysis buffer and negative controls of water and dimethyl sulfoxide, the specific concentrations of each coumarin-enamine dye are ranked on an established toxicity scale. Results demonstrate an increase in cytotoxicity proportional to an increase in dye concentration, displaying a dramatic drop in cell vitality at the highest concentration of 50 µg/mL. The fluorescence of the dyes in the presence of zinc chloride is visualized via confocal microscopy. Additionally, the dye-incubated cells displayed a higher degree of fluorescence in the presence of zinc chloride than in its absence. Future studies include the investigation of dye interaction with other metal ions to compare their fluorescence and ensure a continually low cytotoxicity.

A.23 Shandrea Jenkins

Functional RdRp Gene Inherited from Viruses are Present in Bats as a Defense Tool

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Chiroptera (bats) have a history of serving as hosts or reservoirs for various viruses, such as COVID-19. Among other physiological novelties, it is suspected that an RdRp gene, which catalyzes the replication and synthesis of RNA from an RNA template, contributes to this. However, there is a lack of detailed understanding of the bat RdRp gene. Our hypothesis is that the RdRp in bats promotes RNAi (RNA interference), reducing viral replication in the bats. Therefore, this research aims to understand how T. Brasiliensis can withstand illnesses that would be deadly to other species. To comprehend this, we exposed the TB cell line acquired from ATCC to six treatments: Paraquat, Sodium Chloride, dsRNA, ssRNA, polycytidylic acid, and No Treatment group. We extracted RNA using trizol and removed all genomic remnants with DNase enzyme. The RNA was transformed into complementary DNA (cDNA) using RT-PCR, or reverse transcription -polymerase chain reaction. The DNA was then amplified and replicated using cDNA in PCR (polymerase chain reaction). Following that, amplicons from each treatment group were run on an agarose gel electrophoresis to validate that the expected 200 bp RdRp fragment was amplified. After the gene was identified, we carried out qPCR, or quantitative polymerase chain reaction, which revealed that the RdRp was predominantly expressed in the cells treated with Paraquat and Polycytidylic acid. Currently, research is ongoing to

sequence mRNA from Paraquat and Polycytidylic acid samples, comprehend the function of RdRp in TB as well as identify other stress conditions that trigger RdRp gene activation.

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A.24 Seth Johnson

Blunted Responsivity to Nutrients in Adult Female Offspring of Maternal Vertical Sleeve Gastrectomy

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Surgical weight loss has been popularized in the last several decades as a means to produce significant weight loss and improvements to the comorbidities of Metabolic Syndrome (MetS). MetS includes obesity, diabetes, hypertension, hyperlipidemia, and fatty liver disease, which affects greater than twothirds of the U.S. population. Women are by far the most common recipients of these surgeries (greater than 85%). Women of child-bearing age are very likely to pursue surgical weight loss in order to improve their reproductive function and fertility for child-bearing purposes. Significant research from our lab using pre-clinical models, as well as clinical data from around the world, suggest that surgical weight loss prior to pregnancy may have negative consequences for the offspring. The present studies investigated metabolic endpoints in female rodent offspring born to dams who received vertical sleeve gastrectomy (VSG) prior to pregnancy. Comparisons were made to offspring from lean and obese dams. In adult offspring of either maternal VSG or sham surgery, no differences in body weight, body fat, or lean body mass between groups was identified. Glucose tolerance measured grossly was not different among groups. Fasting glucose was elevated in HFD-fed rats in comparison to chow-fed rats (P

A.25 KriShunda Joiner

IL-33 supplementation improves pathophysiological characteristics of preeclampsia in a rat model of placental ischemia

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Preeclampsia (PE) is characterized as new-onset hypertension in combination with end-organ damage manifesting after the 20th week of gestation and is a leading cause of fetal and maternal mortality. PE characteristics include maternal systemic vascular dysfunction, fetal growth restriction, and chronic immune activation. In clinical studies, PE women have been shown to have decreased levels of IL-33, a pleiotropic cytokine that has been found to be cardio protective. To identify the immune mechanisms mediating PE pathophysiology, our lab uses the Reduced Uterine Perfusion Pressure (RUPP) model, a surgically induced placental ischemia model that mimics many characteristics of PE including reduced IL-33 levels. We hypothesized that IL-33 supplementation would decrease maternal blood pressure and inflammation, and improve uterine vascular function in RUPP. To test this hypothesis, we chronically infused IL-33 into RUPP rats and measured maternal blood pressure and fetal weights, and quantified inflammatory immune cells via flow cytometry, cytokines via ELISAs, and performed Doppler ultrasound. In RUPP rats, IL-33 treatment decreased maternal blood pressure, decreased cNK and TH17 cell populations, and improved uterine vascular function. These data demonstrate a role for IL-33 supplementation in improving PE characteristics in response to placental

ischemia. The IL-33 signaling pathway may have potential as a therapeutic target for the management of PE.

A.26 Ariel Jordan

Maternal B Cell Depletion Reduced Blood Pressure and Activated Natural Killer Cells in a Rat Model of Preeclampsia

Ariel Jordan, Nathan Campbell, Owen Herrock, Ty Turner, Lorena Amaral, Evangeline Deer, Babbette LaMarca

Preeclampsia (PE), new onset hypertension during pregnancy, is the leading cause of maternal and fetal mortality and mortality. PE is associated with chronic inflammation including activated natural killer (NK) cells and activated B cells producing agonistic autoantibodies against the angiotensin II type I receptor (AT1-AA). AT1-AA has been implicated in many pathways in PE pathophysiology. The reduced uterine perfusion pressure (RUPP) model mimics the effects of preeclampsia. We hypothesize that Rituximab, a B cell depleting chemotherapeutic, will deplete B cells, improve blood pressure and reduce NK cell activation. To test this hypothesis, the RUPP procedure was performed on gestational day (GD) 14 and Rituximab was given through a mini-osmotic pump. On GD18 carotid catheters were implanted and on GD19 blood pressure was measured and blood and tissues were collected. B and NK cells were measured using flow cytometry. AT1-AA was measured using a cardiomyocyte bioassay. One-way anova was used to determine significance. MAP in RUPP rats 123±2 (n=19;p

A.27 Connor Lopez

Impact of Diamine Structure on Poly(diketoenamine) Network Properties

Connor Lopez – Simon Research Group

With the advantages of dynamic covalent bonds and fixed cross-link density, vitrimers are chemically resistant and retain the ability to be reprocessed without significant degradation to material integrity. Poly(diketoenamine)(PDK) vitrimers are of particular interest because of their simple synthesis and quick, catalyst-free bond exchange. Despite recent research of PDKs, little is known about the consequences of diamine structure on network properties. Here, we establish the effects of linear diamine spacer length on PDK network thermomechanical properties for pristine networks. We synthesized diketoenamine precursors by reacting 5,5- dimethyl-2-(pent-4-enoyl)cyclohexane-1,3-dione with excesses of butane diamine, hexamethylene diamine, and octane diamine. The diketoenamine precursors were then mixed with pentaerythritol tetrakis(3-mercaptopropionate) and ethyl (2,4,6-trimethylbenzoyl) phenylphosphinate, and cured between glass slides with UV light (λmax= 365nm) for 15 minutes, providing 100 μm thick films. Differential scanning calorimetry and dynamic mechanical analysis experiments indicate that as carbon spacer length decreases, glass transition temperature (Tg) increases and network flexibility decreases. PDK vitrimers provide a unique, tailorable, and reprocessible material platform, which exhibits their immense promise and long-term value as sustainable next-generation plastic materials.

A.28 Ar'Kayla Martin

AGE/RAGE Signaling Impacts on Healthspan: Middle-Age

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Damage to macromolecules from stressors such as diabetes can cause a transition of proteins and lipids to a category called advanced glycation end products (AGEs), which are known to worsen inflammation and oxidative stress. As one ages, the number of AGEs increases throughout the body

which correlates with cognitive and physical decline. Since that indicated a relationship between AGE levels and reduced health span, it is thought that reducing AGEs and AGE signaling can prevent and decrease age-related diseases. We hypothesize that reductions in AGE signaling will delay the onset of age-related cognitive and physical impairments and other molecular hallmarks of aging such as inflammation. Cohorts of 12-month-old male and female WT and receptor for advanced glycation end products (RAGE) KO mice (C57/Bl6 background) were exposed to a series of behavior assays to assess learning and memory through the radial arm water maze, circadian rhythm through the running wheels, and anxiety through the elevated plus maze. A weight difference was noted when the RAGE KO exhibited a higher body weight, however, it is not known if the weight difference has any effect on cognition, circadian rhythm, and anxiety since those tests are still completing analysis. The data from the middle age mice will allow us to gain more information about the role that AGEs have on the onset of age-related pathologies in the future months. Our future studies will include locomotor, cognitive, and frailty assessments in advanced ages to help us better understand the role of AGEs.

A.29 Hannah Mattke

Pyridine-Core Synthesis and Functionalization of HIV Integrase Inhibitors

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HIV integrase inhibitors are a class of anti-viral drugs that prevent the incorporation of the viral genome into the host cell genome. The three prominent targets in HIV therapy, integrase, reverse transcriptase and protease are all unique to the virus and thus are attractive foci in research. HIV Integrase inhibitors are mostly based on aromatic heterocycles such as pyridine and quinoline. In this project, we are constructing the pyridine core by reaction of substituted malonic esters with aminocrotonate ester. Variations in 2 positions on the heteroaromatic core allows for improving the drug-target interactions. The formation of the pyridine skeleton has been optimized and now only requires one step. Functionalization of the 4 and 6 position is performed by chlorination in preparation for palladium-catalyzed coupling reactions

A.30 Alyssa McAlister

A Study of the Effects of Relative Humidity on Hydrogen Bond Structures Present in Hyperbranched Polymers

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Hyperbranched polymers (HBPs) based on 3-hydroxy-2-(hydroxymethyl)-2-methylpropionic acid (bis-MPA) have found application in a variety of fields due to their commercial availability and chemical stability. These materials are also well suited for dielectric applications due to their high dielectric constants and low losses. While these systems are used in a broad number of applications, the relationship between their structure and bulk physical properties have yet to be fully explored. The physical properties of bis-MPA based HBPs are highly influenced by the presence of water, likely due to the increased availability of hydrogen bond (H-bond) donors and acceptors. Due to this, it is hypothesized that by exposing these polymers to low relative humidity environments, water will have a chain extending effect on these chain-like clusters of hydrogen bonds, ultimately increasing the dielectric constant. Using both experimental and computational approaches, HBPs of the second and fourth generation were examined. Molecular dynamics were used to quantify H-bonds present in the systems and visualize their ordering, while thermogravimetric analysis elucidated the amount of water absorbed into the polymers. Fourier transform infrared spectroscopy was used to determine the extent of H-bonding and to investigate the primary H-bond types contributing to overall properties.

A.31 Caroline McKinney

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

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

A.32 Anne Margaret Miller

Synthetic Side-Chain Development of Pyridine-based HIV Integrase Inhibitors

A. Margaret Miller[1] , Hannah J. N. Mattke[1] , Christopher T. Bruni[1] , Sharon E. Suffern[1] , R. Victor Mishoe[1] , Gavisha Mugon[1] , Sarah J. Hayek[1] , Jacques J. Kessl[2] , Julie A. Pigza[2] , Matt G. Donahue[2] , Wolfgang H. Kramer[1 *]
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Retroviruses employ three unique enzymes, reverse transcriptase, integrase and protease, that are essential for their life cycle. Antiviral therapy targets those enzymes preferably, as less side effects are expected. Human immunodeficiency virus (HIV), which causes acquired immunodeficiency syndrome (AIDS), is generally combated with triple therapy, consisting of usually two reverse transcriptase inhibitors and one integrase or protease inhibitor. As the high mutation rate of the virus causes resistance, HIV drugs are constantly optimized. HIV integrase incorporates the viral DNA into the host cell genome. HIV Integrase inhibitors are mostly based on aromatic heterocycles such as pyridine and quinoline. In this project, we are constructing the pyridine core by reaction of substituted malonic esters with an aminocrotonate ester. The development of the side chain in the 3-position which consists of a methine carbon carrying a tert-butoxy group and a carboxylic acid. This requires the extension by one carbon, which we accomplish by a Bode homologation reaction.

A.33 Zariyae Moore

Confinement stress reduces exploratory activity Drosophila melanogaster.

