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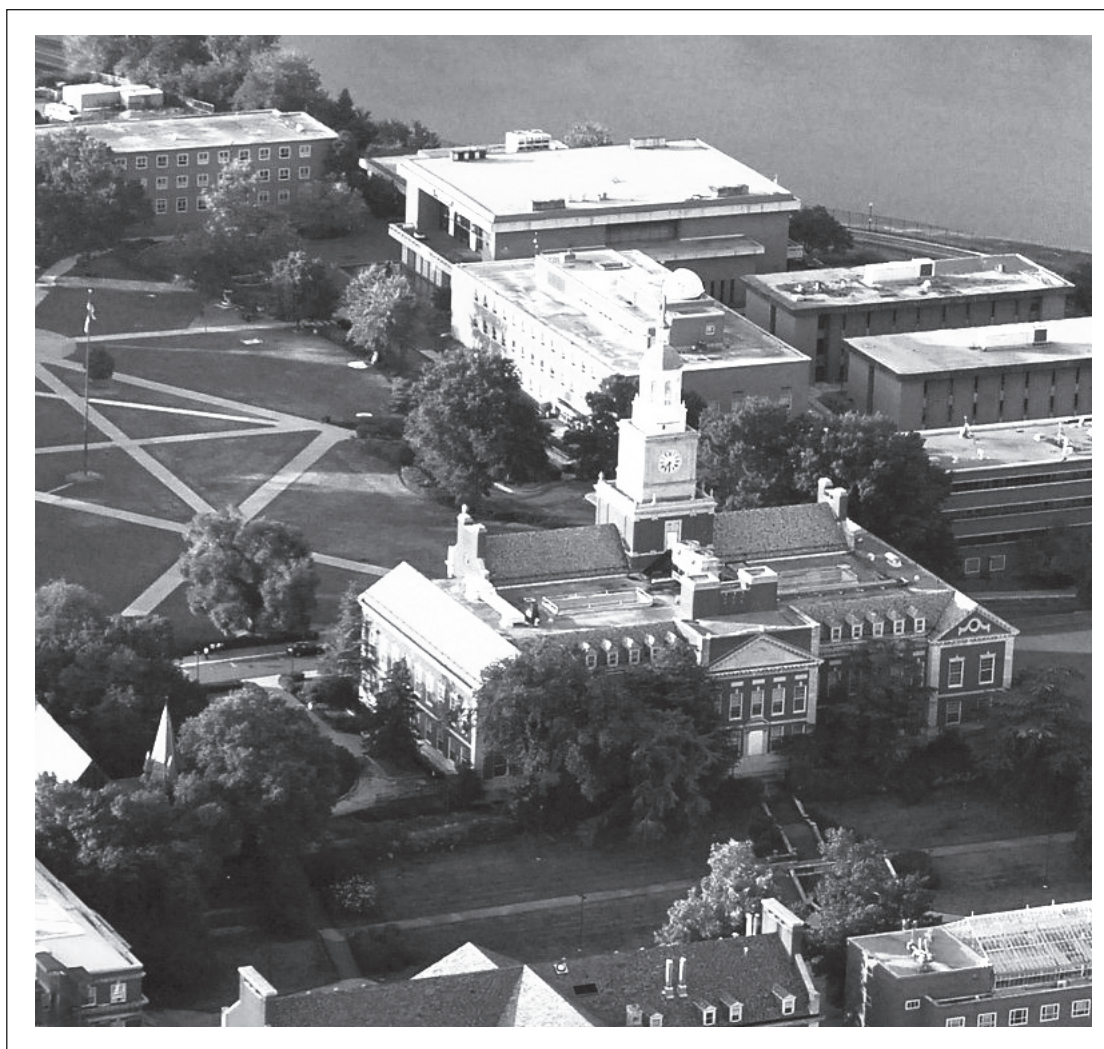
April 27-28, 2023



ABSTRACT BOOK

HOWARD UNIVERSITY

RESEARCH SYMPOSIUM



Abstract Book

APRIL 27-28, 2023

ABSTRACTS

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A B S T R A C T S

BIOLOGICAL & BIOMEDICAL SCIENCES

Auranofin Inhibits Ebola Virus Replication by Targeting NP-VP35 Interaction

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Background: Ebola virus (EBOV) is an enveloped, non-segmented, and negative-sense RNA, that causes a hemorrhagic fever with high mortality. Replication of the EBOV genome depends on the interaction of NP with VP35 and large protein (L). Host protein phosphatase-1 (PP1) controls a switch between EBOV transcription and replication. We hypothesized that NP-VP35 interaction, which is unique for EBOV, might be a subject for PP1 regulation and thus may represent an attractive target for PP1-blocking small molecule inhibitors that can also serve as EBOV inhibitors. We tested small molecules that are affecting PP1 as inhibitors of NP-VP35 binding and EBOV replication. Results: Using high-throughput screening of over 400,000 compounds, we identified several gold-containing molecules including M385, TMPGC, TPPGC, Auranofin and Chloro-gold that disrupted the interaction of PP1 catalytic subunit with sds22 regulatory subunit using Split NanoBit assay. Auranofin inhibited EBOV minigenome (IC₅₀= 0.5 μ M) and also potently inhibited EBOV and MARV replication in Vero E-6 cells at submicromolar concentrations. Comparing to chloro-gold, Auranofin showed at least 10-times better efficacy, also less toxicity. Auranofin potently inhibited NP-NP dimerization (IC₅₀= 4 μ M) and also prevented binding of VP35 to NP (IC₅₀= 32 μ M) comparing to a less efficient chloro-gold compound (IC₅₀= 12 μ M and IC₅₀= 35 μ M, respectively). Conclusion: Taken together, our study suggests that Auranofin may serve as EBOV inhibitor by targeting EBOV NP-NP and NP-VP35 interactions. As Auranofin is approved for human use for rheumatoid arthritis, it is feasibly can be further tested as an inhibitor for EBOV and MARV infections.

Effect of high salt diet on memory and behavior in Apolipoprotein E4 expressing mice

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Several reports have demonstrated that the expression of Apolipoprotein E4 (ApoE4) allele in humans increases the risk genetic of Alzheimer disease (AD). AD is characterized by a progressive decline in cognitive functions and memory. However, there is complete lack of the association of AD with dietary habits and any other comorbidities especially hypertension. Therefore, we hypothesized that high dietary salt intake will result in early progression of AD in mice expressing human ApoE4 allele. To address this hypothesis, we used mice expressing human ApoE4 or the control ApoE3 alleles exclusively in brain. Young adult male and female mice aging 5–7-month-old (n=5 in each group) were fed a 4% NaCl (high salt) or a 0.1% NaCl (normal salt) diet for 4 weeks. Learning and memory was determined using the Barnes maze test. We expect that mice fed a high salt diet will show greater memory loss than the normal salt fed mice. We further expect that a high salt diet will not have any effect on the ApoE3 expressing mice. The results will be discussed.

Pathway-Focused Analysis Reveals Key Genes Associated with Renal Fibrosis in an Accelerated Mouse Model of Diabetic Kidney Disease

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Diabetic kidney disease (DKD) is a major complication of diabetes and a leading cause of end-stage renal disease (ESRD). Several factors contribute to the development of DKD, including persistent hyperglycemia, changes in renal hemodynamics, increased activity of the renal-angiotensin-aldosterone system, inflammatory response, and oxidative stress. The final common pathway at the histological level leading to ESRD is renal fibrosis. However, the exact mechanisms are not fully understood. This study aimed to

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identify genes involved in the development and progression of fibrosis in DKD. To elucidate the mechanisms involved in the development and progression of DKD, we employed the use of an accelerated mouse model of disease progression—the BTBR ob/ob mouse model. These mice quickly develop the pathological features of human DKD. 8-week-old male wild type (WT) and BTBR ob/ob mice were humanely euthanized and whole kidneys homogenized. To identify differentially expressed genes between WT and BTBR ob/ob mice, we employed the use of a pathway-focused fibrosis profiler PCR array. Histological analysis revealed significant tissue scarring in BTBR ob/ob mice. Analysis of serum and spot urine revealed a dramatic increase in albumin: creatinine ratio in BTBR ob/ob mice. A pathway-focused gene expression analysis of whole kidney homogenate of WT and BTBR ob/ob mice identified 9 fibrosis related genes differentially expressed in whole kidney homogenate, including *Acta2*, *Ccn2*, *Edn1*, *Itga3*, *Mmp3*, *Plat*, *Tgfb2*, *Tnf*, and *Mmp1a*. These findings uncover potential genes involved in the development and progression of DKD and provide insight into the possible early mechanisms of disease.

Ebola virus modification to PP1-targeting compound enhances PP1 binding to NP and facilitate capsid formation

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Background: Ebola virus (EBOV) is a non-segmented negative-sense RNA virus that causes severe hemorrhagic fever in humans. Previously, host protein phosphatases PP1 and PP2A were shown to promote EBOV transcription. The molecular basis of PP1-viral interaction during EBOV infection is largely unknown. To address this, we investigated the effect of continuously treating EBOV-infected cells with the PP1-targeting 1E7-03 molecule. Methods: Deep sequencing of viral RNA was used to identify alterations in the EBOV genome. TEM was utilized for EBOV capsid analysis. Split NanoBiT and Crosslinking system was used to analyze NP dimerization and NP binding. Results: When cells harboring EBOV were continually treated with 1E7-03, the NP E619K mutation appeared. NP E619K mutation had no effect on EBOV transcription but prevented EBOV capsid formation in the cells expressing NP, VP24 and VP35. Treatment with 1E7-03 treated cells by 1E7-03 stimulated capsid formation by NP E619K but not WT NP. In split NanoBiT assay, dimerization of the NP E619K mutant was significantly reduced (15-fold) but the binding of the NP E619K to PP1 was increased. Cross-linking and co-immunoprecipitation studies revealed that the NP E619K mutant had a reduced ability to oligomerize, and that 1E7-03 treatment increased dimer formation. Conclusion: Our

findings indicate that enhanced PP1 binding to NP reduces NP polymerization and impairs capsid formation in the absence of 1E7-03 but promotes capsid formation in the drug treated cells. We propose that PP1 plays an important role in EBOV replication by binding to NP and preventing transcribing EBOV from capsid formation.