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Confinement stress in humans is a general phenomenon where people kept in tight quarters and without agency, suffer mild to severe stress that can result in high levels of anxiety, a loss of self-efficacy, and depression. Many zoo animals can also suffer stress due to confinement, which may lead to repetitive, stereotypical behaviors. To better understand the neurobiological consequence of confinement, we have begun to examine the effects of this treatment in Drosophila melanogaster. Wildtype Drosophila melanogaster will display robust exploration of novel arenas. This exploration is driven by neophilia or arousal by novel stimuli. However, when confinedin small tubes typically used

for monitoring circadian behavior, for a period of 24 hours, the exploratory behaviors aresuppressed. The magnitude of the loss of exploration is scales with the size of the confinement chamber and will revert after several hours in standard- 28 mm diameter Drosophila vials. This loss of exploration following confinement mimics the effects of increased serotonin signaling, however, inhibiting serotonin signaling does not block the effects of confinement. These data indicate that confinement is not affecting exploration through serotonin signaling. To gain a broader understanding of the behavioral effects of confinement, we have begun to examine the effect of confinement on additional behaviors. Interestingly, we have found that confinement also decreases the time for males to initiate courtship behaviors.

A.34 Ruthanne Nuckels

A Gas Phase Mechanistic Study on the Formation of 2-Thiohistidine Under Biomimetic Conditions

Recent interest in the incorporation of 2-thiohistidine into small peptides has renewed interest in the preparation of 2-thiohistidine in an efficient manner. Literature reports show that 2- thiohistidine can be prepared under biomimetic conditions in moderate to low yield from the reaction of cysteine with a bromolactone intermediate derived from histidine. Previous studies reported in the literature utilize excess reagents and 3-mercaptopropionic acid to cleave the resulting cysteine adduct to form 2-thiohistidine. Our attempts to prepare 2-thiohistidine using literature conditions led to the isolation of product with inconsistent yields. Our observations led us to perform select mechanistic and optimization studies to determine how we could improve product yield. Gas phase (ESI-MS) studies conducted suggest that the bromolactone intermediate is quantitatively converted to the cysteine adduct. The cysteine adduct was subjected to CID analysis indicating that the formation of 2-thiohistidine could occur in the absence of 3-mercaptopropionic acid. We hypothesize that an intramolecular elimination of dehydroalanine is responsible for the formation of 2-thiohistidine. This presentation will outline our studies on the formation of 2- thiohistidine under biomimetic conditions using various sulfur containing compounds in lieu of cysteine. We will also outline solution phase studies suggesting that 3-mercaptopropionic acid is an unnecessary reagent for the elimination of dehydroalanine

A.35 Ugoeze Onyeagucha

Characterizing the Inhibitor of DNA binding 3 (ID3) Mediation of Doxorubicin in Triple Negative Breast Cancer Cells

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Triple-negative breast cancer (TNBC) is the subtype of breast cancer that lacks the expression of the hormone receptors (estrogen and progesterone receptors) and human epidermal growth factor receptor 2 (HER2). TNBC is commonly diagnosed in young women below 50 years of age. It is the most aggressive breast cancer subtype and has the highest tendency to metastasize. Although it represents about 15-20% of breast cancer cases, TNBC accounts for approximately 25% of the death due to breast cancer. The overall survival of TNBC diagnosed at stage 1 is about 85% compared to 94%-99% of HER2-positive breast cancers, which is another breast cancer subtype. However, the median overall survival of metastatic TNBC is one year compared to about five years of the other subtypes. Due to the lack of molecular targets, chemotherapy remains the main treatment option for TNBC. During the initial treatment, TNBC responds very well to chemotherapy but becomes resistant and aggressive to subsequent exposure, thus resulting in early relapse and shorter patient survival. Besides, chemotherapy faces obstacles due to toxicity and severe side effects that significantly limit its use in patients. Hence, there is an urgent need to develop a novel strategy to improve treatment outcomes and reduce toxicity in cancer patients. Recently, we have discovered the Inhibitor of DNA binding 3 (ID3) as a mediator of Doxorubicin (DOX) in TNBC. ID3 is a member of the helix-loop-helix

(HLH) transcription factor that inhibits the DNA-binding function of members of the basic helix-loop-helix (BHLH) family of transcription factors. Our data demonstrated that knockdown of ID3 significantly decreased the number colony of TNBC cells. Also, ID3 expression is significantly elevated in cells treated with DOX in dose dependent fashion compare to the untreated control. Interestingly, knockdown of ID3 decrease the number of viable TNBC cells treated with DOX compared to the control TNBC cells. These data warrants further investigation on determining how ID3 mediate DOX response in TNBC cells.

A.36 Peyton Osborn

Preparation for in vitro selection of substrate-specific FAD-synthesizing ribozymes.

Coenzymes are complex organic molecules found in all known life forms that are essential in many enzyme-catalyzed reactions necessary for life. The RNA World Hypothesis conjectures that the first primitive life forms may have been RNA-based rather than DNA-based because of the fact that many coenzymes are nucleotides or contain cyclic nitrogenous bases, which could indicate that they are remains of an earlier metabolic state predating ribosomal protein synthesis as it occurs in organisms today. In such an ancient system, one would expect to find RNA molecule enzymes, known as ribozymes, capable of carrying out the important biochemical processes usually performed by proteins, which includes an ability to catalyze the synthesis of coenzymes in a substrate-specific way and to link to these coenzymes as proteins do. It has been demonstrated that RNA can be linked to and catalyze the synthesis of the important coenzymes Nicotinamide adenine dinucleotide (NAD), Coenzyme A (CoA), and Flavin adenine dinucleotide (FAD), but the currently known ribozymes that catalyze these reactions, CoES7 and CoES21, are not substrate-specific as they will accept other organophosphates in place of the coenzyme precursors. Our goal is to use the Systematic Evolution of Ligands by Exponential Enrichment process (SELEX) to select for a ribozyme capable of catalyzing substrate-specific synthesis of FAD. In order to accomplish this, DNA libraries coding for the CoES21 ribozyme, along with other randomized sequences of comparable length, were constructed using asymmetric and fusion PCR.

A.37 Samuel Pitre

DOCKING STUDIES OF PYRIDINE-BASED HIV INTEGRASE INHIBITORS

Samuel J. Pitre[1] , Solomon K. Mcharo[1] , Sharon E. Suffern[1] , R. Victor Mishoe[1] , Jacques J. Kessl[2] , Julie A. Pigza[2] , Matt G. Donahue[2] , Wolfgang H. Kramer[1*]
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Allosteric inhibitors for the enzyme HIV integrase are developed to augment the HIV therapy which usually consists of a cocktail of three antiviral drugs. HIV integrase is an important enzyme in the life cycle of the AIDS virus, it incorporates the viral DNA into the host cell genome. HIV integrase, reverse transcriptase and protease are three prominent targets in HIV drug development as they are unique to the AIDS virus. HIV integrase inhibitors are based on a heteroaromatic core, which can consist of simply a pyridine or quinoline core. In our lab, we focus on pyridine as a basis for the synthesis of HIV integrase inhibitors. The pharmacophore is well established and consists of a two-carbon sidechain containing a methine carbon carrying a tert-butoxy group and a carboxylic acid. The binding strength is determined by the substituents on the heterocycle and to predict potential successful substituents on the pyridine we run docking studies with the protein using the AutoDock software suite. So far, the literatureknown compounds are correlating well with the calculations.

A.38 Joshua Poole

Development of Orthogonal Post-Polymerization Modification Strategies: Au(I) Catalysis enabled Click Chemistry

Industry highly favors complex thermoplastics such as polystyrene, polyethylene terephthalate, and polysulfone due to their resistance to thermal and chemical degradation. However, these sought-after attributes make it difficult to recycle these polymers at their end of industrial life. Post-polymerization modification (PPM) in tandem with thiol-ene click chemistry can provide an answer to this drawback. Au(I)-catalyzed hydroarylation installs an activated acrylate functionality to waste aromatics that enables subsequent functionalization with thiol-ene click chemistry in one pot. The resulting thiol group that will then be attached will affect the thermomechanical properties of the parent polymer. Nuclear Magnetic Resonance along with attenuated total reflectance-Fourier transform infrared spectroscopy will be used to analyze the molecular structure of the functionalized polymer, while gel permeation chromatography will be used to analyze the changes in molecular weight. Differential scanning calorimetry and thermogravimetric analysis will be used to analyze the effects of the added functional group on the thermomechanical properties.

A.39 Joseph Previte

High-Rate Thermoplastic Composite Manufacturing via Polyphenylene sulfide/Carbon Nanotube Susceptor Films

When designing next generation, fuel efficient aircraft, it is critical to minimize additional weight. This can be achieved by employing carbon fiber reinforced polymers, which are significantly lighter than traditional materials like aluminum. Specifically, thermoplastic composites can be induction welded, which eliminates the need for metal fasteners, by creating a bond consisting of entangled polymer chains. In order to achieve efficient volumetric heat generation during induction welding, the material must be electrically conductive where it will be joined. In this study, polyphenylene sulfide (PPS) was chosen for its mechanical properties, solvent resistance, and fast crystallization rates, afforded by its high degree of crystallinity and simple backbone structure. To combat the electrically insulative nature of PPS, carbon nanotubes (CNT) were incorporated. The goal of this project was to examine the effects of PPS/CNT melt processing parameters (temperature and time) on the electrical conductivity, to ultimately prepare susceptor materials that will heat efficiently when exposed to induction welding conditions. Initial results indicated that longer processing times yielded significantly lower conductivities due to CNT agglomeration, whereas increasing processing temperature had little effect. These changes in conductivity were measured by a 4-point probe instrument, and the corresponding nanotube agglomeration was visualized using scanning electron microscopy. Additionally, differential scanning calorimetry, wide-angle X-ray scattering, and rheology were implemented to examine the crystallization behavior, degree of crystallinity, semi-crystalline morphology, and complex viscosity of the PPS/CNT as processing parameters were adjusted.

A.40 Benjamin Reyes

Development of an Organocatalyzed Asymmetric Alkylation Reaction Involving TBS-MAC Addition to Stabilized Allylic Substrates

Benjamin A. Reyes, Francis K. Kekessie, Julie A. Pigza

Squaramide organocatalysts (SQs) can catalyze reactions via noncovalent interactions in two binding modes that can activate both the substrate and a nucleophile of appropriate pKa. We and others have demonstrated that masked acyl cyanide (MAC) reagents are compatible nucleophiles with these catalysts and can participate in nontraditional bond forming reactions via delivery of an acyl group. It has also been demonstrated that a nitro group on a substrate can be effectively activated with these catalysts. We want to combine these two aspects in the development of an organocatalyzed asymmetric alkylation reaction of stabilized allylic substrates, a reaction which has traditionally been accomplished with metal catalysts. This presentation will describe our initial results of the screening of various Lewis acids and achiral squaramide organocatalysts with 1,3- diarylpropenes containing a

para-nitrobenzoate leaving group. The products generated are valuable chiral building blocks for use in the synthesis of natural products with relevant biological activity.

A.41 Brian Ridenour

Design and synthesis of vitrimer thermosets derived from main-chain benzoxazine polyesters

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Benzoxazines are a new class of monomers that undergo cationic ring-opening polymerization – in the absence of catalyst and without by-products – yielding a crosslinked polymer network comprised of a phenol and a tertiary amine bridge as the structural motif. Extensive hydrogen bonding between the phenol and tertiary amine gives rise to the many notable features observed in polybenzoxazines, including high glass transition temperatures and thermal stability, making them useful for applications in electronic packaging and aerospace composites. Despite these advantageous properties, polybenzoxazines often suffer from difficulty in processing, brittleness, and a lack of reprocessability or recyclability – drawbacks that may be addressed via the design of benzoxazine building blocks linked by dynamic covalent bonds. This project focuses on the synthesis of covalent adaptable polybenzoxazine networks based on dynamic transesterification exchange – an approach that exploits the tertiary amine structural motif within the benzoxazine network as an internal, immobilized exchange catalyst. Polyester main-chain benzoxazines (PMCBs) were synthesized via step-growth polymerization using benzoxazine-based diols and aliphatic diacid chlorides. Thermal cure of the PMBCs provided thermosets capable of undergoing stress relaxation and reprocessing, with the efficacy of transesterification dictated by the alcohol to ester ratio. Thermogravimetric analysis and differential scanning calorimetry were used to establish the curing profile of the material. Dynamic mechanical analysis was performed to determine the stress relaxation behavior, thermomechanical properties and reprocessibility of the materials.

A.42 Gavin Rose

The Preparation of Bis-Coumarin Probes For Metal Detection in Aqueous Solutions and Incorporation into Thin Films

Molecular recognition of environmentally or biologically important metal ions, for example, Fe(II), Pb(II), Cr(II), and Cu(II), is an important area of sensor design. High concentrations of labile metal ions can have a detrimental effect on the homeostasis of a particular system. The work presented here investigated the use of bis-coumarin-enamine molecular probes that exist in three different isomers (para, meta, and ortho) and are capable of changing optical properties by inhibiting the excited-state intramolecular proton transfer (ESIPT) fluorescent mechanism, upon the coordination of metal ions. A series of bis-coumarin-enamine molecular probes were prepared, and their binding behavior with various metal ions (Zn(II), Ni(II), Co(II), and Cu(II)) was studied in organic solvents. One challenge was using these molecular probes in an aqueous environment. To overcome this problem, we prepared inclusion compounds in situ by incorporating the molecular dyes into β-cyclodextrin (CD). Moreover, we incorporated these bis-coumarin-enamine probes into thin films and investigated the photophysical studies in the solid-state.