Initial Assessment of the External Auditory Morphology in Semi-aquatic Pinnipeds

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Morphological studies of pinniped auditory apparatuses remain limited. These semiaquatic carnivorans include the modern Families of Phocidae (true seals), Otariidae (sea lions/fur seals), and Odobenidae (walruses). Pinnipeds have unique auditory adaptations to hear efficiently both in water and on land. For mammals, this typically requires separate auditory mechanisms. Currently, it is unknown how pinniped hearing works; many pinniped-specific adaptations have not been described due to inaccurate terminology of this region and the inability to correlate morphology to terrestrial taxa. The severe lack of information on this topic led to this initial study, comparing tympanic morphologies of modern semiaquatic carnivorans in relation to hearing. Modern representatives of Phocidae, Otariidae, Odobenidae, Ursidae (bears), and Mustelidae (weasels) were examined. Cranial measurements were used to calculate ratios specific to the tympanic region and were included in linear morphometric principal component analyses (PCA) to determine the significant variation in morphology. These ratios allowed for the exclusion of body size as a variable while still incorporating 'shape' without completing a geometric morphometric analysis. This is the first study using this methodology, especially in reference to pinniped hearing adaptations. Phocids tend to have overall larger tympanic bullar ratios and many of the fossil specimens plot similarly to terrestrial carnivores due to similar morphologies of the bony external acoustic meatus. These identified morphologies concur with current phylogenies and allow for isolation of adaptations specific to hearing. Once modern and fossil auditory morphologies are established, behavioral hearing analyses can be incorporated to demonstrate the evolution of pinniped hearing.

A B S T R A C T S

The FENTANYL Crisis

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The impact of fentanyl has become a national crisis, destroying countless families, and leaving a multifaceted health and public safety crisis, especially in young adults. Fentanyl, otherwise known as N-phenyl-N-[1-(2-phenylethyl)-4-piperidinyl]propanamide; is a potent synthetic opioid drug, utilized as an analgesic (pain relief) and anesthetic. Fentanyl is administered as either a shot, a skin patch, or lozenges illegally. A thorough search was conducted over the NCBI PubMed as well as the other public data bases, and the knowledge gathered therein as briefed in this small review presentation. Fentanyl is extremely lipophilic in nature allowing it to move through the blood into the fat-rich tissues of the nervous system far exceeds the capabilities of heroin and morphine. The combined higher potency and enhanced brain penetration increase the speed of effect onset, overdose risk, and shorten the time window for successful overdose reversal. Studies published by National Institute on Drug Abuse (NIDA) of National Institutes of Health, and the Department of Health and Human Services (DHHS) further investigate the presence of fentanyl and their effect on the body. These Studies will be significant in providing an agenda in a descriptive analysis of the drug, which in turn helps develop a procedure to combat the effects of this drug. Responsive studies may also inquire about the development of accurate techniques to analyze opioids. The aims of such analyses would include improving the clinical treatment and understanding the public health consequences of fentanyl addiction and overdose.

Chip Assay Indicates: PPI is Able to Bind to HIV-1 LTR

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Background: HIV-1 activation is driven by the long terminal repeat (LTR) promoter. Protein Phosphatase 1 (PPI) has been shown to prevent virus activation. We proposed that direct or indirect interactions PPI to HIV-1 LTR can form multiprotein complex to control HIV-1 transcription. The goal of our research was to show possibility of PPI binding to HIV-1 LTR. Methods: TZM blue cells were used as a source of LTR-PPI complex by PPI-Gfp vector transfection alone or with HIV-

1 Tat. To detect that complex we used ChIP assay which utilizes an antibody (Gfp) to bind specifically to DNA (LTR) associated with protein (PPI) and to capture target DNA for downstream analysis by qPCR. Results. One control and two experiments were designed. Negative control assay utilized Gfp overexpression as a foreign protein. In the experimental assays PPI-Gfp was overexpressed alone (1) and with Tat (2). Finally eluted LTR-DNA were amplified with specific primers by qPCR. Their amplifications (copy numbers) were calculated based on Standard curve obtained by serial diluted of pNL4.3Luc DNA by Cp (crossing point) parameter. As expected, control assay did not show any specific amplifications whereas the experimental ones showed 13 times fold decreasing enrichment for PPI/Tat compared to PPI/no Tat. Discussion: Chip assay indicates PPI is able to bind to LTR and orchestrate with other partners silencing (latency) of virus. Tat activation significantly decreased PPI-LTR interaction and make virus actively transcribed. These preliminary data require addition experiments to make conclusion for PPI-LTR interaction.

Ferroportin Q248H Mutation Leads to a Moderate Iron Load in Slc40a1Q248H/Q248H Mice

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Background: Deregulation of iron export by ferroportin (FPN) and FPN-binding peptide, hepcidin, is linked to elevated intracellular iron. FPNQ248H mutation which is prevalent in African Americans (2.2%-13.4% frequency) is linked to elevated iron levels in Zimbabwean children and increased inflammation in patients with Sickle Cell Disease. Thus, understanding the mechanism of iron regulation by FPNQ248H mutation is essential for better treatment of iron disorders in African Americans. We hypothesized that FPNQ248H mutation leads to again-of-function and causes systemic iron accumulation. Results: FPNQ248H male mice grew slower and exhibited higher serum transferrin saturation and reduced TIBC. Analysis of hematological parameters showed increased RBC, hemoglobin, and hematocrit. Liver TFR and hepcidin mRNA levels were increased and splenic DMT1 and FTH1 levels were elevated in FPNQ248H mice. High iron diet led to an increase in serum ferritin and hepcidin levels in FPNQ248H mice. RBCs, Hb, and MCV levels were slightly higher in FPNQ248H mice than in WT mice. Both mRNA and protein ferritin levels were higher in the liver of FPNQ248H mice. Conclusion: FPNQ248H mice demonstrated a mild iron load which could be due to the increased iron absorption and recycling indicated by the upregulation of DMT1 and FTH1. High iron diet led to a dramatic increase in iron storage in FPNQ248H mice liver. Taken together, our study is the first to

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investigate the in vivo model of FPNQ248H mutation showing alteration of iron metabolism and iron load typical for type IV hemochromatosis.

Phages Gamgam, Isolation and Characterization from a soil sample collected from the Howard University campus

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Bacteriophages, commonly known as a "phage", are viruses that infects bacterial host. There are tens of thousands of undiscovered phages on the earth. In this study phage Gamgam was one of the bacteriophages isolated that could infect the host bacteria, *Mycobacterium smegmatis* MC2 155, to increase the diversity and understanding of phages within the Howard University environment. After isolation, purification and amplification from a soil sample, a high-titer lysate was generated, DNA was extracted and then sent for sequencing at the Pittsburgh Bacteriophage Institute. Sequencing was completed utilizing Illumina Sequencing on the MiSeq platform. Gamgam is a lytic cluster C subcluster C1 bacteriophage of the Myoviridae morphotype. Gamgam is circularly permuted with 154,543 base pairs, 236 genes included, with a G+C content of 64.8%. Annotation of phage Gamgam, is ongoing using the Phage Evidence Collection and Annotation Network (PECAAN) and DNAMaster. Even though many sub cluster C1 phages have been isolated from the Howard University environment phage Gamgam had its own uniqueness.

The host protein phosphatase 1 is recruited by Ebola virus nucleoprotein to activate viral transcription factor VP30

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Coauthors: Asrar Ahmad, Andrey Ivanov, Sergei Nekhai

The viral transcription factor VP30 of Ebola virus (EBOV) is active in viral genome transcription in its unphosphorylated form. In the past, we demonstrated that VP30 can be dephosphorylated by protein phosphatase 1 (PP1). Compound 1E7-03, an inhibitor of PP1, can stop viral transcription in Vero cells and in the EBOV minigenome system. Here, we demonstrate how the host PP1 is bound to by the Ebola virus nucleoprotein (NP) in cells. We show that the well-known PP1 and PP2A inhibitor okadaic acid and compound 1E7-03 inhibit

VP30 dephosphorylation. Understanding the molecular mechanism of VP30 dephosphorylation will bring us a step closer to finding in future a therapeutic treatment for EBOV infection.

DNA BARcoding

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There are over 12,000 species of ants that have been discovered. DNA barcoding is used to make specific identification among species using a specific part of a genome to identify certain characteristics. Within this experiment, a multitude of ants were collected from the same area to decipher how many species could cohabitate in the same environment. DNA Barcoding was used to decipher and confirm which species the ants come from. Without DNA samples there would never be confirmation or certainty of the ant pieces. The DNA Barcoding of the ants allowed the researcher to determine the species of the ant.

A Bioinformatic Analysis of an Unknown Ant Specimen Found in Washington D.C.

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Background: Ants are eusocial insects, classified into the family Formicidae. There are more than 13,800 classified species of ants. The range maps of ants in the United States are frequently updated due to changes in the environment. The Barcoding U.S. Ants project aims to further our understanding of ants in the United States. Methods: Howard University students located in Washington D.C. took part in this initiative by collecting ants for DNA barcoding analysis. The ant specimen had its DNA extracted, amplified via PCR, and sequenced. Through the DNA Subway platform, a bioinformatics analysis was performed on the ant's DNA sequence to identify its taxonomic classification. Results/Discussion: Based on the phylogenies generated by DNA Subway as compared to sequences in the BLAST database, the ant we sampled is within the *Monomorium* genus. Range maps show that *Monomorium minimum* is a native species to the D.C. area thereby providing support for the high likelihood of the specimen belonging to the *Monomorium minimum* species.

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Ant DNA Barcoding

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Barcoding US Ants is a project that gives the public an opportunity to participate in labs. The project includes collecting ants and sending them off to be DNA tested to identify their species. Once the lab results are back, the data is ready to be analyzed through DNA Subway Blue Line and published. The information that is collected will ultimately help other scientists learn more about ants as a whole. From this lab, we can learn about the different species of ants that exist. The process of DNA extraction can also be studied in this lab. With this in mind, PCR is a helpful technique when looking at the DNA of ants. PCR, also known as a polymerase chain reaction, is a laboratory technique used to amplify and isolate DNA sequences. In order to amplify a DNA sequence, PCR makes lots of copies of one part of the DNA. To jumpstart this reaction, there are four key ingredients; the DNA template, PCR primers, dNTPs, and DNA polymerase. PCR primers are also necessary because they are short pieces of DNA that provide a starting point for DNA synthesis. They amplify a specific region of the DNA which is called the target region. dNTPs, which are also known as Deoxyribosenucleotides aid in building DNA. Lastly, DNA polymerase is an enzyme that bridges DNA nucleotides. In PCR, the DNA polymerase that is typically used is called Taq polymerase. Since it can withstand high temperatures it's ideal that it's used in PCR.

Falsies "An Esthetic Compromise to Infection Control"

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Women have desired the perfect set of eyelashes for beauty and esthetic purposes; eyelashes that are long, thick, full, and enhance their beauty. Iridescent eyes are often seen to be a sign of beauty and are associated with a heightened level of appeal, assurance, and general esthetic welfare. Many options are available to give the look women often desire including: mascara and as of recent popularity artificial eyelashes that can be individual lashes or as a strip adhering to the dermal margin of the eye with lash glue. Once placed, the client is encouraged not to wash the lashes for the first 48 hours. However, many clients avoid washing their false eyelashes to extend the time they adhere to their natural lashes. In the typical dental

office, microbial aerosols are repeatedly suspended in the air as a result of dental treatment utilizing high-speed handpieces and water-air spray syringe systems on patients daily. This study focuses on the incidence of the microbial growth and the risk to cause infection with inadequate eye hygiene wearing false strip eyelashes in the dental care setting under the pretenses of exposure to aerosolized particles dispensed in the air. Testing involved mannequins wearing false eyelash strips exposed to aerosols in the dental clinics in 1 week increments. The mannequins were then swabbed with sterile cotton swabs & transferred to a test tube with 1mL normal saline after 1 week vs initial placement of lashes via incubation. This study challenges the need for enhanced infection control measures.

Chemosensory abilities in neurodevelopmental disorders: genetic and epigenetic regulatory pathways during early development, aging, health and disease

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Olfactory dysfunction is a marker of the aging population and neurodegenerative conditions such as Parkinson's and Alzheimer's disease in subsections of the population with higher risk factors. Groups of individuals suffering with other disorders causing degenerative neuropathology, depressive disorders, progressive memory loss, and normal age-based decline in physiological functions as well as communication disorders, also display various olfactory deficits and/or olfactory dysfunction. Thus, olfaction modulates our communication ability early in development and later in life when the olfactory system displays dysfunction as prodromal marker of neurodegeneration. We attempt to understand and analyze the pathways that the olfactory system follows in between early and late time points while it comes under the influence of genetic and epigenetic factors that modulate physiological and behavioral symptoms. As a first step, we have conducted a comprehensive literature review and determined the following: during the COVID-19 pandemic, loss of olfaction and gustation has been widely observed and analyzed in COVID and long-COVID cases. Earlier studies have detected similar effects in other viral conditions. Olfactory bulb neurons play a crucial role in normal physiological function, its deviation, and emergence of pathological conditions as they transmit impulses to higher cortical and limbic structures. However, communication disorders such as autism and other autism spectrum disorders are neurodevelopmental disorders with complex etiology where a polygenic component is a predominant factor. In this group of disorders, symptoms develop early in life and are thought to be the outcome of genetic factors that control neural circuit assembly and synaptic wiring.

A B S T R A C T S

Viscoelastic response of commercial mucin to HIV pseudotyped virus

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Mucin is a heavily glycosylated protein that makes up the mucus gel which serves as a protective barrier against pathogens like viruses. Mucins are prone to self-aggregation which imparts a viscoelastic (fluid-like and solid-like) characteristic to the mucus gel. However little is known about how the presence of viruses change the flow properties of mucin. Replication-deficient HIV viruses pseudotyped with either gp120 or vesicular stomatitis virus (VSV-G) envelope proteins were used as model viruses. Commercially available Porcine gastric mucin-type II (PGM-II) and porcine gastric mucin type III (PGM-III) in the filtered (free mucin) and unfiltered (having mucin-mucin interactions) states were used as model mucins. DLS was used to determine the landscape of the sizes of the diffusing species. Rheology was used to determine change in the inter-mucin interaction and friction. Axisymmetric drop shape analysis was used to determine the changes to the mucin surface tension. Preliminary results suggest that the average intensity of PGM-II and PGM-III, in the filtered state, are lowered and the hydrodynamic diameter decreases with both pseudotyped viruses. Subsequent rheology studies show a lowered elastic and frictional character when either VSV-G or gp120 pseudotyped viruses are present. The unfiltered state of mucin shows no significant changes in DLS measurements but increased elastic and frictional characteristics are observed at lower oscillatory frequencies in rheology studies. Our data demonstrates that viruses change solution behavior of mucin both in the singular and aggregated states and thus may alter the viscoelastic characteristics of the mucus gel.

DNA Barcoding Ants to classify species and identify changes in Ant populations across Washington DC

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This project involves the process of DNA barcoding ants in order to expand range maps for ants across the United States. DNA Barcoding is achieved by collecting ant samples, isolating and extracting the ants' DNA, visualization using gel electrophoresis, and amplifying the DNA sequence(s) with the Polymerase Chain Reaction (PCR). The results were then sent

to the Cold Spring Harbour laboratory for analysis. After the data is returned, a bioinformatic analysis is then performed on the DNA Subway (a gene annotation and analysis tool), to compare ant specimens to other known species. At the conclusion of the experiment, the species of the ant specimen collected was determined via the Basic Local Alignment Search Tool (BLAST) and DNA Subway. This information can be used to monitor changes in ant populations over time and to identify the effects of human activities on these populations. Being aware of human impact on ant populations is a significant concern, as ants play a crucial role in the terrestrial ecosystem, including seed dispersal, soil aeration, and acting as decomposers. Understanding human impact on ant populations is crucial to the development of conservation efforts.

Uncovering the Interactions of Non-POU Domain-Containing Octamer-Binding (NONO) Protein during Innate Immune Response to Improve Novel Brain Cancer Treatment

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Delta-24-RGD is an oncolytic adenovirus developed to treat brain cancer. The Phase I Clinical trial showed replication and direct oncolysis by the oncolytic adenovirus in recurrent malignant gliomas. Still, the virus was cleared by the immune response within weeks. Previous studies of the innate immune response show NonO is an HIV capsid sensor, working with cGAS. We predict NonO is an adenovirus capsid sensor, and the generation of a NonO-resistant Delta-24-RGD virus will improve the anti-cancer effect. RNA sequencing and transcriptomic analysis of MRC5 infected with WT adenovirus (Ad300) at 100 MOI were conducted. SDS-PAGE of Ad300 infected MRC5 cells visualized cGAS, NonO, and GAPDH. Average relative density was quantified from the western blot. The infection rate in Ad300 infected MRC5 cells was determined by flow cytometric analysis. Immunofluorescence staining was performed for DAPI and NonO. Preliminary findings from RNA sequencing revealed a unique transcriptomic shift. The pathways related to the defense response to the virus and innate immune response were strongly upregulated. NonO was upregulated seven-fold. Western blots indicated an increase in cGAS and NonO over 48 hours. Flow cytometric analysis of MRC5 GFP-positive cells demonstrated 89.3% infectivity with 100 MOI. Flow cytometry confirmed the infection rate of Ad300 at 100 MOI. Fluorescent microscopy confirmed the translocation of NonO from the cytoplasm to the nucleus. Future experiments will characterize the interactions of NONO and cGAS within the cGAS-STING pathway. These findings will be utilized to modulate innate immune pathways to increase viral replication and enhance the anti-cancer effect.

A B S T R A C T S

**Hypertension & Pregnancy:
The Domino Effect in African American Women**

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Background: Hypertension is a preventable condition indicative of increased risk for developing cardiovascular disease and other chronic conditions later in life. Hypertension disproportionately impacts African Americans. Hypertensive women who become pregnant have an increased risk of developing preeclampsia, as well as other pregnancy complications. This places African American women at a unique intersection: experiencing hypertension at higher rates than women of other racial groups in the US and having an increased risk of pregnancy complications. Methods: This is a literature-based study. Search terms such as "hypertension", "African American", and "preeclampsia" were used on Google Scholar and PubMed. Articles on hypertension and its impacts on pregnancy, fetal health, and maternal health were analyzed. Graphics and figures were added to demonstrate and explain certain concepts introduced. Results: Pregnant, hypertensive African American women are at an increased risk of experiencing preeclampsia and other prenatal and perinatal complications when compared to pregnant, hypertensive Caucasian women. African American infants of hypertensive mothers are at an increased risk of experiencing health complications when compared to Caucasian infants of hypertensive mothers. Conclusion African Americans disproportionately experience Hypertension. When pregnant, hypertensive African American women experience an increase in perinatal and postpartum complications when compared to Caucasian women. African American infants of hypertensive mothers have an increased risk of experiencing chronic complications, such as low birth weight and hypertension in adulthood, when compared to their Caucasian counterparts. When combining hypertension with a history of pregnancy complications, African American women experience an increased risk of developing cardiovascular disease and other chronic diseases when compared to Caucasian women.

Regional and Temporal Analysis of Microglia Activation in a Model of Pediatric-HIV Infection

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Antiretroviral therapy has served as a successful method to treat HIV, by effectively reducing viral load. However, pediatric HIV remains heavily prevalent, as there are 150,000 cases via mother-to-child transmission (MTCT) each year (Haddad, et. Al, 2021). Unfortunately, pediatric HIV infection has detrimental impacts on the brain causing a decline in executive and cognitive function despite increasing access to antiretroviral therapy. Imaging projects have demonstrated that perinatal HIV infection (pHIV) leads to altered subcortical volumes, cortical thickness, and cognitive deficits. The pediatric simian immunodeficiency virus model was utilized in infant rhesus macaques due to similar neurodevelopmental patterns in humans and monkeys, and similar pathogenesis between HIV and SIV. Previous studies have indicated reduced neuronal population in the dorsolateral prefrontal cortex (Haddad et al, 2021) and the hippocampus (Curtis et. al, 2014). To further investigate potential HIV neurological deficiencies, microglia cells were studied. Microglia are cells that serve as indicators of neuroinflammation. Subjects include 20 infant rhesus macaques, both orally and intravenously inoculated and euthanized 24, 36, 72 hours, and 12-20 weeks post-infection. Following euthanasia, the subject's brains were blocked, sectioned, and stained and will eventually be developed into a spatiotemporal map. Results will help gain insight into specific areas of HIV-induced neuroinflammation throughout the brain regions and compare results of short-term (24-72 hours) and long-term (12-20 weeks) HIV infection.

DNA Ant Barcoding

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There are nearly 1,000 species of ants in the world. They all have to live a different life style depending on what their environment is like. According to National Wildlife, each ant type has its special diet; depending on where they live can affect what they eat as a part of their diet. For the first experiment, we were to collect ants on our campus for the DNA Barcoding Project. The ants collected will be tested to find out more information about different species of ants. For the second experiment, the DNA from the ants collected would be extracted and tested to help determine what species the ant is. This is completed by using the gel electrophoresis machine. The third experiment used some of the DNA that was extracted from the previous experiment to conduct PCR test. The PCR test produces multiple copies of the DNA to study and find out more about the specimen. The information from all three of these labs can help us determine what species of ants are on our campus, different characteristics about the ants, and how humans can affect their habitat.