A.43 Lindsey Claire Ruth

Confirming the Role of the WNT Signaling Pathway in SMC Vascular Calcification

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Vascular calcification is the deposition of hydroxyapatite crystals in the arterial tissue that inhibits the normal vascular functions of a contractile state and relation that aids the maintenance of vascular homeostasis of wall tension, blood flow, and structural support. When the calcification occurs, normal functions are drastically affected due to the mechanical strain experienced by the vascular smooth muscle cells (VSMC). Calcification and other health conditions produce a greater risk for cardiovascular complications, which is one of the leading causes of mortality. Calcification is initiated by several mechanisms and pathways that induce a phenotypic switch in VSMC, but this research focuses on the wingless-relation integration site (WNT) pathway. The WNT pathway provides a mechanism in which specific molecules are accumulated and signal for a phenotypic switch in VSMC. When the WNT protein is accepted by the low-density lipoprotein receptor-related protein 5/6 (LRP 5/6) and Frizzled (Fz) receptor on the cell's membrane, the complex signals for the destruction of the degradation complex for β-catenin, allowing for β-catenin to pool and be translated to the cell's nucleus, and the phenotype of the VSMC is switched from a contractile state to a senescent state that occurs during calcification. In vitro cell culture models were utilized to grow human primary aortic SMC that were measured for calcium deposition quantities on day 7 and day 14 using flame atomic absorption spectroscopy and analyzed with chemiluminescence imaging on day 7 and day 14 via western blot procedure.

A.44 Stephen Schruff

Bio-Derived Benzoxazine Vitrimers Based on Dynamic Imine Exchange

Vitrimers are an emerging class of polymers with ongoing research being conducted to understand their dynamic properties. Vitrimers share properties with both traditional thermosets and thermoplastics, demonstrating impressive thermomechanical properties and solvent resistance while retaining melt processability and recyclability. These unique properties of vitrimers are achieved by incorporating dynamic covalent bonds into the crosslinked polymer network. Herein, a bioderived vitrimer is prepared by synthesizing an aldehyde functional benzoxazine monomer from vanillin and furfuryl amine. This monomer then undergoes a solvent-free reaction with various flexible diamine compounds to create a difunctional monomer with dynamic imine linkage within the backbone. Different stoichiometric ratios of amine to aldehyde were tested to see which would produce the highest conversion to imines and result in the highest Tg networks upon polymerization. The resulting thermomechanical properties of polymerized networks were investigated using instruments including DMA, TGA, DSC, FTIR, and a rheometer. Reacting the benzoxazine monomer with different diamines showed the tailorability of the dynamic network properties, with glass transition temperatures (Tg) ranging from -50 to 150 °C and varying modulus at ambient conditions. Stress relaxation experiments were conducted to probe the dynamic exchange kinetics and resulting thermal reprocess ability of cured networks. In addition, we demonstrated that these bio-derived vitrimers are able to undergo hydrolytic depolymerization upon exposure to specific acidic conditions. This work provides insight on the creation of vitrimer materials using bioderived precursors and establishes a platform for developing recyclable benzoxazine matrices.

A.45 Thamar Scipio

Adoptive Transfer of Diabetic CD4+ T cells Induces Characteristics of gestational diabetes in normal pregnant rats

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Gestational diabetes mellitus (GDM) is a form of diabetes that occurs during pregnancy and is marked by insulin resistance, glucose intolerance, and beta islet cell dysfunction. GDM is associated with adverse maternal difficulties such as increased risk of T2DM and birth complications to the infant

(macrosomia). Although there are limited management strategies, there is no cure due to a lack of an appropriate animal model. In the current study, we used normal pregnant Sprague Dawley (NP-SD) rats and virgin streptozotocin (STZ)-induced diabetic female Dahl Salt Sensitive (DM) rats to determine whether adoptive transfer of CD4+ T cells from DM rats causes characteristics of GDM in NP-SD rats. Splenic CD4+ T cells were magnetically separated from DM-SS rats (DM-CD4+ T cells) and untreated virgin female Dahl SS rats (SS-CD4+ T cell) and injected into NP-SD rats on gestational day (GD) 12. On GD18, animals were placed in metabolic cages overnight for urine collection to determine proteinuria, a marker of renal injury. On GD 19, arterial pressure (MAP) was measured via chronic catheter, and blood glucose levels were measured by a glucometer before the animals were euthanized. In another set of animals, we performed a glucose tolerance test (GTT). A student's one-way ANOVA was used for statistical analysis. On GD19, MAP was significantly increased in DM-CD4+ T cell recipient rats (102±2 mmHg, n=5, p

A.46 Shivani Shukla

Maternal B Cell Depletion Improves Birth Weights in a Rat Model of Preeclampsia

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Preeclampsia (PE) is new-onset hypertension during pregnancy and the leading cause of maternal morbidity and fetal growth restriction. Fetal growth restriction is associated with an increased risk for cardiovascular disease in adulthood. PE women have activated B cells producing agonistic autoantibodies against the angiotensin II type 1 receptor (AT1-AA). We have shown that Rituximab, a B cell-depleting chemotherapeutic, lowers blood pressure (MAP), B cells, and AT1-AA in the reduced uterine perfusion pressure (RUPP) model of PE. We hypothesize maternal B cell depletion will improve offspring survival, growth, and cardiovascular disease later in life in response to placental ischemia. To test this hypothesis, the RUPP procedure was performed on gestational day (GD) 14 and administered Rituximab via a mini-osmotic pump. Dams delivered between GD 20-22 and birth weight of offspring was measured. After aging offspring for 16 weeks, we implanted carotid catheters, measured MAP, assessed B cells by flow cytometry, and determined AT1-AA with a cardiomyocyte bioassay. Two-way ANOVA was used to determine statistical significance. RUPP offspring were smaller (5.3g, p

A.47 Lola Perriann Smith

Hydrogen peroxide produced by Streptococcus pneumoniae through pyruvate oxidase (SpxB) catalyzes the oxidation of hemoglobin and the formation of a potential ferryl radical

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Streptococcus pneumoniae (Spn) is a gram-positive bacterium that causes pneumococcal disease leading to 300,000 pediatric deaths annually. Spn produces hydrogen peroxide (H2O2), which plays a role in the bacteria's pathogenesis. Previous studies show that Spn-H2O2 is responsible for oxidation of hemoglobin (Hb) and degradation of heme, but mechanism specifics were unknown. Two enzymes are implicated in this oxidation, spxB (streptococcal pyruvate oxidase) and lctO (lactate oxidase) as a mutant Spn lab strain, ΔspxBΔlctO, did not oxidize Hb. My research goal was to identify which metabolic route, spxB or lctO, is responsible for the oxidation of Hb and its downstream effects. Through spectroscopy, it was demonstrated that TIGR4 WT and the ΔlctO mutant oxidized Hb within 4 hours, whereas the ΔspxBΔlctO and the ΔspxB mutants, no oxidation was observed.

Complementary strains recovering H2O2 production through spxB also caused oxidation identifying the TIGR4 spxB enzyme as the responsible pathway for Hb oxidation. Interestingly, during these assays, a radical was detected at a wavelength of ~305 nm in supernatants of TIGR4 and ΔlctO but not in ΔspxΔlctO and ΔspxB. Formation of these radicals was inhibited by thiourea, an antioxidant implicating these radicals as a possible virulence mechanism through oxidation of Hb by Spn- H2O2. To validate either pathways' role in heme degradation post Hb oxidation, in-gel heme staining was performed and further implicated the role of spxB enzyme in Hb oxidation. Overall, we demonstrated that the spxB pathway plays a significant role in the oxidation of hemoglobin and heme degradation through Spn-H2O2 production.

A.48 Michael Smith

Determining the Impact of Occidiofungin on Yeast Strains Deleted for Actin-Associated Proteins

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The antifungal compound, occidiofungin, is a natural secretory product of Burkholderia contaminans MS14 with demonstrated cidal activity against a broad range of fungal pathogens. Occidiofungin triggers cell death by apoptosis, likely through disruption of cellular actin organization as yeast exposed to sublethal doses of occidiofungin lack F-actin cables and are unable to form hyphae during morphological switching. Prior work has shown that haploid Saccharomyces cerevisiae cells deleted for the tropomyosin gene, TPM1, exhibit a 4-fold resistance to occidiofungin. As tropomyosin binding stabilizes actin cables and filaments, we propose that this loss of F-actin contributes to the resistance phenotype. In contrast, the actin interacting protein encoded by AIP1, works to target F-actin for disassembly. Given that cells deleted for aip1 have increased F-actin, we propose that Δaip1 mutants will also exhibit resistance to occidiofungin. To test these hypotheses, a PCR-based transplacement approach was used for deletion of the AIP1 open reading frame by homologous recombination. For all resulting strains, sensitivity to occidiofungin was measured by minimum inhibitory concentration assay, changes in the rate of cell cycle progression were determined by calculating doubling time from growth curves, and defects in nuclear positioning and cell cycle progression were monitored by microscopy of DAPI stained cells. Our results show that cells deleted for AIP1 have an occidiofungin sensitivity profile similar to wildtype, with no obvious defects in nuclear positioning or delays in cell cycle progression. These findings suggest that sensitivity to occidiofugin cannot be predicted based solely on cellular actin organization.

A.49 Neziah Smith

Enhancing Benzene/Cyclohexane Separation Using Boron-Doped Ordered Mesoporous Carbon

Neziah Smith, Mark Robertson, Anthony Griffin, Zhe Qiang

Listed as one of the "seven separations to change the world", the selective capture of cyclohexane within benzene remains an exceedingly difficult task, especially at industrial scale. With a difference in boiling point of 0.6 °C, conventional fractional distillation requires extremely high energy consumption. To address this grand challenge, we herein demonstrate an alternative route through utilizing boron-doped ordered mesoporous carbon-silica nanocomposites for hydrocarbon separation. OMCs have advantages of long-range nanostructural order, accessible pores, and high surface area. Introduction of boron heteroatoms into the carbon framework enables additional favorable interactions to preferentially adsorb cyclohexane. This work focuses on understanding cyclohexane-benzene separation and their respective sorption kinetics using boron-doped OMCs with varying heteroatom content. The nanocomposite composition was determined through thermal gravimetric analysis (TGA), nanostructure by small-angle X-ray scattering (SAXS), pore size distributions by

Barrett–Joyner–Halenda (BJH) model and surface area by Brunauer Emmett Teller analysis. This work proposes a scalable, energy-efficient path towards the separation of an essential petrochemical product and important raw material.

A.50 Tianna Smith

Respirable Particles Following the Discharge of Firearms Impacts Cardiorespiratory Health

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Adverse health effects have been demonstrated to result from air pollution exposure or particulate matter (PM2.5). Far less is known about exposure to PM2.5 from firearm discharge or gunshot residue(GSR). GSR contains toxins, including lead(Pb), copper(Cu), antimony(Sb), aluminum(Al), and barium(Ba) and have been measured above occupational/environmental regulations at shooting ranges, and individuals at shooting ranges have elevated GSR elements in their blood and urine. These exposures can cause adverse health effects due to elevated toxic compounds present. Additionally, oxidative stress and inflammation are hypothesized mechanisms for the adverse health effects. There is an urgent need for exposure characterization in professional and recreational firearm user populations. Characterization of in vivo responses, including oxidative stress and inflammatory-related responses, are necessary to determine the toxic effects of GSR on health outcomes. The goal of this research was to determine if GSR PM2.5 exacerbates oxidative stress and inflammation to promote cardiorespiratory complications. GSR sample collection and elemental analysis was performed. Collected GSR(100 µg) was intranasally administered to the mice with saline as control. Pre-exposure and 24hrs post exposure ultrasound measurements of left and right ventricles were performed and followed by euthanasia of mice. Collection of tissues and evaluation of inflammation and oxidative stressors by western blot analysis were performed. We expect elevated oxidative and inflammatory stressors will be responsible for adverse health effects as a result of GSR exposure. Further studies need to be performed to determine mechanistic changes in the cardiorespiratory complications.