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Profiling Glycans of the IgG1 Monoclonal antibody using Lectins

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 Ayobami Ogundiran, Jason Lam, Preethi Chandran

Glycosylated monoclonal antibodies (MAbs) are becoming an increasingly popular method to treat health issues such as inflammation, autoimmune diseases, and other chronic conditions. Through glyco-engineering, pharmaceutical engineers can tailor therapeutic MAbs to bind to specific antigens that may enter the body. The goal of this project is to determine how glycosylation patterns affects the aggregation behavior of MAbs and their uptake within cells. There is a need for high throughput, cost-effective, and real-time methods of profiling glycans located on MAbs. Current techniques like mass spectroscopy provide high resolution but are expensive and not high throughput. Dynamic light scattering (DLS) can be a relatively easy, quick, and accessible method for profiling MAb glycans. Our specific goal is to optimize DLS measurements for reliably detecting the majority of terminal sugars on mAbs. The research strategy involves optimizing mAb and lectin concentration to distinguish between antibody-antibody, lectin-lectin, and antibody-lectin aggregation. Three types of mAbs were used: IgG1 antibody Fc fragments with full glycosylation, reduced complexity of glycosylation, and no glycosylation. Preliminary data of diffusion sizes in DLS and with Atomic Force Microscopy show that the antibody-antibody aggregation is affected by glycosylation. The detection of antibody-lectin binding with DLS is sensitive to mAb and lectin concentration with competing effects from inaccessibility of mAb glycans to lectins and lectin self-aggregation. Since glycoprofiling with DLS does not require any sample processing, it presents a rapid and cheap method to detect changes in mAb glycosylation occurring in therapeutics from storage or in blood from disease conditions.

Combating Obesity in African American Women Using Sports

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Healthy aging includes regular aerobic physical activity (PA), which is crucial. But barely 27% to 40% of African American women meet the national PA standards. The data that are now

available also demonstrate a definite drop in PA when African American women go from young adulthood (i.e., 25–44 years) through midlife. Obesity increases the risk of obesity-related co-morbidities in AA women, especially those associated with metabolic and cardiovascular illness, which leads to health disparities. In order to effectively promote PA among sedentary AA women in their midlife, effective interventions are required. Understanding ways for enhancing leisure-time PA maintenance among AA women may require studying positive outliers, or people who have succeeded with long-term (>6 months) PA participation. The purpose of this study is to determine how physical activity might aid to prevent obesity among AA women.

Methodology: This project analyzes how physical activity might aid to prevent obesity among African American women. A systematic review of many peer-reviewed articles over the previous seven years on the topic was used. **Results:** Participants increased moderate-to-vigorous PA and reported improvements in 2 theoretical mediators. Average weekly PA time for research participants was 250 minutes, which is 66.7% more than the amount advised by the government. These women expressed a dedication to leading active lifestyles and taking part in a range of activities. Nearly all participants indicated that they would recommend the intervention to a friend.

Ant Atlas: T. Immigras & Climate Change

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Background: Climate change has an effect on the animal kingdom. The thermal limit of ants is specifically linked to population and migration patterns. The results of this research add to that knowledge of specific ant species in the Washington D.C. area to further identify signs of climate change in this region. **Methods:** In order to conclude taxonomy, an ant specimen was collected using a hot dog as bait and preserved with 70% ethanol until DNA extraction. The specimen was then dried and ground for DNA extraction using Chelex. After the ant DNA was isolated, the Cytochrome Oxidase I region of the ant DNA was amplified using PCR. The amplified region was then observed in depth via gel electrophoresis to determine if the Ant DNA segments were adequate for sequencing. DNA sequence analysis allows for the identification of the taxonomy of the ant specimen collected. **Results:** DNA sequence analysis demonstrates that the ant specimen collected is most likely Tetramorium Immigrans. Though T. Immigrans is common in the D.C. area, it's not native to North America and was introduced to the region from Europe as a pest. **Conclusions:** Originally,

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as part of the Barcoding US Ants project this experiment was aimed to identify and locate various ant species within the united states. After DNA sequencing and analysis, taxonomy and geographic origin were identified utilizing bioinformatic tools. Future implications of the research can be used to understand the migration patterns and regional population of T. Immigrants specifically in order to identify signs of climate change.

The Impact of Malnutrition on Wound Healing Progression: Elderly Individuals

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Background: Due to age-related conditions, elderly individuals may struggle with consuming enough food and often face food insecurity. Furthermore, wound prevalence in the United States(US) is estimated at 3% among those aged 65 and over with a greater frequency for those in low-income settings. Nutritional status and consumption can significantly impact wound healing, highlighting the importance of understanding the impact of malnutrition on elderly individuals. This study aims to evaluate the influence of nutritional status on wound healing outcomes in the elderly. Methodology: This study performs a meta-analysis on recent research conducted starting from 2015 to analyze the impact of malnutrition on wound healing in elderly individuals. The focus was on research that included individuals aged 65+ with limited functionality located in the US. This was to ensure that the elderly individuals covered were more likely to be suffering from malnutrition. Results: Through the rigorous research review; three studies were found that encapsulate the impact of nutritional status on wound healing for elderly people. The three studies individually confirmed that elderly people with malnutrition are at a much higher risk of developing complications during the wound healing process. Malnutrition can reduce collagen formation, the fundamental building block for wound healing, as well as the circulation of oxygen and nutrients required for the healing process. In conclusion, it is critical that health professionals implement intensive medical nutrition therapy to support wound healing in the older populations. Future research will review nutrition deficiency and challenges it causes for patients with chronic wounds.

Effect of High Salt Diet on Renal Functions in Apolipoprotein E4 Expressing Mice

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Several reports have demonstrated that the expression of Apolipoprotein E4 (ApoE4) allele in humans increases the risk of Alzheimer disease (AD). AD is characterized by a progressive decline in cognitive functions and memory. However, there is complete lack of the association of AD with dietary habits and any other comorbidities especially hypertension. Furthermore, there is complete lack of studies on functions of other organ systems. Therefore, we hypothesized that high dietary salt intake will result in progressive decrease in renal function in ApoE4 in mice expressing human ApoE4 allele. To address this hypothesis, we used mice that express human ApoE4 or the control ApoE3 alleles exclusively in brain. Young adult male and female mice aging 5-7-month-old (n=5 in each group) were fed a 4% NaCl (high salt) or a 0.1% NaCl (normal salt) diet for 4 weeks. 24-hour urine output, food, and water intake were measured. Kidney salt transporters expression will be determined by western blotting. We expect that the ApoE4 expressing mice on a high salt diet will show greater kidney function loss than the normal salt diet fed mice. We further expect that high salt diet will not have any effect on kidney functions in the ApoE3 expressing mice.

pH, Serum, and Calcium Influenced Viral-Aggregates vs. Dispersedly Similar Viruses with Complex N-Glycans on Their Envelop Proteins such as VSVg

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The Vesicular Stomatitis Virus envelop protein is rich in complex N-glycans. We report that the presence of complex N-glycans with terminal sialic acid (SA) sugars produces two types of aggregation states in VSV in diluted cell culture media. One aggregated state (>500 nm hydrodynamic diameter, Dh) is pH-insensitive and occurs when the serum: virus ratio falls below a threshold level. The addition of serum alone, and not any other components in culture media, dispersed the virus present in this aggregated state. Removing terminal

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SA and galactose sugars from VSV glycan shield, exposing N-Acetylglucosamine, eliminated this serum-dependent virus aggregation. While this aggregation state was insensitive to pH if the free calcium levels was below 1mM, there appears to be a pH switch at ~7.4, only above which the calcium can aggregate the virus and serum into uniform aggregates of ~200 nm Dh. Above pH 7.4, the amount of calcium ions required to induce immediate virus aggregation decreases with pH, irrespective of the serum contents in the solution. At higher pH, viruses can aggregate over longer times with lower amounts of calcium (~2 mM).. All three virus states (dispersed, pH insensitive and serum-dependent aggregation, pH-sensitive and calcium-dependent aggregation) exhibit different interactions with antibodies. The calcium and serum levels in different mucus types, blood, and tissue plasma vary. The levels also vary in infections and chronic disease conditions. Our results suggest that viruses with SA-rich complex N-glycan shields may change their dispersal state in different conditions to suit their transmission and infection imperatives.

Sickle Cell Anemia Disease in African Americans: An update

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Sickle cell anemia is an inherited blood disorder that affects millions of people worldwide, especially those of African descent. The condition is caused by a genetic mutation that affects the structure the hemoglobin in red blood cells that carries oxygen throughout the body with wide array of complications viz, severe pain, anemia, organ damage, and an increased risk of infections. PubMed was mainly search (1950 to 2023) with key words "Sickle cell anemia + African Americans," that yielded 643 research articles. Two key articles were main followed i.e., Lee at al., 2019 and Rai et al., 2020 which reveals advancements have made in the medical field to reduce the symptoms of sickle cell. In the past decade, clinical research have made some breakthrough resulted with 3 drugs, L-glutamine, Crizanlizumab, and Voxelotor. Additionally, blood transfusions, bone marrow transplants, gene therapy are some alternatives to reduce the risk and complications. Advancements in research have led to new therapies, such as and targeted medications, which hold promise for more effective treatments and even a cure for sickle cell anemia. With no cure in the vicinity and advancement of research in developing new therapies, the problem still persist due to lack of access to adequate healthcare and treatment options. This leads to delayed diagnoses, inadequate management of

symptoms, and an increased risk of complications which can be minimized by education and awareness, crucial in reducing the stigma and misconceptions associated with the disease.

Pathophysiology of Type-2 Diabetes of African Americans in Washington DC: An Epidemiological and Transcriptional Approach

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The burden of Type 2 Diabetes Mellitus (T2DM) impacted over 37 million individuals in the US, of which 12.1% of African Americans (AA) with higher mortality and comorbidities compared to other Americans. The current research focuses on investigating the differential gene expression of T2DM in AA around the Washington, DC area to determine the possible socioeconomic factors and other health conditions, influencing disease risks and severity in this population. Blood samples from a previously established cohort (n=377, ages 45 - 65 years, both males and females) were used with T2DM (n=77) and controls (n=80). Logistic regression analysis was done to calculate odds ratios (OR) and (95%) confidence intervals (CI). Microarrays coupled with Ingenuity Pathway Analysis (IPA) were done to determine the differentially expressed genes and networks of T2DM in AA. TaqMan Low-Density Arrays (TLDA) were done to validate our genes of interest in three categories: metabolic disease and disorders, cancer-related genes, and neurobehavioral disorder genes (n=24). Our data revealed that 18 genes among which genes APC (p-value 0.0481), SOD2 (p-value 0.0277), and TP53 (p-value 0.0116) (all cancer-related) were differentially expressed in T2DM participants compared to controls. A statically significant association was found between these cancer-related genes and the factors, viz., working status, gender, HbA1c level, elevated BMI, hypertension, and tobacco smoking in AA participants residing in Washington DC. The outcome of the study emphasizes a need for better management of T2DM, limiting tobacco smoking, and large-scale population-based studies of the T2DM association with other disease pathways, including cancers.

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Incarceration as a Risk Factor for Impairment in Cognitive Functioning

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Background: Incarceration is a social determinant of health with public health implications, especially among minoritized communities of color. The experiences of incarcerated people have deleterious implications for mental and physical health outcomes. Research has demonstrated an association between incarceration and poorer global cognition in older adults. The current study examines the long-term impact of incarceration on cognitive functioning in older adults and examines if this relationship is moderated by race, ethnicity, and sex. Methods: Data were collected on participants (n=7,557) in the Health and Retirement Study (HRS). They completed a background questionnaire, psychosocial assessments, and a series of neuropsychological tests. T-tests and Chi-Squared analyses determined differences in demographic and health variables by incarceration status. Linear regression analysis determined if incarceration status predicts poorer cognitive functioning in older adults while controlling for age, race, sex, ethnicity, education, hypertension, diabetes status, wealth, depression, and stroke. Subgroup analyses determined whether associations were modified by race, ethnicity, or sex. Results: Our sample is on average 74 years old, 13% Black, and 60% female. Formerly incarcerated people were younger, disproportionately Black, less wealthy and educated, and more unhealthy. Analyses indicated that incarceration predicted reduced performance in delayed verbal recall ($B = -0.19$, $p = 0.047$) and this relationship may be stronger in Non-Hispanics, African-Americans and Women.

Conclusion: Incarceration may negatively impact long-term memory in older adults and varies by gender, race, and ethnicity. Future studies should investigate variables that influence this relationship, including SES, depression, and chronic illnesses.

Cadherin-11 Antagonism Effect on Cardiac Fibrosis in Chronic Kidney Disease

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Background: Fibrosis of the kidney is the last and highly morbid stage of various types of chronic kidney diseases. The progressive decline of kidney function is the result of prolonged states of inflammation and maladaptive repair mechanisms of extracellular matrix and transmembrane proteins. This cascade also affects the heart, which also can become fibrotic within chronic kidney disease. Cadherin-11 is transmembrane cell junction protein upregulated in various organs within fibrotic diseases. With this, we suggest that Cadherin-11 antagonism is nephroprotective through its antifibrotic properties in the adenine model of kidney disease. Methods: 12-week-old male 129S1/SvImJ mice were fed chow or chow supplemented with adenine (0.2% w/w) ad lib for 7 weeks. Mice were injected IP with vehicle (30% PEG-400) or Cadherin-11 antagonist SD-133 (40 mg/kg BW) 3 days per week for the duration of the study. Plasma and organs were later collected following sacrifice and immediately processed for biochemical analysis. Heart sections for immunohistochemistry were stained with picosirius red and imaged under polarized light. Preliminary Results: Picosirius red staining of the heart imaged with polarized light shows a decrease in collagen fluorescence in diseased mice treated with the Cadherin-11 antagonist. Controls and diseased mice without treatment have increased collagen fluorescence. Conclusion: Cadherin-11 antagonism reduces the amount of collagen within the heart. With reduced collagen, there is less maladaptive repair causing fibrosis. With a reduction in Cadherin-11, there is a reduction of fibrosis, but whether it also restores the functionality of the kidney is currently unknown.

A New Approach for Active Coronavirus Infection Identification by Targeting the Negative RNA Strand- A Replacement for the Current Positive RNA-based qPCR Detection Method

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We are currently facing a global pandemic caused by a strain of viruses from the Coronaviridae family, coronavirus disease-2019 (COVID-19). The additional variants have prolonged the effects of the pandemic by enhancing their ability to evade their host immune systems and decreasing the effectiveness of current pharmaceutical treatments. The identification of viral targets that are indispensable for the virus can be targeted to inhibit mutation-based new escape variant development. This would have the dual benefit of preventing the virus from spreading and of providing the targeted individuals with a potential therapeutic option. The 5'-PolyU tract of the antigenome offers such a target. Host cells do not harbor 5'-PolyU tracts on any of their transcripts, making the tract an attractive, virus-specific target. The

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current positive RNA-based detection systems are unable to discriminate between replicating and non-replicating viruses, complicating decisions related to quarantine and therapeutic interventions. This is particularly problematic for viruses that are potentially dangerous or can lead to illness. The method targets the negative strand of the virus and could more accurately determine the spread of the virus, which could guide better public health measures during the pandemic.

Functional characterization of a small RNA in *Staphylococcus aureus* that may regulate drug resistance genes

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Staphylococcus aureus is a gram-positive bacteria and a dangerous human pathogen. In 2019, *S. aureus* infections were responsible for 1.1 million fatalities worldwide, which far surpassed global deaths from HIV/AIDS that same year (at ~850,000). One of the deadliest *S. aureus* infections is bacteremia (bacteria in the blood), which can result in sepsis (excess activation of the molecular immune system in the blood) and multiple organ failure. In 2018, there were approximately 120,000 *S. aureus* related sepsis infections, resulting in 20,000. This underscores the significance of *S. aureus* infections. Further complicating public health measures aimed at controlling these infections is that *S. aureus* is very effective at developing resistance to antibiotics deployed to control its spread in the body and within the population, with Methicillin Resistant *S. aureus* (MRSA) being a common example. Increasing our understanding of the mechanisms controlling *S. aureus* drug resistance will help us control the spread of multi-drug resistant *S. aureus* infection. In our recent attempts to characterize a novel virulence effector gene discovered by our lab, SroA, we identified several of its regulatory targets. One of the targets is an uncharacterized small RNA known as RsaI. We executed computational screens to find the potential targets of RsaI that yielded genes necessary for the establishment of multi-drug resistance in *S. aureus*. We are now executing genetic studies to test for RsaI regulation of these genes. If our hypothesis is true, we will have identified a novel regulatory mechanism influencing multi-drug resistance in *S. aureus*.

Is the Keto Diet an Appropriate Medical Nutrition Therapy for Pregnant Women with Gestational Diabetes?

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Introduction: In the past few years the rate of diabetes during pregnancy has become more prevalent. According to the CDC, from 2000 to 2010 the percentage of pregnant women with diabetes increased by 56%. Diabetes occurs when an individual's body is either not producing adequate amounts of insulin. The ketogenic diet is one of these diets and it has gained a lot of popularity over the past few decades. This diet requires an increase in the intake of dietary fat and a decrease in carbohydrate intake so that the body begins to break down fat stores for fuel. If a pregnant woman was to partake in a ketogenic lifestyle there are several ways, in which the diet can affect her health and the development of her child. **Purpose:** The purpose of this study is to assess the use of the keto diet to address the health of pregnant black women with gestational diabetes. **Methodology:** This project uses a systemic approach to analyze articles addressing the health risks and ethical issues of going on a ketogenic diet during pregnancy. The study will extrapolate research articles from 2015-2022 to explore the effect of the keto diet on the health of pregnant women. **Results:** In this study over 15 articles were reviewed that discuss and analyze the health risks that a keto diet can pose for pregnant women. **Discussion/Conclusion:** The findings of the study show that the keto diet poses several risks to women and the growth and development of their fetus.

Success Rate Between Nu-smile Crowns and Stainless-steel Crowns for Primary Anterior Teeth

Presenter's Name: Chidi Eke

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Objective: The rising incident of early childhood caries continues to be a major concern in Baltimore City, the purpose of this study is to investigate the success rate associated with two treatment modalities. **Method:** We conducted a retrospective study from 2018-2022 using data from all the Portal Dental offices in Baltimore City. Inclusion criteria were performed by a single provider and compared the number of successes, re-dos and extractions due to infections using Nu-smile crowns (pre-veneers) crown and Stainless-steel crowns

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for primary anterior teeth. Results: 151 charts reviewed, 126 Nu-smile patients had 253 crowns preformed. 25 Stainless steel patients had 38 SSC performed. Sample for Nu-smile 77 patients with 164 Nu-smile (pre-veneer) crowns and SSC had 13 patients with 24 SSC. Total sample for study was 90 patients, total crowns 184. Failure rate for Nu-smile (pre veneer) was .008, failure rate for SSC was 0.007. The failure ratio of stainless-steel crown to Nu-smile (pre veneer) crowns was 0.875 Conclusion: We found that stainless-steel crowns for anterior primary teeth had more successes, less re-dos and less extractions due to infection when compared to Nu-smile crowns (pre-veneer) crowns.

The Perceived Risk of Lifestyle Choices on Cancer Development Among Obese Adults in the United States

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Background: Obesity is known to be associated with several comorbidities, including cancer. Reduced fat mass, healthy eating and regular exercise are known ways to minimize obesity-associated inflammation, which is an underlying pathophysiologic mechanism of disease development. We sought to evaluate the perception of obese US adults on the influence of obesity, healthy eating and regular exercise on the development of cancer. Methods: We identified 2,986 respondents (weighted population size = 219,552,371) to the 2018 Health Information National Trends Survey (HINTS 5 Cycle 2) who self-reported their height and weight and rated how much they thought being overweight or obese, eating healthy, and engaging in regular exercise influence development of cancer. We used logistic regression models and calculated odds ratio (OR) and 95% confidence interval (CI). We used survey weights in all analyses. Results: The perception of obese respondents was generally lower in agreeing that these putative risk factors (obesity, healthy eating, and regular exercise) affect cancer development. When compared to normal weight respondents, obese respondents were less likely to agree that obesity substantially influences cancer development (25% versus 39.2%: OR= 0.51; 95% CI: 0.33-0.80). Conclusion: There is a need for healthcare providers and public health officials to educate the population at large about modifiable risk factors for cancer development, particularly among obese subjects.

Involvement of stress in the *S. mansoni* and *Biomphalaria glabrata* relationship and the effect of stress-inhibitor drugs on the host-pathogen interaction

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Schistosoma mansoni is the causative agent for the chronic debilitating disease, schistosomiasis. *Biomphalaria glabrata* is the obligate intermediate host of this parasite, enabling the larval forms of the parasite to develop into infectious cercariae. The in-market drug, praziquantel, is effective in destroying the adult worms but not against the early stages of the parasite. In the absence of therapeutical drugs that kill all stages of the parasite, and prevent reinfections, a major impetus to develop new remedies against schistosomiasis is needed. One approach to develop intervention tools has been placed on interrupting the development of the parasite during its intra-molluscan stages. We hypothesized that stress inhibitor drugs would affect the snail susceptibility. Results showed that treatment of susceptible snails inhibited parasite infection after 4-6-weeks post-exposure. To determine the effect of these inhibitory drugs on infection in the schistosome-snail interactions, we examined the regulation of PIWI, HOP, HSP70, and HSP90 on the RNA level in drug-treated and infected. Results show that post infection, there is an upregulation of PIWI, HOP, HSP70, and HSP90 expression and a downregulation in these transcripts with drug treated and infected susceptible snail lines. This data shows the effectiveness of the drugs changing the genotypic variations of the susceptible snail making them resistant to infection. Furthermore, to assess the role of HOP on the canalization process, we silenced HOP using siRNA in susceptible snails. Results show HOP plays a key role in schistosome-snail interaction and is needed for the parasite to develop inside the snail host.