A.51 Tomyah Smith

Sex Differences in the Effects of Alcohol Self-Administration on Actigraphy-Based Sleep Measures

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Alcohol can cause sleep disruptions, and sleep disruptions can increase relapse risk in individuals with Alcohol Use Disorder (AUD). Rates of AUD are rising in women, but knowledge gaps exist. This experiment used actigram sleep measures and alcohol self-administration in rats to study the relation sleep disruption and sex. Wistar, rats (4 male. 3 female) were surgically-implanted with then trained to orally self-administer alcohol under a fixed-ratio schedule of alcohol using a step-wise sucrose fading procedure. For each rat, on the final stable day at each step, actigrams were generated and used to determine inactivity (i.e.,

A.52 Corrinne Stahl

Aza-Prins Cyclization of N-(2,2-Dimethoxyethyl)-4-methylbenzenesulfonamide to N-Sulfonyl 3,5-Disubstituted Piperidines

Corrinne E. Stahl

Piperidines, a six-membered ring nitrogen heterocycle, are a common structure of many pharmaceutical compounds, including FDA approved anti-cancer, anti-hypertensive, and SSRI drugs. As a privileged structure with the ability of chiral molecules to fit into 3D enzyme binding sites, as 47 percent of pharmaceuticals target enzymes, creating chiral piperidines has a great importance for the pharmaceutical industry. This summer research supported by the NSF REU program at USM focused on synthesizing 3,5 disubstituted piperidine rings with two chiral centers using the Prins-Ritter cyclization.
Initially, a series of Bronsted acids were tested in the acid screen, but only methanesulfonic acid, pKa -1.86 was found to be successful in cyclizing the starting material and had to be run at 0° as it initiated further reactions at room temperature. Triflic acid, pKa 14, cyclized the material but still produced side reactions at 0°. Deuterated formic acid, pKa 3.75 and para- toluene sulfonic acid, pKa -1.34, did not react. These acids were likely unable to initiate the Aza- Prins mechanism that drives the desired Aza-Prins reaction due to their higher pKa values. The structures of the products and starting materials were analyzed using 1D and 2D NMR techniques.

A.53 William Sutton

Cloning Generational mRFP Tagged Lentiviral Vectors for use in Rescue Experiments.

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Mast cells are involved in innate and adaptive immune responses by releasing their mediators (biological compounds) into the extracellular environment in response to external stimuli. This exocytic process is mediated by membrane fusion between vesicles/granules and the plasma membrane, which involves the activities of SNAREs (soluble N-ethyl-maleimide sensitive factor attachment protein receptors) and other accessory proteins such as Munc13s and Munc18s. Therefore, studies aimed at unraveling the functions of different SNAREs and accessory proteins in mast cell exocytosis have been a focus of the field. One of the most practical ways of doing functional protein studies is by creating protein knockouts, which havebeen made easier by the advent of CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) technologies. This study aims to generate a novel expression vector for the restoration of phenotypes exhibited by CRISPR KO genes in RBL-2H3 Cells (a homolog of mucosal mast cells). We successfully cloned red fluorescent protein upstream of the CMV promoter in plvx-IB (a lentiviral vector) using homology-based cloning (cold fusion). The successful insertion of RFP into the plvx-IB vector was confirmed via Sanger sequencing and transient transfection into RBL-2H3 cells. In conclusion, the new construct will be a valuable addition to the tools used in rescuing phenotypes generated by CRISPR knock-out and RNA interference strategies, as well as in the creation of stable cell lines.

A.54 Nathan Tran

Synthesis of Arylquinolines via Alternate Pathways

HIV-AIDS is a disease that has been prevalent for decades and been the subject of much research over the past several decades. Previous research has shown that arylquinolines are effective HIV-1 integrase enzyme inhibitors. HIV-1 integrase enzyme plays a vital role in viral replication with its ability to integrate viral DNA (vDNA) into the host chromatin. In addition, these arylquinolines bind at an allosteric site which differentiates them from other HIV-integrase targeting therapeutics currently employed. Binding at a different site bypasses the developing resistances of HIV-1 that other therapeutics face. This project seeks to lower the required steps to the arylquinoline as the currently employed path is 11 steps. Our proposed alternative path will decrease the time needed to synthesize the compound and will also allow for the installation of functional groups not compatible with the

original, 11-step route. Starting materials for the new route will be multi-substituted isatoic anhydrides (IAAs) susceptible to quinoline condensation. These one-pot quinoline condensations with IAAs will be screened in the presence of varying heats, solvents, and acid/base additives. Determination of the product's formation and reactivity will be determined via NMR spectroscopy and mass spectrometry

A.55 Zack Wallace

Extending the Three-Dimensional Culture of Adipocytes Through Surface Coatings

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Over 650 million individuals worldwide are affected by obesity, which increases the risk of developing many life-threatening complications. There is a growing need for better treatment options to combat obesity. Current methods to understand the effects of obesity on cellular biology include the use of animal subjects that do not match the behavior of human fat and adipocytes, the primary cell type in the fat tissue. Long-term in vitro culturing of adipocytes is difficult, as the fat-laden cells tend to float away, preventing researchers from studying the gradual changes in adipocyte biology. The goal of this project is to develop a coating that tethers the adipocytes to a cell culture plate and will extend the length of time of in vitro behavior. Currently, the maximum length of time that adipocytes have been effectively cultured is 6 weeks and the next goal is 15 weeks. This will be achieved by using surface coatings formed with conjugates of elastin-like polypeptides (ELPs), polyethyleneimine (PEI), and Arginine-GlycineAspartic Acid (RGD). These three biomaterials have properties that promote a three-dimensional spheroid growth of the adipocytes and stimulate cell adhesion to the plate. The coatings that will be made are ELP-PEI, ELP-RGD-PEI, and RGD-ELP-PEI. The candidates will be coated on the cell culture plate and adipocytes will be seeded on the coated plate. After allowing the cells to grow, a series of media changes will be performed. Optical microscopy will determine how well the cells adhered to the plate and which coating is the best.

A.56 Ethan West

Analysis of P3HT Nanowires Doped with FeCl3 Using Kelvin Probe Force Microscopy

P3HT is a semiconductive organic polymer typically used in photovoltaics such as organic solar cells and organic light-emitting devices (OLEDs). Doping of P3HT increases the control over its conductivity by introducing more charge carriers into the semiconductor. Using Atomic Force Microscopy (AFM) and Kelvin Probe Force Microscopy (KPFM), this study delves into the chemical doping process of aggregated P3HT nanowires with FeCl3 on Indium Tin Oxide (ITO) substrate. KPFM allows us to observe changes in the structural and electrical properties of the nanowires after doping with FeCl3. Using AFM topography scans, at a moderate dopant concentration, we observed height differences as low as 4nm in undoped areas and up to 14nm in doped areas. The contact potential differences in those areas, given by KPFM scans, are lower than -500mV in doped areas but over 300mV in undoped areas in reference to the ITO substrate. Based on both the topography and surface potential scans, we believe that FeCl3 dopant applies itself to the top of the P3HT nanowires, rather than inside, since the increase in height of the nanowires, corresponds to a drop in contact potential difference. The lack of segmented doping, and the doping effects being limited to the main dopant areas also indicates that the dopant is covering the nanowires rather than inserting itself within them.

A.57 Rachel Worden

Synthesis and characterization of Janus glyco-dendrimersomes for utilizations in hydrophobic dye delivery

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Near infrared (NIR) fluorescent dyes have shown promise in noninvasive bioimaging techniques that provide better visualization of tumors and organs compared to typical methods, such as x-rays and MRIs. Despite this, NIR dyes are typically hydrophobic and may contain toxic components, making them incompatible in biological applications. To overcome this, polymeric Janus glyco-dendrimersomes (JGDS), made of a hydrophilic/hydrophobic bilayer, can be utilized to encapsulate and transport these dyes into the body. The resulting nanostructure is heavily influenced by the weight ratios of the hydrophilic and hydrophobic blocks. Previous research in the Morgan group observed differences in hydrogen bonding pathways based on saccharide stereochemistry. In this work, we explored the differences in glycopolymer molecular weight and pendant saccharide stereochemistry on the effects of JGDS self-assembly, morphology, and overall structural stability. Glycopolymers of varying molecular weights (DP 14 and DP 33) and differing pendant saccharide structures (glucose and galactose) were synthesized via reverse addition fragmentation chain transfer (RAFT) polymerization and subsequently characterized through NMR and GPC. The glycopolymers were then photo-coupled to branched polylactic acid (PLA) dendrons synthesized through ring opening polymerization (ROP), and characterized via dynamic light scattering (DLS), transmission electron microscopy (TEM), and atomic force microscopy (AFM).

A.58 Taylor Dorlus

Computational Screening of Donor-Acceptor Based π-conjugated Polymers

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The growing concern for solar efficient ways to conduct electricity and emit light is the driving force for researching the efficiency of organic solar cell technology. Compared to inorganic alternatives, organic material is less expensive and offers more flexibility that allows the material to be easily integrated into solar devices. Several studies show that a **π**-conjugated system with donor-acceptor functional groups leads to an increase in the delocalization of electrons and therefore, an increase in conductivity. The efficiency of solar cell technology to produce energy is highly dependent on the framework used to absorb wavelengths in visible light region of the electromagnetic spectrum. Band gap value of a polymer is an important parameter determining its usability in several applications of conjugated polymers.
The use of polymers in optoelectronics is an advantage for devices that cover large areas compared to semiconductors with a relatively small molecular weight. In this current project, molecular parameters of eight different conjugated polymers were fully optimized using three major methods (B3LYP, CAM-B3LYP, wB97XD) with basis set 6-311G(d, p) in the Gaussian 09 program package. The HOMO-LUMO calculations were done based on the overlapping of molecular π-orbitals and anti-bonding π-orbitals (π*), respectively. Based on full geometry optimization, the time-dependent density functional theory calculation was carried out for all polymers using the CAM-B3LYP method and 6-311G(d, p) basis set.

B.1 Delaney Anderson

Comparing the relationship between social support and cannabis, tobacco, and alcohol use between black and white Mississippi and Louisiana adults

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Racialized disparities are prevalent in a variety of areas, including substance use. Across the US, lifetime cannabis use (30.0% vs 36.8%) and past 30-day alcohol use (43.8% vs 59.8%) varies between blacks and whites, though tobacco use (19.4% vs 21.1%) is similar. There are a variety of factors that may influence an individual's decision to use substances, but social support has been shown to be a well-established protective factor. However, individuals from marginalized communities tend to receive lower levels of social support. The purpose of this study is to compare the relationship between social support and cannabis, tobacco, and alcohol use between black and white adults. Data was collected for two weeks in June 2022 from Mississippi and Louisiana adults (18+) using the 2022 Lifestyle and Mental Health survey. A multiple linear regression found no significant predictors of cannabis use but found race ($p < 0.05$) and age ($p < 0.05$) to be significant predictors of tobacco use, and race ($p < 0.001$) and sex ($p < 0.01$) to be significant predictors of alcohol use. Social support was not predictive of substance use and an independent t-test showed no significant difference ($p = 0.51$) in social support between races. Limitations included self-reported data, a small sample size, and the inability to examine the specifics of social support. Future studies should consider additional details of social support and utilize a larger and more representative sample.

B.2 Kaitlyn Boykin

The Impact of Social Support on Health Disparities Within the Southern LGBTQ+ Community

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Those belonging to the lesbian, gay, bisexual, trans, and queer (LGBTQ+) community face myriad complex interpersonal and environmental challenges, many of which perpetuate the disproportionate health disparities among the community. A growing body of evidence suggests one way to mitigate these disparities is through peer social support. Greater visibility in the community, familial support, and engagement with peers have been shown to improve overall health for LGBTQ+ individuals. However, over 75% of this research has excluded investigations in the Southern United States. This study will focus on the LGBTQ+ population in the Deep South where health outcomes are particularly poor and community support tends to be sparse compared to urban regions in the United States. Variations in general physical health qualified by gender, sex, and sexuality , and how increased social support and engagement may serve to mitigate disparities in these health outcomes were investigated. In line with previous research, we expected to find worse health outcomes among LGBTQ+ participants. We also expected social support and engagement will buffer poor health outcomes, particularly among LGBTQ+ participants given their greater challenges in obtaining appropriate healthcare. Results from the current study found non-heterosexual did report worse health compared to heterosexual participants, though no significant effect of social support or engagement emerged. Future research should be conducted with a larger sample to further investigate these potential protective effects.