DNA Ant Barcoding

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The Barcoding U.S. Ants project with Cold Spring Harbor Laboratory DNA Learning Center is meant to better understand ants and how different species interact with the environment. The method of collecting ants is expanded beyond lab scientists to what they referred to as "citizen scientists." Here,

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anyone is able to participate in the study by expanding the locations, environments, and species collected. With non-expert scientists included, tracking patterns in ants is more efficient and we, as students are able to interact directly with new scientific discoveries. Barcoding US Ants merge citizen science with DNA barcoding to improve range maps for the ants of the United States. Citizen scientists collect and identify ants at locations throughout the US by monitoring ants' ranges and contributing to data that reveals responses to climate change or the movement of invasive species. Current range maps are fragmentary, and DNA barcodes exist for only half of the 900 species known species of ants in the US. Additionally, sequence variation within species may also be discovered and reveal species diversity or allow tracking of subpopulations. Thus, this project can contribute new, valuable knowledge about an important group of insects that is both familiar and unknown and aims to publish several hundred DNA barcodes to GenBank, the authoritative DNA database.

Bioinformatic Approaches to African Ancestry, the Development of Sickle Cell Disease and the Advancement of Precision Medicine

Presenter's Name: Raven Flowers
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According to the National Institutes of Health (NIH), "bioinformatics and computational biology are rooted in life sciences as well as computer and information sciences and technologies". These two interdisciplinary approaches rely heavily on several areas of study, but the most relevant disciplines used in this research are mathematics, biology, computer science, and behavioral science. Bioinformatics applies concepts within the broad areas of sciences and technology to simplify data for the public. Computational biology also uses math and computer science to address scientific queries in biology (Downing et al., 2000). Although bioinformatics and computational biology can often be categorized together, they are distinct. Bioinformatic and computational methods are essential for molecular biology research and utilized in many areas of biotechnology and biomedical sciences. In the beginning, to make use of these approaches, the narrative surrounding ancient African civilizations and how they could be used to better understand genomics was examined, as well as the role they played in the development of disease over time. The development of sickle disease within the African diaspora was analyzed, and the data compiled was used to support precision medicine efforts.

Refining a computational Cellular Potts Model model of the posterior Lateral Line primordium (PLLp) in zebrafish by exploring the effects of changes in parameters

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Zebrafish's lateral line system detects water flow and pressure. The posterior lateral line primordium initiates its formation. The primordium follows the horizontal myoseptum from the zebrafish's ear to its tail. The trailing zone deposits neuromasts, while the primordium continues until the leading zone shrinks and resolves into terminal neuromasts. Wnt and Fgf signaling dominate the leading and trailing zones, and their mutually inhibitory interactions reinforce the division. Neuromast cell interactions specify central sensory hair cell progenitors. The virtual lateral line primordium was altered and analyzed using CompuCell3d. The most accurate model of the primordium is understood to have parameters that relatively interact with one another to create clearly identifiable neuromasts and deposited rosettes. Lambda and constrictor parameters were altered in top and side view models. The side view model compared lambda (constrictor strength) to rosettes. The lambda or constriction value between cells decreased rosettes' size and increased their number. To explore this idea differently, a top view model was created. Multiple system runs of the top view model showed the relative relationship between the leading and trailing ends by changing cell circumference. Reduced constriction and increased cell adhesion led to fewer, larger clustered rosettes. This matches the top view model's findings on constricting epithelial cells' adhesion. More cell adhesion will form neuromast-like clusters with more cells in each group. By changing parameters, both models accurately represented the lateral line primordium and reinforced the same idea. Although built differently with different parameters being explored, they formed neuromasts accurately because more constricting increased rosettes.

The effect background music in video games plays on attention span

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With the rapid development of technology, it appears the attention span of young adults has decreased over time.

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Understanding how attention span is impacted is important in today's society. What methods we use to study attention are just as crucial. In this study, video games are used to conduct an experiment. Video games are not just a form of entertainment that holds attention; they also require a higher level of concentration to complete a task using problem-solving skills and hand-eye coordination. Why do people play video games if they require work? Three main factors make the experience of playing video games enjoyable: sounds, visuals, and interactivity. This study will focus on sound using background music. The design of the video game was made to allow ordinary people to participate in the data collection. The video game is a variant of an ongoing project to study the interaction of motor performance and cognition. In this study, we are exploring the capacity of music to enhance the gaming environment. Participants will play the game with and without background music, and we will explore the effects of the genre of music, lyrics, and the subject's personal musical preferences on the rate of learning and duration of play. This study shows that background music did have an effect on attention span.

Understanding Gorlin Syndrome: Biomedical Importance and Health Disparity

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Background: I suspect more people have Gorlin syndrome than our studies suggest. GGS is a genetic disease that can cause various issues within organs & tissues in the body. Symptoms are vast & may vary significantly even between family members. Methodology: Medline Plus.gov 1. Statistics, PTCH1 Gene Function, 9q22.3 microdeletion, National Library Of Medicine 2. PTCH1 Gene Mechanism, Cancer.gov 3. Symptoms, Gorlinsyndrome.org 4. and diagnosis. GGS Affects roughly 1 in 31,000 people & has two main genetic causes. 1) A mutation in the PTCH1 gene, a tumor suppressor which prevents cells from growing in a rapid or otherwise random manner. 2) The Chromosomal change: 9q22.3 microdeletion in which a section of chromosome 9 is deleted from each cell. This deleted section includes the PTCH1 gene & is responsible for many physical symptoms which include: Mental disorders, macrosomia & delayed development. Discussion: GGS may cause developmental issues in patients, this can affect their ability to function in society at varying degrees. GGS also puts patients at increased risk of multiple forms of cancer as well as sporadic tumor growths which can lead to numerous ailments. As it stands, the best chance of avoiding GGS is through genetic screenings prior to/ during pregnancy.

Potential roles of BNIP3 mediated placental mitophagy in the development of gestational diabetes mellitus

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We hypothesized that placental mitophagy mediated by BNIP3 plays a critical role in the development of GDM. Four studies were conducted. 1) To investigate whether mitophagy is impaired in the GDM placenta, we compared the protein abundance of mitophagy markers or major pathway mediators in mitochondrial fractions of placental tissues collected from women with normal glucose tolerance (NGT) or GDM, followed by Western blotting analyses. 2) BNIP3 expression in human trophoblast cell line BeWo was knocked down, followed by Cell Mito Stress Test. 3) The expression of mitochondria-related genes in response to BNIP3 knockdown (BKD) was investigated by RNA sequencing. 4) We knocked out BNIP3 specifically in mouse trophoblast cells and conducted glucose tolerance test in pregnant mice with (cKO) or without (CT) gene knockout at late pregnancy. All numerical parameters between groups of patients, cells or mice were analyzed by ANOVA (n=4 or 3). The main findings include: 1) The protein abundance of mitophagy markers in GDM placentas was all reduced. 2) Mitochondrial ATP production was reduced in BKD cells. 3) The expression of mitochondria related genes TOMM6, MT-ATP6, NOL3 and IFI6, was reduced in BKD cells, while the expression of MCUB increased. 4) cKO mice demonstrated enhanced glucose intolerance. These results suggest that BNIP3 and BNIP3 mediated mitophagy pathway may play an important role in mitochondrial homeostasis in trophoblast cells, and the reduced BNIP3 expression in the placenta may lead to mitochondrial structural and functional defects, thus affecting placental functions and contributing to the development of GDM.

Protein intake and conformity with the Dietary Reference Intakes in the United States: Analysis of the National Health and Nutrition Examination Survey, 2017–2020

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Background: Daily protein intake plays a vital role in creating and maintaining every cell in our bodies and should be part

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of our daily health maintenance plan. Low adherence to the United States Dietary Guidelines and challenges in following a nutrient-healthy eating pattern concern overall public health. Objective: This cross-sectional study aimed to analyze protein intake for 2017-2020 and evaluate recent conformity to the DRIs according to age, sex, and race or ethnicity in the U.S. population. Methods: Data from NHANES 2017-2020 were used to determine current protein intake and differences among age, sex, and race/ethnicity groups. The study assessed the percentage of the population below the Estimated Average Requirement (EAR) and Recommended Dietary Allowance and above and below the Acceptable Macronutrient Distribution Range (AMDR). Results: The mean protein intake was lowest in those aged 80 years and above and highest in the age group of 31-50 years. Protein intake was also lower in females and higher in males. In the sex-combined analysis, Hispanic individuals consumed significantly more protein than Asian, compared to non-Hispanic black and non-Hispanic white individuals. Conclusion: This study proves that low adherence to the DRIs, combined with physical inactivity and nutrient-poor diets, increases the risk of chronic diseases such as type 2 diabetes mellitus, cardiovascular disease, cancer, and osteoporosis. Therefore, developing effective strategies to improve protein intake and overall dietary habits is crucial, especially for African Americans.

Sickle Cell Anemia in the Black Diaspora

Presenter's Name: Naomi Godwin
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Sickle cell anemia is the result of a point mutation (homozygous) in the hemoglobin gene that causes sickle hemoglobin. Sickle cell is an evolutionary trait that many people developed to protect them from tropical diseases, such as malaria which is very common among African countries. This leads to organ damage, anemia, and reduced lifespan. Sickle targets is present in many African Americans (AA) who are the worst hit in the United States. The present study investigated sickle cell studies (mostly Public Databases) over the course of the years to see how they relate to black people and their history. Also looked at the genome of people who carry sickle cell and if it's possible that their genetic history has to do with their current carrier/ having the disease. AA which have a small percentage of European descent within them also showed that those AA with less Caucasian ancestry have a more prevalent sickle cell trait. People that have a percentage of Caucasian background have a smaller chance of having sickle cell as well as being a carrier for sickle cell. The portion of Africans and AA who have the sickle cell trait or have sickle cell line up with the slave trade and how Africans were displaced and bred out. Sickle

cell developed as a direct result of malaria and blood borne diseases which are less prevalent among countries outside of Africa. European countries did not have this problem hence they did not develop sickle cell to combat it.

Strategies for Inclusion of People with Limited English Proficiency in Research

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Clinical trials are not reflective of the vast racial, ethnic, cultural, and linguistic diversity of our population in the U.S. The Inclusion of Diverse Populations Core of The Georgetown-Howard Universities Center for Clinical Translational Science (GHUCCTS) would like to hold a presentation on strategies for inclusion of people with limited English proficiency (LEP) in research. This session will present best practices, culturally and linguistically appropriate approaches, and GHUCCTS resources for inclusion of people with LEP into research.