B.3 Carrington Brown

Investigating Familial Support and Body Image Ideals in Women

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Having the "perfect" body has become a high priority for many individuals, especially women. Women reported experiencing emotional distress, could possibly avoid this with adequate support. Familial support has been shown to be helpful in navigating negative feelings and perceptions regarding one's body image. Questions remain about whether different forms of familial support may influence individuals' perceived body image. Therefore, the purpose of this study was to investigate which type of familial support (diet or physical exercise) better predicted healthy perceived body image in women. Self-reported data were collected using a community needs assessment survey from Mississippians, who were 18 and older and were recruited via outreach events in the summer of 2018 and 2019. This study consisted of 199 women under the age of 50. Pearson correlation analyses were utilized to determine the association between positive familial support and current vs ideal body weight. Familial support around physical activity ($r = -0.18$, $p = .072$), diet encouragement ($r = -0.01$, $p = 0.944$), and diet discouragement ($r = -0.02$, $p = 0.865$) were not correlated to a healthy perceived body image. An exploratory analysis found that social/emotional support was related to mental health ($r = 0.521$, $p < 0.001$). Limitations included small sample size and self-reported data. Future research is needed to further explore the relationship between mental health and social/emotional support and how it relates to healthy perceived body image in women.

B.4 Kristen Brown

PrEP Uptake: Improving Outcomes and Identifying Stigmas/Misconceptions in African American Communities

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HIV, also known as Human Immunodeficiency Virus, is a disease that attacks normal immune cells that help the body fight infections. The first published report of what would ultimately become known as HIV and AIDS appeared in the Centers for Disease Control and Prevention (CDC) Morbidity and Mortality Weekly Report in June 1981.1 PrEP, also known as Pre-Exposure Prophylaxis, is a preventive medicine that when taken as prescribed can lower the person's risk of catching HIV. Currently, HIV prevention tools are more prevalent today, but the issue arises when these tools are not offered, used, or merely heard of amongst communities. In 2019 the CDC (Centers for Disease Control) stated, 22% of eligible individuals were prescribed PrEP but only 8% of these individuals were members of the African American community. The objective of this study is to determine if identified stigmas and misconceptions associated with HIV and PrEP. From these findings increase PrEP uptake in African American communities. To help combat this issue, researchers and public health officials have sought to identify and tackle key barriers and educate these communities on the resources and prevention methods that are available to end this disparity. To perform this study, a survey was conducted, and participants were asked questions about their sexual activity, sexual health, feelings regarding HIV and PrEP and solutions that could be implemented to help break down these barriers. The data collected from this survey was analyzed and used to interpret the results and conclusion of this study. The hypothesis was supported by data results stating contribution from all

individuals in the community such as patients, doctors, researchers, and public health officials will end HIV disparities and create health equity across the nation.

B.5 Niya Brown

The Impact of Minority Health as it Relates to High Health Insurance

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Health insurance pays for some or all of the cost of health services a person receives. This includes doctor's visits, hospital stays, and visits to the emergency room. Many factors contributed as to why some patients could not afford health insurance. These factors included monthly utility bills, transportation, food and much more. The cost of health care insurance prevented individuals from receiving healthcare services. The objective of the study was to prove that higher insurance has a negative impact on the health of minorities. Being uninsured could lead to poorer health outcomes, advance the stages of illness, and higher mortality and disability rates. We hypothesis is that lowering the cost of health insurance will create a better health outcome for minorities. Secondary data, from CDC (Center for Disease Control) reported that 31.6 million people were uninsured during the year of 2020, 11.5% of these people were under the age of 65. It is vital for health insurance to be affordable to all people because it will enhance access to preventive care and improve health outcomes. The hypothesis is supported by 58% of minorities (African-American and Hispanics) report going without certain medical care because of the cost. Based on results of this study, health insurance is associated with ineffective usage of the physician services. Thus, does not promote the use of cost-effective schedules of care among those in the minority population. A potential explanation is that the use of healthcare services varies by the type of health insurance coverage due to differences in the design of coverage.

B.6 Jasmine Carpenter

Eating Disorders in Adult Populations: Socially Influenced or Genetically Determined

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Eating disorders can be defined as any condition that causes an individual to eat abnormally whether it is excessively, or faintly. The effects of having an eating disorder can include becoming obese or frail. It has been observed in health that one's genetics or family history can accurately determine or predict their health in their adulthood. Understanding what one is consuming and what it does to their body can also help predict their health. We hypothesized that awareness and understanding of one's familial health history and genetics determines one's digestive health and can help them counteract any potential health risks. This research presented and discussed the two important factors; genetics and awareness. Important concepts in food science/nutrition and biology are also discussed and evaluated. Consideration of what social factors that may play a role in adults having eating disorders here in Mississippi are also discussed. This research is quantitative and a survey was given to the targeted age group, adults 18+ in Mississippi. The survey will be used to better understand and prove what one's eating habits or eating disorders are more influenced by. Poor eating habits and eating disorders serve as misconceptions over the past years. Until recent developmental studies, behaviors deemed as normal have now been recognized as eating disorders. Undereating and overeating will be emphasized in this research as eating disorders such as Bulimia Nervosa. In addition, projects conducted by My Brother's Keeper centered on food science and eating habits will be are talking points to discuss and understand the why or what certain factors may have contributed to one's eating habits.

B.7 Julia Cates

Life satisfaction among Mississippi Tobacco Users in the presence of Obesity.

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Research indicates that high life evaluation is associated with better health outcomes, such as reduced risk of chronic disease and reduced mortality. There is less evidence that has considered tobacco users life evaluation with morbidity. The purpose of this research was to examine the relationship between life evaluation and tobacco use in individuals with obesity. Understanding these relationships may further guide clinicians in the development of strategies to assist in behavior change. Data was collected using the 2022 Lifestyle and Mental Health questionnaire. Mississippi residents greater or equal to 18 years old were eligible to participate. A total of 153 individuals responded (Age= 33.98+16.55, 110 Women, 75 Black and 69 White individuals, 52 tobacco users, and 33 obese). The scores for life evaluation were: (1) (Positive Affect Scale) [posaf] = 19.9$\pm$4.77, (2) (Satisfaction with Life Scale) [swls] = 22.83$\pm$6.86, (Depression Scale) [cesd] = 10.28$\pm$6.13, and (Flourishing Scale) [flourish] = 43.29$\pm$9.46. Using a general linear model, multivariate analyses, life evaluation was lower for tobacco users (posaf ($p<0.001$), swls ($p=0.11$, cesd ($p<0.001$, and Flourish ($p=0.002$)). There were no differences in life evaluation between obese and non-obese respondents, nor did the presence of obesity alter the relationship between life evaluation and tobacco use. Life evaluation is lower in tobacco users versus non-tobacco users. The presence of obesity does not further lower life evaluation scores. This information may assist clinicians in developing appropriate strategies for behavior changes.

B.8 Zada Davis

Exploring the Relationship Between Education Level and Perceived Physical and Mental Health of Adult Mississippians

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Mississippi ranks the second to least educated within the United States with only 20% of individuals receiving a form of advanced education. A recent study has shown that those with higher education levels demonstrate a greater concern and awareness for their overall health than those with lower education levels. The purpose of this study was to determine the relationship between education level and perception of mental and physical health of adults in Mississippi. It was hypothesized that education would be negatively correlated with perceptions of health. Self-reported data of 383 individuals was collected through a paper and online survey during the summer of 2018 and 2019. A Spearman correlation showed a significant correlation between education and an individual's perception of their own health status. Education level was positively associated with perceived mental health ($r = 0.19$, $p < 0.001$) and perceived physical health ($r = 0.11$, $p < 0.05$), indicating that those who received higher education reported healthier self-perceptions. Limitations included the use of self-reported data. Further, other potentially significant factors were not included in data analysis. Future research should consider specific locations such as residency.

B.9 Jaiden Downs

The Effects of COVID-19 on Mental Health of African American Children and Adolescents

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Mental health is a range of mental, emotional, social, and behavioral operations that can be evaluated from good to poor. Mental health is a growing public health issue among African American children and adolescents. There are a number of factors that affect mental health in African American children and adolescents including lack of mental health care available to them. African Americans are a minority group which has a history of underserved mental health services. The mental health of youth is paramount for the future of our communities. There are many causes for the prevalence of mental health issues in African American children and adolescents, however, with the prevalence of COVID-19 there has been an increase in the need for awareness of mental health. There is little research targeting African American youth in mental health. There is an increased risked for mental illness when factoring in COVID-19. Feelings of anxiety or depression is something that should be addressed in young people since these feeling can become prevalent over the course of someone's life. The objective of this study is to review surveys completed by African American children and adolescents and evaluate them addressing the effects of COVID-19 pandemic on the mental health of African American children and adolescents during the pandemic and as restrictions are being lifted.

B.10 Alayjha Edwards

The Growing Epidemic of Sexually Transmitted Infections in Adolescents and Young Adults

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STI, also known as sexually transmitted infections, has been an ongoing epidemic in adolescents and young adults for a long time however, it has been well under-researched. The increased rates pronounced in adolescents (10-17) and young adults (18-24). Within the research, females, and males account for nearly half of the new STIs in the United States. Researchers from the University of California Los Angeles found that 1 in 4 adolescents have been infected with Chlamydia trachomatis (CT) every year. This research aims to address the issue of STIs among adolescents and young adults and what are ways to prevent and reduce the rates. This data was collected in second resources, retrieved from My Brother's Keeper, Inc. (MBK), Center for Research, Evaluation, and Environmental & Policy Change (CREEP), and service data. The effects of sexually transmitted infection on adolescents and young adults were categorized based on race, gender, age, sexual orientation, and risk factors. Based on the results of this study, 62 percent of females between the ages of 10-15 are at a higher risk for contracting Chlamydia and Gonorrhea due to their prefrontal cortex still developing throughout adolescence. YMSM are at an even higher risk for STI due to an individual-level risk behavior within the infection of syphilis by making up 58 percent of the population. Based on the data collected, this research can continue to be improved and investigated to reduce the STI rates among adolescents and young adults in America. There are medical solutions that can be made to reduce this issue.

B.11 Makyla Edwards

Ending Cycles: Chronic Disease Prevention Among Southern Families

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Rates of chronic diseases in American adults rose from 25.5% in 2012 to 60% in 2021. Among youth, research shows over 40% have been diagnosed with at least one chronic health condition in 2021. The Deep South claims the highest rates of chronic disease, which are preventable with healthy lifestyle behaviors such as adopting a healthy diet or engaging in regular physical activity. It is crucial to find effective interventions to address these chronic rates within the family, particularly to mitigate chronic diseases among children. Thus, the current study aimed to gain a more nuanced understanding of individual, familial, and cultural factors that may influence attitudes toward chronic disease prevention. Specifically, we predicted individuals living with children and those previously diagnosed with a chronic disease would report greater endorsement of disease prevention. However, results found those living with a child diagnosed with at least one chronic disease reported less endorsement of disease prevention compared to those living with a child without a chronic disease. We discuss the potential moderating effect of perceived uncontrollable mortality risk. Future research should be conducted to further tease apart this effect to guide a holistic approach to end familial cycles of chronic disease.

B.12 Shawna Everman

Perceived Physical Health and Fruit Consumption in Mississippians with Obesity

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The prevalence of obesity in Mississippi remains highest in the Nation. Research suggests obese individuals have a low perception of physical health, which may comprise adoption of health promoting strategies (i.e., diet and exercise). Increasing one's fruit consumption may lead to weight loss. Understanding the relationship between perceived health and diet in individuals with obesity may lead to improved strategies of behavior change. The purpose of this study was to determine if the relationship between an individual's perception of their physical health and fruit consumption was different depending on the presence or absence of obesity. Data were collected in 2020 via an online community health assessment survey using Qualtrics survey software. Mississippi residents greater or equal to 18 were eligible to participate. A total of 368 individuals responded (Age= 33.94+14.02, 276 Women, 113 Black and 160 White individuals, and 66 Native Americans). The majority (71%) rated their physical health as "Good" or "Very Good", 23% as "Fair" or "Poor", and 10% as "Excellent". No obese individuals considered their health as "Excellent". Using a general linear model, multivariate analyses, fruit intake was significantly different across categories of perceived physical health (p

B.13 Adaisha Freeman

The Impact and Importance of Allergists and Immunologists on Public Health

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An allergist/immunologist is a medical doctor who specializes in treating and managing allergies, asthma, and health conditions that affect the immune system. Clinical allergists and immunologists work with patients directly and educate them about their condition as well as provide valuable lifestyle and dietary tips to help manage their symptoms by reviewing medical history and asking questions

regarding current symptoms, treatments and medical history. After questioning, they perform various tests and procedures to identify and treat immune conditions. A study was performed of adults in ages ranging 18-54, on their knowledge and use of allergists and immunologist. The results of this study showed that, 61.1 % were aware of what an allergist/immunologist is, where 38.9 % do not. Because it is more common for women to visit doctors more often than men, the percentage of women who were aware of the roles of an allergist and immunologist was much higher than the male percentage. Of this group, only 38.9 %t of them have utilized services from these doctors. The study found that 55.6 % of the participants have allergies, asthma, or immunologic diseases, have either been prescribed over the counter medications, (Zyrtec or nasal spray), or prescription medication (albuterol or a nebulizer) from their doctor. At the conclusion of the survey, more than half of the US, about 54.6 %, suffer from allergic reactions and these clinical physicians have a significant role in public health as it is vital to assure that the most effective treatments are provided to assure a better quality of life.

B.14 Lauren Kelli Gatlin

The Impacts of Sexual Health & Relationship Dynamics in African American Women in Mississippi

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Relationship dynamics can be defined as the pattern(s) of behavior that happen between people in the ways one can relate, interact, and communicate with one another other.1 Sexual health is the awareness of physical, emotional, and social will being in relation to sexuality2,3. According to the CDC HIV Surveillance Report of 2019, in the United States, Black/African Americans only made up 13% of the female population but accounted for 58% of diagnoses of HIV infection among females".8 This study will hypothesize that African American women will report and share experiences of high responses of being influenced under drugs or alcohol during sex; low response of experience anger when their partner(s) ask to use contraceptives or condoms, and low responses of practices of safer sex with their partners as well. The primary purpose of this study is to assess quantitative data on the impacts of relationship dynamics and sexual health of African American women. A survey was conducted using google forms with a target goal of recruiting 50 participants. The questions were grouped into themes of demographics, sexual health, and relationship dynamics. The groupings were derived from socio-economic factors, behavioral/physical factors, and relationship/personal risks factors. All data gathered was then used to interpret the results and conclusion.

B.15 Jakeem Greer

The Relationship Between Vaccine Hesitancy and Preventable Chronic Diseases in Black and White Mississippi Adults

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The COVID-19 pandemic resulted in over 1 million deaths across the country, and vaccination is the most effective measure to prevent morbidity and mortality. Vaccine hesitancy, the act of being anxious or hesitant to receive a vaccine, is common in those with lower education levels, chronic diseases, and in minority groups. Chronic disease patients are more susceptible to COVID-19 infection. The purpose of this study was to examine the relationship between race, chronic diseases, and COVID-19 vaccine hesitancy. It was hypothesized that Blacks and those with chronic diseases would be more

hesitant to receive the vaccine. Data were collected using an online questionnaire advertised via social media and direct text messages. Participants consisted of Black and White Mississippi adults (N=523). Linear regression analyses showed that race and high blood pressure status were significant predictors of vaccine hesitancy ($p < 0.05$). Regression results showed Black versus White participants were less hesitant to receive the COVID-19 vaccine. In conclusion, the analyses showed that race was a key determinant in vaccine uptake. This suggests that different preventive behaviors are practiced amongst different racial groups. Limitations included self-reported data, a small sample size, and less representation of some demographic factors. Implications of this study are that healthcare professionals should consider ethnic factors in terms of preventive healthcare. Future studies should be performed to determine other factors influencing COVID-19 vaccine decisions and include a more representative sample.

B.16 Destiny Grisby

Accessing the Knowledge of Adolescents on Reproductive and Sexual Health

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The ICAN project is a community-based initiative designed to increase access to and utilization of reproductive health services among adolescents, aged 13-18, in the Jackson Public School District (located in Jackson, MS). The project used dual comprehensive sex education training programs for school-based nurses/health educators, and student and their parents with the major goal of increasing their knowledge of adolescent health, sexual health, and HIV/STD risks. Each session was held after school to increase interaction and create a safe environment. According to the CDC, Mississippi has been one of the states with leading teen pregnancy, gonorrhea, chlamydia, syphilis, and HIV rates. This project used pre- and post-test assessments to measure the knowledge of each participant on reproductive and sexual health, followed by a participation satisfaction feedback. The assessment consisted of questions about defining puberty, influences of sexual behavior among adolescents, teen birth rates, and transmission and prevention of STDs and HIV. The satisfaction feedback was used to gauge the participants' knowledge before and after the training session, future plans, and satisfaction with the instructor. At the end of Year 2, students on average had a 16.2% increase in the final post-test. After further analysis, about 73.7% of the student participants increased their post-test score by 1 or more. During year 3, a student outreach session was held, and 159 students were given the same participant satisfaction survey from the training. On a scale from 1 to 10, the students had a mean rate of 7.35 for self-reported knowledge before and a mean rate of 9.25 for selfreported knowledge after the training session. During year 4, the mean score of the students' knowledge before was 6.7, and after the session was 8.5. Also, 95.1% of the participants displayed an increase in knowledge. During year 5, there were 79.5% of the student participants with an increase in knowledge. At the conclusion of each project year, self-reported knowledge among the students increased significantly as a result of the training. After more than 20 training sessions hosted, the ICAN Project was able to educate more than 845 students on sexual and reproductive health, including the basics of HIV and other STIs, how to practice safe sex, and the difference in sexualities.

B.17 Mardarius Harper & Kozetta Hilliard

Examining Current Knowledge Surrounding Sickle Cell Disease in Mississippi Minority Populations: An Education Opportunity

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Genetic screening is a service that is offered to asymptomatic individuals which can help educate those who are at risk of passing certain traits on with prevention, early treatment, and reproductive choices. The objective of the study was to examine current knowledge surrounding sickle cell disease and to see how likely populations would be to receive genetic screening. Sickle cell disease (SCD) is a condition in which red blood cells are sickle-shaped. This causes the cells to stick to each other and to the walls of blood vessels forming clumps which subsequently cause pain and other complications. This was a quantitative study in which participants were asked to complete a survey that presents basic information about genetic screening, the risks and benefits of screening, and how genetics relates to not only a person's health but their potential offspring's health as well. They were also asked about sickle cell disease and how it can be inherited. Demographic information was also gathered including gender, race, and sexual orientation. According to the Centers for Disease Control and Prevention (CDC) (2021), approximately three million people in the United States have sickle cell trait (SCT) but are unaware they are carriers. Based on the results of the data, there was an increased knowledge of 40% pertaining to sickle cell disease by the end of the survey. Raising awareness of SCD is important as the disease and the symptoms associated with the condition are under-represented to minority populations. It is vital for individuals to undergo genetic screening to become more aware of their genotypes and the possible disorders that could be passed on.

B.18 Tylan Hunt

Examining the Relationship Between Level of Social and Emotional Support and Chronic Disease Status in Mississippi and Louisiana Adults

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Chronic disease is a leading killer in the United States. Mississippi and Louisiana are at the forefront with among the highest prevalence of obesity, diabetes, and high blood pressure. Social and emotional support has been linked to better health outcomes and is critical for disease prevention and management. This study examined individuals' self-disclosed level of social and emotional support and their chronic disease status. It was hypothesized that there would be a negative correlation between social and emotional support and chronic disease status. Data was collected using the MIOS 2020 Community Health Assessment survey for Mississippi and Louisiana adults. A Spearman correlation revealed that social and emotional support was not significantly related to self-reports of obesity ($r = - 0.04$, $p = 0.42$), diabetes ($r = -0.09$, $p = 0.11$), and high blood pressure ($r = 0.07$, $p = 0.19$). Limitations included self-reported data, and limited sample size. Future studies should utilize a longitudinal design to further examine this relationship over a period of time.

B.19 Ramez Iseed

Examining the link between social support and the number of servings and fruits and vegetables consumed by MS adults

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Health studies focus exclusively on self-regulation without accounting for factors such as social support. However, social support has been linked to affecting the health choices Americans make. The purpose of this research is to determine the link between social support and the number of daily servings of fruits and vegetables Mississippi adults consume. This study was a secondary analysis of survey data, which was collected at several community outreach events in the summers of 2018 and 2019 in Mississippi. The survey was distributed on paper to 18+ year old Mississippi residents and was approved by The Institutional Review Board of the University of Southern Mississippi. The survey consisted of questions regarding household information along with health and dietary choice. The variables being examined are social support and intake of fruits and vegetables. Results suggest a significant correlation between social support encouragement and daily intake of both fruits (p=

B.20 Latavius Johnson

The Promotion of Healthy Relationships Within the HIV Positive Population in Mississippi

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The Healthy Relationships program is a multi-session skill building program designated for men and women living with HIV/AIDS. Individuals who have been diagnosed with HIV/AIDS typically find it difficult to disclose their status to their families, friends, partners, etc. The purpose of Healthy Relationships is for participants to learn problem-solving and decision-making skills to address coping with stress related to safer sexual behaviors and disclosure of serostatus. The participants observed facilitators and modeled the skills they portray, and they were urged to apply these skills in their familial relationships, romantic relationships, and friendships. Getting insight on the mental headspace of each person including who they are comfortable disclosing their status to, and helping implement healthy relationships into the lives of people that live with HIV/AIDs is essential. Participants were given pre and post-tests to gauge where their comfortability was in discussing their status. Of the participants, 22.6% were female and 77.4% were male, and 3.2% identifying as transgender. Data from pre to post shows a 3.2% decrease in the lack of comfort telling a family member or friend, a 3.3% decrease in lack of comfort telling a sexual partner, and an increase of 3.2% in comfort of telling someone you are dating. Participants were also asked which family members know of their HIV status and the top three answer choices were Brother/Sister (15), Mother (11), and Aunt/Uncle (9). Based on the data collected, the Healthy Relationships program has increased the healthy relationships within the HIV-positive community.

B.21 Michael Johnson

Do Mobile Health Apps Help? The Relation Between Health Apps and Physical Activity

B.22 Rayven Jones

Examining The Relation Between Rural-Urban Residency and Mental Health Outcomes When Accounting for Alcoholism in Mississippi Adults

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Mental health complications and alcoholism are prevalent, and often comorbid, health concerns in the state of Mississippi. In February 2021, 42.7% of adults in Mississippi reported symptoms of anxiety or depression. Additionally, there is substantial research demonstrating that harmful and hazardous alcohol consumption also contributes to a range of mental health problems and disorders. Studies have consistently shown that alcohol and depression can converge as part of a dual diagnosis, also known as a co-occurring disorder. Moreover, factors like alcohol abuse and social isolation can influence the declination of mental health. The objective of this research was to examine the relationship between mental health status and rural/urban residency in Mississippi adults (>18 years), and to determine if this relationship is moderated by alcohol consumption. We further aim to investigate variations in alcohol consumption and how alcohol consumption might affect mental health outcomes. We predicted that those residing in rural areas would report worse mental health, and that those reporting greater alcohol consumption would also report worse mental health status. However, results found no significant effects on mental health when considering residency or alcohol consumption. These results highlight the importance of further research investigating potential mitigating or protective factors for alcoholism and poor mental health.

B.23 William Jones

Perception of Depression Among Teenagers (Ages 13–19) in Jackson, Mississippi

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Major Depressive Disorder (MDD, also utilized as "depression") is one of the most common health conditions in the world. Often times people with depression suffer greatly with persistent feelings of hopelessness, dejection, constant worry, poor concentration, a lack of energy, an inability to sleep and, sometimes, suicidal tendencies. The causes of depression are poorly understood, but involve some combination of genetic, biologic and environmental factors. In 2017, approximately 17.3 million adults in the United States experienced a major depressive episode in the past year (about 7.1% of the population). Of these, 35 percent received no treatment. The sad reality is many teens are depressed within our Jackson, Mississippi Metropolitan Area and is steadily increasing. In the life of teenagers, the perception of depression is an issue met by the first resource the internet, to help them to understand their situation. The aim of this study is to assess the capabilities of digital technologies to offer a solution that addresses the needs of teenagers successfully identifying depression and seeking proper treatment. The hypothesis will be tested using qualitative focus group research design. To perform this study, two focus groups were conducted, and participants were asked questions that provided natural feedback to provide solutions that could be implemented to help break down barriers around depression thoughts, beliefs, and feelings. Recruit and selection of participants are offered by voluntary response sampling and stratified sampling. Digital flyers were created to assist in the voluntary response sampling that allows finding participants based on individuals interest in the subject matter. Stratified sampling was necessary to capture the particular age and location characteristic of interest for the study. The data collected from the focus group is being analyzed and used to interpret the results and conclusion of this study. Future research studies addressing the perception of depression among teenagers should conduct surveys to ensure the anonymity of respondents, which may influence their desire to speak freely.

B.24 Dakota Kilcrease

The Power of Green: Examining Nature's Influence on Vegetable & Fruit Consumption Amongst Mississippi Adults

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Mississippi and Louisiana are known for their escalating obesity prevalence, contributed in part to sedentary behaviors and poor overall diet. A healthier diet has been identified as a key determinant for overall health, with evidence showing green vegetable consumption to reduce overall body fat. This insight is especially relevant to Mississippians and Louisianans, who experience a multitude of limitations to healthy and convenient food options. Although evidence in the literature suggests nature immersion positively influences mental health, there is little research exploring the relationship between nature and diet. This research determined the relationships between vegetable & fruit consumption and time immersed in nature amongst both Mississippi and Louisiana adults. Survey data were collected from adults (18+) from various community outreach events within Mississippi and Louisiana. Study inclusion were adults self-identifying as either white or African American. A Spearman correlation and multivariate regression were used to analyze the collected data. Time in nature was moderately correlated with weekly physical activity, self-perceived health ratings, monthly fruit consumption, and monthly green vegetable consumption. Time in nature was also found to predict monthly fruit consumption, monthly vegetable consumption, and weekly physical activity. Limitations include a small sample size that is limited in scope to the rural Southern United States. These results can help contribute to the current knowledge of public health interventions by providing evidence-based strategies towards healthy behavioral habits. Future studies need to consider the benefits of nature immersion in urban areas, and the broader cultural factors influencing nature use.