The Effects of Stress on Reproductive Biomechanics

Presenter's Name: Jordan Graves
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Reproductive biomechanics is an understudied field of STEM. Biomechanics is an interdisciplinary field that combines biology with physics and engineering principles to understand the mechanical functioning of tissues. Reproduction in vertebrates typically requires dramatic expansion of the reproductive tract to accommodate eggs and developing embryos. We still do not understand the mechanical properties of these tissues and how they undergo this expansion. Using a live bearing fish species model will hopefully address some of the gaps in our understanding of why this topic is vital to successful reproduction of all live bearing species. Studies have shown that reproductive ability is adversely affected when the endocrine system is unable to perform its normal functions. The scope of this research would be to determine the effects of low, intermediate and high stress conditions on reproductive biomechanics at the different reproductive stages. Using a pressure inducing system we can determine the biomechanical properties of the gonads and reproductive tract. This study will also give more insight to the debilitating

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effects of greenhouse gasses, specifically CO₂ which has the highest output worldwide, on the habitats and reproductive ability of species.

A Comprehensive Analysis of the Nutritional Status of Vitamin D and Zinc Levels Before and During COVID-19 in Children And Young Adults

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As of August 5, 2022, the pandemic of COVID-19 has afflicted 84 million people globally, including children. The effect of vitamin D and zinc on COVID-19 infection and immune response in children will be explored. This study aims to examine the relationship between vitamin D and zinc levels and COVID-19 infection in children, as well as the potential contribution of these nutrients to the immune response to COVID-19. Methodology: This study will assess academic journals using databases such as PubMed, ScienceDirect, and Web of Science. COVID-19, Vitamin D, and Zinc were among the search terms utilized. The quantities of zinc and vitamin D were determined after a thorough examination of the selected articles. Only research examining the prevalence of vitamin D and zinc levels in children with COVID will be included. Results: The review's findings will indicate that vitamin D and zinc levels may be connected with COVID-19 infection and immune response in children. It will also assess the potential significance of these nutrients to the immune response of the body to COVID-19. Expected Outcome: The findings of this review suggest that vitamin D and zinc levels may influence the immune response of children to COVID-19. In addition, readers will be advised to check vitamin D and zinc levels in children, particularly those who are at a higher risk for COVID-19 infection or severe sickness.

Antcestry

Presenter's Name: Shaniya Hampton
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Background: Ants reside in many different locations across the globe and deal with various environmental conditions. Scientists collect and identify ant specimens to aid the Barcoding U.S. Ants Project in maintaining an up-to-date

geographical database. Methods: In order to determine ant species in the region, ant samples were collected from Howard University's campus, DNA was extracted, and the CO1 gene was amplified via PCR. The samples were sent to GENEWIZ for sequencing. Once available, the sequence was analyzed using the DNA Subway bioinformatics platform. Results/Discussion: Using a BLAST search, comparable sequences provided taxonomic identification of the ant specimen collected as *Aphaenogaster Tennesseeensis*, a relatively uncommon species of the genus *Aphaenogaster*. This species is native to the United States and Southern Canada. Using bioinformatics, citizen scientists can analyze the DNA of various species and serve as a crowdsource for widespread and ecologically important studies. This information can be used to develop an understanding of micro-evolution in species and further progress the complexity of range maps and habitats.

Identification of Yellow Dock herbal supplement contents using DNA barcoding technology

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Herbal supplements are increasingly available from a wide variety of vendors. Some consumers may question the accuracy of the identification of the plants inside these supplements. We employed DNA barcoding technology to screen six different yellow dock herbal supplements for presence of plant DNA. After DNA extraction, samples underwent PCR to amplify the *rbcL* gene region. We were able to amplify DNA from 3/6 samples. We compared the sequences of the samples we isolated against the NCBI Blast database to identify the most likely plant species identification.

An analysis of the Various Ant Species Living on Howard University's Campus

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Background: Washington, DC is home to about 100 species of ants, each with its own unique characteristics. Goal: The main goal was to identify what specific species may be

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residing on Howard University's campus. Methods: As part of this experiment, ants were collected around the university in Washington, D.C. DNA analysis was performed to identify and sort the species of ants gathered. With the use of gel electrophoresis the results of the PCR reaction were visualized to assist in understanding of the process. Additionally, DNA Subway was used for sequence building and comparing it to thousands of known DNA sequences to better grasp which species the ant could belong to. Results: The ants were collected, analyzed by PCR and gel electrophoresis, and DNA Subway was used to identify the species to most likely be *Brachyoponera Chineseis*. Conclusion: *Brachyoponera Chineseis*, otherwise known as Asian needle ants, have a dark brownish-black color, with orange-brown mandibles (appendages near their mouth), legs, antennae, and stingers. Asian needle ants are originally from Japan, China, and Korea. Currently, these ants are also found in the Nearctic, Oriental, and Australian regions. It's likely that they were accidentally brought to the United States in the 1920s or 1930s due to human activities. This species is invasive in the United States, especially in the eastern states, including Alabama, Georgia, Virginia, and the Carolinas.

Cannabinoid receptor-mediated synaptic signaling and neural plasticity in central olfactory neurons

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Our understanding of the endocannabinoid (eCB) signaling system and cannabinoid receptor type 1 (CB1R) in olfactory processing remains limited. eCBs are released from depolarized principal neurons and rapidly diffuse to presynaptic inhibitory interneurons to transiently reduce presynaptic firing and neurotransmitter (GABA) release. We study the function of the eCB system in regulating neural activity at synapses in the main olfactory bulb, the first central relay station in the brain for the processing of olfactory information. Our experimental approach uses electrophysiological recording techniques, specifically whole cell patch-clamp recordings. Previously, we showed that CB1R is present in periglomerular processes of a GAD65-positive population of interneurons but not in mitral cells, key output neurons. We detected eCBs in the mouse main olfactory bulb as well as the expression of CB1R and other genes associated with the cannabinoid signaling system. Mitral cells and tufted cells in the olfactory bulb are computational elements in brain circuits that integrate incoming signals with membrane properties to generate behaviorally relevant synaptic output. Our data show that cannabinoid mediated retrograde signaling is present in neural circuits involving mitral and tufted cells. These cells release eCBs and, through

retrograde signaling, inhibit presynaptic interneurons such as periglomerular cells and GABA release of these presynaptic neurons. This, in turn, allows mitral and tufted cells to temporarily regulate their synaptic input and relieve them from synaptic inhibition. eCBs function as retrograde messengers to regulate neural signaling and mediate plasticity at olfactory bulb synapses with potential effects on olfactory threshold and behavior.

Evaluating Perceptions of the Effectiveness of a Community Advisory Group for Stroke Education & Prevention Initiatives in an Underserved Community

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Health disparities are the issue of inequitable health conditions and treatment of a particular population directly related to the historical and current unfair social determinants of health. (Centers for Disease Control and Prevention, 2020) In North Philadelphia, zip codes 19132, 19133, and 19121, hospitals, community groups, and researchers are seeing a considerable uptick in stroke symptoms such as hypertension, high blood pressure, diabetes, and full strokes in Black Americans, as compared to any other section of the city of Philadelphia. There is a 20-year life expectancy difference between a person living in North Philadelphia vs. other parts of Philadelphia. The Frazier Family Coalition for Stroke Education and Prevention (FFC) is the Collaborative's community-focused stroke reduction initiative in partnership with Jefferson and Temple Health. It is led by the FFC Community Advisory Group (GAP), consisting of community stakeholders representing the people we serve. To better the FFC's stroke reduction methods, the team used information gathered from the CAG members in a one-hour focus group using 7 product improvement questions to improve quality collaborative outputs. The aims were to build morale, assist in defining clear goals and objectives, and identify areas that limit quality outcomes. The findings for superior collaborative outputs include being better at meeting the people where they are, more consistency, better ability to attract people, defining clear goals, and building community trust. The data presented in this paper will provide an essential resource for other organizations and researchers looking to reduce healthcare disparities amongst underserved communities.

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Relationship Between Prostate Cancer Rates and the SDOH in Delaware's African American Men

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There's a long history of mistreatment toward marginalized groups in the U.S. healthcare system. This is attributed to not only the lack of cultural competency of healthcare providers but also to outside factors that affect the marginalized individual's daily lifestyle. The Department of Health & Human Services defines these factors as the Social Determinants of Health (SDOH): economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context. This study focuses on the relationship between the SDOH and their impact on the prostate cancer incidence rates of Black men in Delaware. According to the American Cancer Society, prostate cancer is the most commonly diagnosed cancer among Black men. The writer, hailing from Delaware, sought to find how built environment and health care quality specifically affect the prostate cancer incidence rates of African American men in New Castle County. The methods included collecting and cleaning various databases for statistical proof of the correlation between the SDOH and prostate cancer incidence and death rates. The numbers showed that there is a direct correlation between the SDOH and the cancer incidence rates of African American men. The neighborhoods in New Castle County predispose its members to obesity, alcoholism (both major risk factors for prostate cancer), and food insecurity. Additionally, African American men are less likely to be made aware of prostate screening tests and preventative care. With these discoveries in mind, professionals can move toward a better, more equitable healthcare system.

SroA Regulates Staphyloxanthin Pigment Synthesis in Staphylococcus Aureus

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Staphylococcus aureus is a pathogen notorious for causing serious infections worldwide. Its ability to evade host immune defenses and develop antibiotic resistance allows it to persist and spread in hospitals and communities. Without new treatment strategies, antibiotic-resistant *S. aureus* infections

are projected to become a leading cause of death worldwide. Characterizing novel virulence factors or regulators of virulence factors will assist us in developing new treatments. A critical virulence factor for *S. aureus* immune evasion is the carotenoid pigment Staphyloxanthin (STX). STX enhances the ability of *S. aureus* to cause invasive infections with high mortality, including sepsis and bacteremia. STX protects *S. aureus* from reactive oxygen species released by phagocytic immune cells and is essential for pathogenesis. The multi-step biosynthesis of STX is encoded by the crtMNO PQ operon, which is primarily regulated by the alternative sigma factor SigB. However, additional regulatory factors likely exist but remain undiscovered. We recently discovered a novel *S. aureus* protein, SroA, that may act as a major effector of virulence. We created a mutation in *sroA* and noticed that the cells exhibited increased pigment. This led us to hypothesize that SroA may act to modulate STX synthesis in *S. aureus*. To confirm the SroA effect on STX synthesis, we methanol extracted STX from wild type and *sroA* mutants and quantitatively measured them. Our results demonstrate a statistically significant (P -value < 0.001) increase in STX amounts in *sroA* mutants, suggesting that SroA regulates STX synthesis in *S. aureus*.