B.25 Isabella Landry

Examining The Relationship Between Sleep Quality and Mental Health in Mississippi; The Role of Socioeconomic Status

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A large body of literature has linked sleep quality to short and long-term mental health issues. Recent studies suggest that social factors may contribute to sleep quality. Understanding the vulnerability of some populations to poor sleep may provide information about their risk of depression and anxiety and lead to further improvements. This study aimed to examine how socioeconomic status impacts the relationship between sleep quality and mental health status. The data for this study were collected using a survey approved by The University of Southern Mississippi's Institutional Review Board. A total of 153 people participated in the survey, with 72% being female and 28% male. After running two linear regressions, it was found that there was a positive relationship between sleep quality and mental health ($p = <0.001$), which confirms the results of past studies; however, income was not significant and did not show an effect on the relationship ($p=0.81$). As a result, the study only confirmed one hypothesis. The main limitation of this study was the sample size and the lack of diversity in the sample. Future studies should have a larger sample and investigate different populations.

B.26 Andrew Le

A Bunch of Sour Apples: Examining Potential Sociodemographic Predictors of Healthcare Trust and Its Correlation with COVID-19 Vaccine Hesitancy in Mississippi Adults

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A lengthy history of exploiting or undervaluing racial minorities in healthcare settings has resulted in a lack of healthcare trust among minority populations, especially among Black populations. Consequently, minorities display reduced engagement with preventative care, most recently highlighted with COVID-19 vaccination efforts. This study investigates if income, education, and race predict healthcare trust and how this trust correlates with COVID-19 vaccine hesitancy in Mississippi adults. We predicted that racial minorities with low income and education would have a lower likelihood of healthcare trust, and trust negatively predicts vaccine hesitancy. A Vaccine Hesitancy survey was conducted in Summer 2021 to assess demographics, healthcare trust, and vaccine hesitancy factors. Linear regressions were used to determine the predictive effect of race, income, and education on healthcare trust and healthcare trust on COVID-19 vaccine hesitancy. Results indicated that healthcare trust was predicted by education but not income and race. Furthermore, trust and race were predictors of vaccine hesitancy. This study notes education as a target for improving healthcare trust and establishing linkages between healthcare trust and COVID-19 Vaccines. More research is needed to identify mechanisms of healthcare trust to inform intervention approaches. This study contributes to the understanding of preventative healthcare engagement among Black populations.

B.27 Maria Matory

Association Between Self Efficacy and Lifestyle Behaviors Among Adults with Type 2 Diabetes In Mississippi

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Today 285 million individuals are diagnosed with type 2 diabetes, and it is projected that by 2030, 438 million people will be diagnosed with type 2 diabetes. Type 2 diabetes is expensive to treat due to its major complications and it accounts for 20% of the nation's healthcare expenses. Through self-efficacy modification of lifestyle behaviors such as physical activity and diet are known to prevent and mitigate diabetes complications. The purpose of this research was to investigate the relationship between self-efficacy for diet and physical activity behaviors in adults with type 2 diabetes. Survey data were collected at several outreach events during the summers of 2018, and 2019 in Mississippi. Regression analyses revealed that higher self-efficacy for physical activity predicted higher physical activity levels, after controlling for age, gender, race, income, and education levels ($p=0.017$). Self-efficacy for diet did not predict fruit or vegetable intake in the regression models. Limitations include a small sample size and potential biases due to subjective reporting. Further research is needed to explore and confirm the relationship between self-efficacy for diet and physical activity behaviors and respective behaviors among individuals with type 2 diabetes.

B.28 Teia McCormick

The Impact of Wellness Programs & Activities on Quality of Life for Elderly HIV-Aging Individuals

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Research shows that people worldwide are living longer. The World Health Organization states, "By the year of 2050, the world's population of people aged 60 years or older will double (2.1 billion). WHO also states, "The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million." This may be seen as a step in the right direction for the health of those in the U.S; however, we now must examine the necessary steps to improve the quality of life for those aging. Studies have shown that aging results from the accumulation of a wide variety of molecular and cellular damager over time and the stiffening of the blood vessels and arteries. These changes can lead to fragility, hearing loss, cataracts, osteoarthritis, pulmonary disease, diabetes, depression, dementia, and many more lifealtering side effects. To combat these changes, the implementation and use of geriatric wellness programs are necessary. Geriatric wellness programs encompass daily activities that include physical activity to reduce the risk of falling and improve mobility, cognitive abilities to improve memory and using different parts of their brain, and social interactions to prevent mental health crisis. Research indicates these are all risks factors for and can lead to cardiovascular disease, cancer, and mortality if not addressed by the aging population and aging populations living with HIV. This analysis is an internal case study with the goal to identify the distinguishing factors between general geriatric wellness programs and the Lifestyle Program facilitated by My Brother's Keeper with a focus on wellness for aging individuals living with HIV. This hypothesis and data focus on the proving that participation in the Lifestyle Program, as opposed to other geriatric programs, will significantly improve quality of life, decrease the likelihood of preventable health complications, and improve mental stability for aging communities.

B.29 Akumcha Mobit

The Correlation of the Presence of Infectious Disease Leading to Mental Illness

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The several viewpoints as to why infections may lead to a later diagnosis of mental illness is of great importance to obtain proper treatment and assistance from medical personnel. A nationwide study, published in Psychiatry issue of JAMA, reveals that some infections in childhood could lead to the development of mental illness later in life.1 My objective is to identify aspects of positive correlations between infectious disease and the gradual development of mental illness. Another literature review indicates that physiological (physical) and psychological (mental) stressors has in turn lead to the prolonged activation of the immune system. Furthermore, causing it to weaken over time, which would make the host susceptible to various infections of communicable diseases. Infectious diseases coming into contact with the human central nervous system and the immune system, causes alteration further allowing infective agents to circulate into the brain causing mental illness. A survey was created and distributed through a form-site link with the hope of recruiting 30 participants. Through my survey, there is an established correlation, 13 agree (41.9%), and 16 (51.6%) strongly agreed that there is a correlation between physical infection of widespread diseases and mental illnesses. Although the results cannot prove causality, these findings provide evidence for the involvement of infections and the immune system in the etiology of a wide range of mental disorders. Studies in the near future could access specific populations and timeline of when these mental disorders are diagnosed medically.

B.30 Kirsten Moore

The Impact of the Making Proud Choices Curriculum on Adolescents in Mississippi

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Making Proud Choices is an evidence-based curriculum that provides adolescents with sexual health knowledge to reduce their risk of sexually transmitted infections (STIs), HIV, and pregnancy. Research shows that teen pregnancy is an alarming issue across the United States but is especially prevalent along the Southwestern border of Mississippi. This fact led to the curriculum's implementation across Warren, Claiborne, Jefferson, Adams, and Wilkinson counties. By administering the Making Proud Choices curriculum, teen pregnancy and STIs among adolescents would decrease as a result of an increase in sexual health knowledge. Four organizations dispersed the curriculum to adolescents within 5 counties and provided pre and post-tests to measure their proficiency. In 2018, the four organizations conducted 17 five-hour sessions of the Making Proud Choices curriculum. The implementing organizations reached 116 participants between ages 11-19. Adolescents within the study were given a pre-test to measure their prior sexual health knowledge and a post-test to measure an increase in knowledge. The posttests showed condom use prevention beliefs increased by 24.05%, condom knowledge increased by 30.62%, pregnancy knowledge increased by 31.25%, and HIV knowledge increased by 13.6%. The Making Proud Choices curriculum was implemented to educate adolescents about sexual health. The goal was to expand the ideal health of adolescents and reduce STIs and teen pregnancy within high-risk communities.

B.31 Jalen Payton

In My Control or Not in My Control: Does Fatalism Moderate the Relationship Between Socioeconomic Status and Diseases in Diverse Populations in the Southeastern United States?

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Mississippi and Louisiana are known for the highest prevalence of chronic disease in the nation. These states are also among the poorest and least educated in the nation. According to the literature, socioeconomic status is linked to health outcomes. Research also shows that fatalism could play a role in health outcomes. Our previous research reveals that fatalism moderates the relationship between income and disease status but not between education and disease status among a diverse Mississippi and Louisiana sample. To build off previous research, the purpose of this study is to investigate fatalism as a moderator between socioeconomic status and disease status within Black, White, and Native American populations in Mississippi and Louisiana. Survey data was collected from adults (18 years or older) in the first two weeks of June 2020 in an online community health assessment. Fatalism was calculated based on a mean score of all the items, and income and education were self-reported. The data revealed that in white individuals income was a major contributor of disease (p

B.32 Kaylan Richard & Daebreon Shanks

Examining the Effects of Sex Education on Mississippi Youth

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Sexual Education is education that involves the human sexual anatomy of one's body, reproductive health, contraception's, and emotional relations. Sex education can be viewed as a preventative measure to combating health disparities such as teen pregnancy and sexually transmitted diseases (STD). In 2011, the state of Mississippi mandated its school districts to adopt a sexuality education curriculum. Statistics show that, "Of Mississippi's 151 school districts and four special schools, 81 districts chose to implement abstinence-only programs, 71 chose abstinence-plus programs, and three chose a combination of abstinence-only and abstinence-plus programs based on grade level". Mississippi students that have been introduced to abstinence-plus programs may practice safe and have better knowledge of contraceptives. We believe that Mississippi has resulted in higher rates of STD contraction and teen pregnancy rates because of our youth not being provided with proper information during their early reproductive years. It's been 11 years since the Abstinence programs have been implemented and Mississippi remains the second highest teen birth rate in the country, at 29.1 births per 1, 000 teens reported by the CDC. African American teenagers who don't have the proper education and access to health care were shown to have more babies than white teenagers by 50%. This is a major problem, because teen mothers are less likely to finish high school and more likely to live in poverty. They are also more likely to have children who suffer from development issues. If we don't work to save our youth, then who will.

B.33 Jayla Richey

Examining race, depression, and anxiety, as predictors of obesity in African American and White women in Mississippi.

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Overweight and obesity is a problem across the globe which disproportionately affects African American women. Depression, anxiety, and stress have been shown to relate to obesity in the general population. Literature has shown that African American women may suffer from depression and anxiety more so than their white counterparts. The purpose of this study was to examine the relationship between depression and anxiety levels and obesity status in African American and White women. Data was collected using the 2022 Lifestyle and Mental Health Survey among (18+) in Mississippi and Louisiana adults. 105 Black and White women were included in this analysis. A binary logistic regression analysis showed that higher depression levels predicted obesity status, after controlling for race, income, education, anxiety and depression levels. Having a low sample size and self-reported data were some of the limitations in this study. Future research should explore the role of depression in obesity among women.

B.34 Debora Roberson

Depression, Income, and Environment as Predictors of Obesity Status Among Southern United States Adults

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Obesity in the United States is a major public health concern, with rates only continuing to rise. Rates are highest among the Southern adult population where more than 35% of Mississippi and Louisiana

adults have been diagnosed with obesity. Many factors contribute to these high rates, such as mental health and individual income. The current research aims to better understand the effect of these interrelated social determinants in an effort to more effectively guide interventions aimed to mitigate the rising rates of obesity with a novel added focus on environmental factors in the Southern population. Specifically, we expected to find higher levels of depression, lower annual income, and decreased neighborhood safety would predict obesity diagnosis. Results from the current survey, however, found reported level of depression, individual income, and neighbor safety did not significantly predict obesity. Future research should be conducted to provide a better understanding of predictors of obesity status and how to mitigate obesity rates in the South.

B.35 Jaylen Sandifer

Understanding Disparities in Healthcare for Transgender People in Jackson, Mississippi

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Transgender is an umbrella term for persons whose gender, gender expression or behavior does not conform nor associate with their assigned birth sex.1 Currently, limited data is available on the healthcare disparities transgender people experience in the deep south. The research study wanted to explore possible examples of health care disparities (ie, visual non-conformity, medical mistrust, access to healthcare, healthcare experiences, and transgender competent care).1-4 The aim of this study is to assess the experiences of transgender persons especially those who identify as gender fluid, and/or gender-nonconforming and their relationship to medical care experiences in the Jackson, Mississippi Metropolitan Area. This study will hypothesize there would be high reports of discrimination, lack of medical trust, and postponement of medical care due to fear of discrimination. The hypothesis will be tested using quantitative cross-sectional research design. The search findings discovered that 33% of the respondents (n=13) indicated that there would postpone preventive medical care due to "fear of discrimination"; 11% would postpone preventive medical care due to being "unable to find a provider who would see them"; 78% indicated they would "have to teach their medical provider" about aspects of their healthcare needs; and 38% indicated "not trusting their medical provider". In conclusion of the study, barriers in healthcare for transgender, gender fluid, and/or gender-nonconforming people exist for those residing in the Jackson, Mississippi Metropolitan Area. The concluding data for this study also revealed a lack in physician trust and trans competent care may also exist in this local healthcare system. The significance of this study gives light on the fact that transgender persons in the healthcare system in the Jackson, Mississippi Metropolitan area are possibly being overlooked.

B.36 Ané Scott

Mississippi Versus Everybody: The Mental Health Impacts of COVID-19 on College Students

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The Coronavirus (Covid-19) pandemic changed the lives of people all over the word. Covid-19 was considered a pandemic on March 11, 2020, which is when most Colleges and Universities across the United States of America and Mississippi were still in session. Colleges and Universities began to close in response to the Covid-19 pandemic, which in turn affected the lives of college students in a multitude of ways including their mental health. On June 8, 2021 "Impact of COVID-19 on the mental health of US college students" was published in BMC Psychology and the article reported that mental health for the surveyed college students declined. The research article and its data were used as the basis of comparison for our research. Our research replicated portions of the aforementioned research

to ensure that an accurate comparison occurred. The 2021 article allowed straightforward analysis on how Covid-19 impacted the mental health of Mississippi college students compared to US college students. It was hypothesized that Mississippi college students' mental health would also see an impact because of Covid-19, and that Covid-19 would have resulted in greater impacts on mental health for Mississippi College students than US College students. Many of the Mississippi College students reported increased levels of anxiety. The majority of survey participants were not first-generation college students, which is in contrast to US college students where 58% were first generation. The survey also showed few students felt Covid-19 impacted their relationships with friends and family. Conversely, however 73.5% US college students felt Covid-19 impacted relationships with friends, while 63.5% felt Covid-19 impacted relationships with family. While Mississippi college students were impacted by Covid-19, it cannot be easily stated that Covid-19 caused a greater impact on Mississippi college students than on US College students.

B.37 Camryn Sheriff

Health App Use Across Income Levels in Mississippi Adults: Link to Eating Habits

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Mississippi is known for having unhealthy eating habits and lifestyles, increasing health disparities. Since the COVID-19 pandemic began, virtual and mobile healthcare demand has increased which also increased technology's influence in healthcare. Research suggests using mobile health applications is associated with better eating habits and motivation to live better with the participants reporting feeling better as well. The purpose of this research was to explore the use of health apps in Mississippi adults across income levels and to determine if those using the apps have better dietary habits. Survey data was collected from adults 18 and older from Mississippi. Variables included income levels, levels of health app use, and several questions about eating habits. Chi-square and one-way anova tests were run to analyze the data collected. The tests found that high-income individuals used health apps more than low-income individuals. These tests showed a significant correlation between the use of health apps and eating breakfast and fruit consumption in low-income adults. This data could show how technology would be a useful tool in the healthcare world.

B.38 Bryanna White

Evaluating Religiosity as a Predictor of Sleep Quality when Controlling for Mental Health and Social Variables in Mississippi and Louisiana Adults

Bryanna White, BS,[1] Shawna Everman, BS,[2] Austen R. Anderson, PhD,[3] Jennifer L. Lemacks, PhD, RD,[4] Tammy Greer, PhD,[4] Sermin Aras, MS, RD[4]
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Sleep quality is the soundness, duration, and depth of an individuals' sleep pattern. Some studies indicate that sleep quality and religiosity are associated. Mechanisms linking religiosity with sleep are not completely identified. Religiosity may impact factors such as mental health and social support, which in turn, impacts sleep quality. Anxiety and depression are among the leading mental health issues in adults in the United States. Anxiety and depression may negatively impact sleep quality due

to creating a cycle of agitation surrounding sleeping habits. Stronger relationships with friends and family may help someone to perceive that they are cared for and is considered social support. Fewer sleep disturbances could be aided with those stronger relationships. Being religious may also have stress-buffering benefits when the religious person places their trust in a divine power to take care of all situations. This study sought to determine whether religiosity predicts sleep quality, after controlling for mental health and social support. The 2022 Lifestyle and Mental Health survey was completed by 153 adult participants who live in Mississippi and Louisiana. A multiple regression model tested the relationship between religiosity and sleep quality after controlling for demographic variables and other relevant predictors (anxiety, depression, social support). It was found that anxiety significantly predicted sleep quality (β=.182, p=.006). Alternatively, depression, social support, and religiosity did not significantly predict sleep quality (β=.046, p=0.435; β= -0.121, p=0.617; β=0.319, p=.210) respectively. Future studies should explore and confirm these relationships in a larger sample of the population.

B.39 Rickeysha White

Understanding the Relationship Between Physical Activity and Mental Health Among Southern Young Adults

Rickeysha White[1], Kaitlyn Boykin[2] , MA, Abigail Gamble[3] , PhD, MS, Jennifer L. Lemacks[4] , PhD, RD, Tammy Greer[4] , PhD, Sermin Aras[4] , MS, RD
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Depression and anxiety are public health concern that underly many chronic health disorders such as obesity or heart disease. Rates of such disorders are continuously rising, particularly among the Southern United States. An abundance of past literature finds simple preventative behaviors such as increasing daily physical exercise, which may be difficult for those with depression or anxiety, can serve as a protective factor against disease. Thus, this study aimed to investigate how mental health may predict physical activity among male and female young adults. Further, we exclusively considered young adults in the South where physical activity is among the lowest in the United States. We predicted participants that reported higher rates of anxiety or depression would also report being less physically active. We further expected this effect to occur at a larger magnitude for female participants given higher rates of depression and anxiety diagnoses among women. Results from the current survey found no effect of depression or anxiety on daily physical activity. However, participant sex emerged as a marginally significant predictor of physical activity such that women reported being less active than men. The current results may be used to guide more targeted interventions to address activity levels among Southern women, however, future research is needed to explore this phenomenon and should further explore potential sex differences.

B.40 M. Alex Fratesi

Clinicá Médica: A Descriptive Study on the Establishment of a Free Clinic for Spanish Speaking Patients

M. Alex Fratesi, Brandon McDaniel, Licy Yanes-Cardozo, M.D.
Affiliations: UMMC School of Medicine, Jackson Free Clinic

With an estimated 9.6% of United States residents without health insurance in 2021, it is imperative that action is taken to provide healthcare to vulnerable populations. Of those uninsured residents, approximately 31.4% of Hispanic adults lacked health insurance (American Hospital Association). To alleviate the financial burden of uninsured healthcare costs in the Hispanic population, Clinicá Médica (CM) was established in 2021 in Jackson, Mississippi (MS) as a part of the Jackson Free Clinic (JFC), a student-run free clinic. The aim of this study is to describe the challenges and the impact of CM in

providing accessible healthcare despite language barriers to the ever-growing Hispanic community. Results: multiple medical services were available to Hispanic patients such as clinic appointments, vaccinations, and educational health fairs in their native language. Significant challenges were funding for facilities, EMR, laboratory analysis of specimens, and diagnostic equipment; obtaining Spanish-speaking medical student and physician volunteers; and advertising to Hispanic patients via outreach events. Despite these challenges, within the first fiscal year of operations, 882 Hispanic patients received COVID vaccinations, 60 Hispanic patients have been treated and/or referred to specialty clinics, and the number of Hispanic patient clinic-visits has increased 15-fold in the last year. Conclusion: Establishment of a clinic to serve those in need is not without challenge; however, the impact of the CM in the Hispanic population was significant. Free clinics are not only a means to provide medical care to patients, it also provides a platform for medical students to positively interact with their community.

B.41 Iyana Malik

D-dimer Trends Predicts COVID-19 Patient's Prognosis: A Retrospective Chart Review Study

Iyana Malik, RN; Raeed Kabir; Reena Chen; Jebun Nahar, PhD; Abul Hussam, PhD; Azad Kabir, MD MSPH*

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Background: Patients with COVID-19 are associated with a significant increase in thrombotic events leading to multi-organ failure and death. The objective of this study was to evaluate the effect of different modalities of anticoagulation dose on patient death and relationship between daily D-dimer levels and oxygen requirements among patients with COVID-19.

Methods: This is a retrospective study of patients admitted to Jackson Hospital, Montgomery, Alabama with a diagnosis of COVID-19 from January 1, 2021, to February 15, 2022. Multivariate linear regression analysis used the oxygen requirements (in L/min) as the outcome variable. The multivariate logistic regression model used patient survival status as the outcome variable. The independent variable used in the models were patient sex, age, race, BMI category, daily D-dimer categories, categories of anticoagulation doses, bleeding episodes, and vaccination status. The three different categories of anticoagulation doses were considered for the purpose of the study: low dose was defined as Enoxaparin 40 mg daily; moderate dose was defined as Enoxaparin 40mg subq twice a day; and high dose was defined as Enoxaparin 1mg/kg subQ twice a day or Heparin drip or any direct oral anticoagulants.

Results: The study reviewed a total of one hundred (100) hospitalized patients. The age distribution of participants varied between 26 and 90 and there were fifty-three percent (53%) African American, and fifty-four percent (54%) women. Among those who died (22 patients out of 100), fifty-nine percent (59%) were male; sixty-eight percent (68%) aged > 60 years; fifty-eight percent (58%) BMI>30 and seventy-seven percent (77%) D-dimer level ≥ 2 µg/mL. Out of the thirteen (13) patients who developed bleeding episodes, forty-five percent (45%) died. Intermediate-dose anticoagulation was found to be the optimal dose as only fourteen percent (14%) patients died compared to a thirty-six percent (36%) and fifty percent (57%) death rate among those treated with low-dose and high-dose anticoagulation, respectively. The multivariate linear regression model predicting oxygen requirements showed D-Dimer and bleeding status were strongly significant with a p value of <0.01. For the patients who had a D-dimer value ≥ 2 µg/mL, the oxygenation requirement was 31 L higher than those with a D-dimer <2 µg/mL (99% CI; p<0.01). The linear regression models had an R-squared value of 45%. The logistic regression model predicting risk of death showed the D-dimer < 2 µg/mL was found to be protective (OR: 0.24; 95% CI; p<0.05) against death when diagnosed with COID-19. When mean D-dimer and corresponding oxygen requirements were calculated by hospitalization days category, the D-dimer levels and oxygen requirements noted to follow the exact same trends indicating both values increases and decreases simultaneously.

Conclusion:
The study concludes daily D-dimer trends can predict COVID-19 patient survival or daily oxygen requirements indicating D-dimer can be the miracle molecule for COVID-19 prognosis. Additionally, intermediate-dose anticoagulation was found to be the optimal dose to reduce patient death among patients with COVID-19 and anticoagulation dose can be adjusted based on D-dimer trends.
Keywords: COVID-19, SARS-CoV-2, anticoagulation, enoxaparin, bleeding risk, prognosis, oxygen, vaccination, D-dimer, non-critically ill

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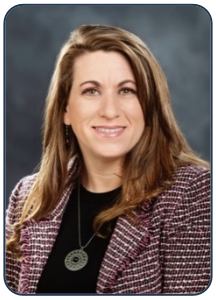

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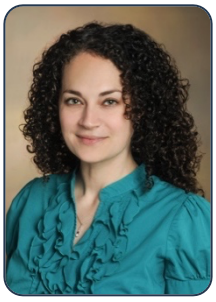

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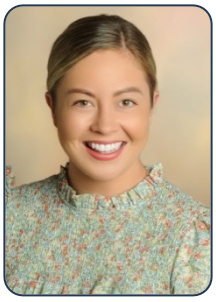

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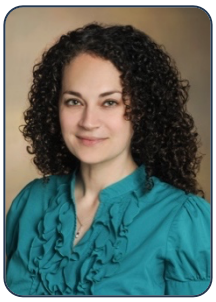

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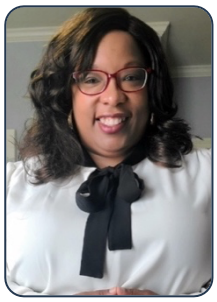

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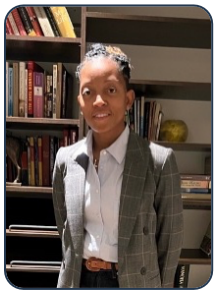

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