The Conditional Deletion of NIPP1 in the Liver Drives an Imbalance in Iron Homeostasis

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Protein phosphatase 1 (PP1) is a serine-threonine (Ser/Thr) phosphatase composed of a catalytic subunit (PP1 α , PP1 β , or PP1 γ) associated with one or two regulatory subunits that define its cellular localization, catalytic activity, and substrate-specificity. The nuclear inhibitor of PP1 (NIPP1) is a major nuclear regulatory subunit of PP1, which associates with about half of the nuclear PP1. PP1-NIPP1 interaction is driven by RVxF NIPP1-helix motifs located in the central and C-terminal domains of NIPP1. PP1 interaction with NIPP1 is regulated by phosphorylation of the adjacent serine residues and acetylation. In this study, we use NIPP1 knockout mice (KO) with the NIPP1 deletion in the liver. We conducted a global proteomic analysis of NIP1 KO livers compared to WT liver and detected changes in the protein expression of ferroportin (FPN) and transferrin receptor (TFR), which play a role in iron homeostasis. Real-time quantitative PCR and western blot were used to further examine mRNA and protein expression levels of liver proteins involved in iron metabolism. We observed increased expression of TFR and ferritin heavy chain (FTH) and decreased expression of FPN and hephaestin (HEPH) in NIPP1 KO mice. These findings suggest a decrease of intracellular iron in the NIPP1 KO liver.

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Thus, PP1 may play a yet unrecognized role in regulating iron homeostasis. As NIPP1 deletion causes a significant imbalance in iron homeostasis, deregulation of PP1-NIPP1 holoenzyme may serve as a potential therapeutic approach for diseases that lead to liver iron overloads such as alcohol-related liver disease or hereditary hemochromatosis.

MiaA is necessary for GroS and GroL expression in E. coli upon heat shock

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RNA modifications are chemical additions or isomerization of one of the four canonical nucleotides within RNA. RNA modifications play a significant role in promoting translational fidelity by preventing translational errors such as frameshifting or ribosome stalling. These RNA modifications promote stability of tRNAs as well. One specific tRNA modification that we are investigating is the i6A37 tRNA modification, catalyzed by the tRNA prenyl transferase enzyme, MiaA, in the bacterial genetic model organism *Escherichia coli* K12. Previous work in our lab demonstrated that MiaA is necessary for the full expression of the alternative sigma factor RpoS, which mediates a stationary phase and general stress response in *E. coli*. Subsequent studies demonstrated that MiaA was necessary for UUX-Leucine decoding in RpoS and other global regulators such as Hfq and IraP. Mia modified tRNAs recognize UUX codons, we hypothesized that elevated UUX synonymous codon usage may be a genetic marker for MiaA sensitivity during gene expression. Due to a previously reported sensitivity for miaA leuX double mutants to heat shock, we decided to use heat shock genes to test this hypothesis. We analyzed UUX codon usage in *E. coli* heat shock genes and identified several genes with elevated UUX-Leucine and Serine codon usage, including major heat shock proteins groS (Hsp10) and groL (Hsp60). We measured groS and groL expression using reporter fusion analysis and western blot. GroS and GroL expression was decreased during heat shock and amino acid starvation in the absence of miaA.

The Impact of Inadequate Access to Quality Clinical Care on Lung Cancer Mortality Rates

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The leading cause of cancer death in the United States is not colon, breast, or prostate cancer, but lung cancer. Each year, more people die of lung cancer than colon, breast, or prostate cancer combined. Previous research reveals that lung cancer screening reduces lung cancer mortality; but, health disparities and inequities in the United States reveal individuals from vulnerable communities face difficulty accessing quality clinical care that would reduce mortality rates. In Maryland, Baltimore City has over 300 reported lung cancer cases annually and is ranked #2 in Maryland for the highest lung cancer death. However, only 30 minutes away from Baltimore City: Howard County ranked last for the highest lung cancer death in Maryland, with few deaths related to lung cancer. Therefore, this study evaluated how inadequate access to quality clinical care related to lung and bronchus cancer mortality in South Baltimore City. Comparative data analysis was performed with data sources; County Health Rankings, State Cancer Profiles, and MD iMAP on South Baltimore City and Howard County to focus on hospital proximity and choice, preventable hospitalization rates, number of patients per primary care physician (PCP), cancer mortality rate, etc. The analysis revealed that Baltimoreans lack autonomy over preferred clinical care, minimal continuity of care and quality time with physicians, and disparities in proximity to quality hospitals. Such challenges limit Baltimoreans from receiving referrals for treatment, receiving treatment in general, and detecting their lung cancer, which contributes to such high lung cancer mortality and incidence rates in South Baltimore City.

The effects Environmental Disturbances have on the Biodiversity of Ants at Howard University

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Ants are very common and vital components of ecosystems and there are over 20 quadrillion ants on Earth. These organisms are highly responsive to environmental changes such as human impact, natural disasters, and animal interactions.

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The Barcoding US Ants Project uses its innovative technology in collaboration with scientists to efficiently study diversity between species of ants. In the Fall, ants on the Howard University campus were collected, cataloged, and their DNA was extracted. The COI barcoding gene was amplified using PCR and sent for sequencing to determine their taxonomic identity. The DNA sequence was analyzed with the BLAST and DNA Subway bioinformatics tools to discover closely related ant species. A combination of sequence alignments and phylogenetic trees revealed *Monomorium minimum* as the species closest to the specimen's sequence. DNA barcoding is a versatile methodology that is helpful in displaying biodiversity between Formicidae species throughout the world. Therefore, scientists can use these tools to determine the evolutionary spread that ants on campus undergo over time in response to environmental changes.

Elucidating the role of TCR expression in Mycosis Fungoides: A Preliminary Analysis of Skin of Color biospecimens from Howard University Department of Dermatology

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Presentation Type: Poster Presentation

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Coauthors: Nina Nwade, Sachi Desse, Akanksha Nagarkar, Ummugulsum Yildiz-Altay, Ginette Okoye, Jillian Richmond, Angel Byrd

Mycosis fungoides (MF) is the most prevalent Primary Cutaneous T Cell Lymphoma, comprising up to 60% of known cases. It is primarily a disease of resident memory T-lymphocytes that undergo phenotypic changes due to several gene alterations including ones coding for T-cell receptor (TCR) expression. The upregulation and downregulation of TCRs may give insight into the complex etiology of MF. There is a clear discrepancy in the morbidity and mortality of MF in the skin of color (SOC) population due to several factors including delayed diagnoses, biological differences, and limited research. Differences in the physiology of skin of color can cause atypical presentations, causing delays in diagnosis and higher mortality. Therefore, further investigation into the molecular physiology of MF is warranted to better understand disease presentation, progression, and therapies for SOC patients. Previous studies have identified the most common TCRs present in predominantly White cohorts including TCRVb3, TCRVb5, TCRVb6, TCRVb7, TCRVb20 and TCRVb21. Using MF biopsies from SOC patients at Howard University, we analyzed lesional TCR gene expression and compared it to healthy SOC patients with the goal of considering novel therapeutic targets and analyzing how these molecular findings impact diagnosis and treatment. Preliminary data shows that TRBC1 and TRBC2 are enriched in MF SOC patients whereas TRBV7-8 was enriched in the healthy margins. Because TCRs can be used as

a biomarker to identify MF, this knowledge has the potential to aid in the early diagnosis of MF, thus improving the disparity in outcomes seen in patients of color.

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With the rise of antibiotic resistant bacteria, scientists have begun to explore alternative forms of treatment for bacteria related infection. One of these alternatives is the application of bacteriophages (viruses that infect bacteria) as a treatment option for bacterial infection. To aid in phage discovery the Howard Hughes Medical Institute established the SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) program that trains students to discover, isolate, and characterize phages from the soil of their college campus. The discovery program is divided into two main parts: the bioinformatic analysis of phage genomes and the first, which entails the collection, purification, and amplification of novel virions from environmental samples. As a part of this program we discovered the phage Aikoy using *Mycobacterium Smegmatis* as a host bacterium. *Mycobacterium smegmatis* is in the same family of pathogenic bacteria such as Tuberculosis and Leptrae. We then sent isolated Aikoy genomic DNA and sent it to The Pittsburgh Institute to be sequenced. The genome sequenced for our research was a bacteriophage by the name of Aikoy. The sequencing revealed that Aikoy belongs to the AE cluster. Other members within the same cluster include Leopard and Onyinye. Aikoy has a genome length of 71626bp, which is the longest amongst AE cluster. All members of the AE cluster had a GC Content of 58.8%. We currently are in the process of annotating the genomic sequence to further characterize Aikoy.

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A Conceptual Framework of Type II Diabetes Mellitus and Alzheimer's Disease in African Americans

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Chronic Type 2 Diabetes Mellitus (T2DM) has become a serious health concern and is gaining prevalence globally. In the United States, African Americans are being affected at a disproportionate rate of the condition compared to other ethnic groups. The understanding of how the disease affects vulnerable populations is hindered due to a lack of empirical evidence (reported incidences) regarding its relation to metabolic syndrome. Our earlier findings have indicated that T2DM to an increased risk of developing Alzheimer's Disease (AD) by identifying signature genes with overlapping genetic pathways, e.g., neuroinflammation, beta-amyloid deposition, and mitochondrial dysfunction with significant signs of cognitive impairments associated with AD. In continuation with the previous study, we investigated the β -amyloid precursor protein (APP) pathways and cholesterol biosynthesis-related genes using qRT-PCR based profiler array. The pathophysiology of the two diseases was assessed and validated for each T2DM participant using Ingenuity Pathway Analysis (IPA). We identified Amyloid Processing, Neuroinflammation Signaling, ERB4 Signaling, Interleukin signaling, and nNos signaling as the top canonical pathways. The top diseases and their functions depicted from our results were Metabolic disease, Neurological disease, Organismal Injury and Abnormalities, Psychological disorders, and cardiovascular diseases. APP, IL18, PSENEN, and MAPK are the signature molecules (key genes) that are differentially expressed in APP pathways. The results paved the way and suggested that controlling T2DM may be crucial in reducing the risk of developing AD in chronic diabetic in African American patients. Further studies with other ethnic groups included would be of interest to better understand AD pathogenesis.

Cherry Blossom Road: The Ant's Perspective

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Ants are able to assist in the enrichment of plant life in Washington, D.C. They introduce air into the soil by digging tunnels that carry oxygen, water, and nutrients to the plant roots. Ants also tend to produce honeydew when feeding on the sap of Cherry Blossoms, which are common in Washington, DC. The goal of this study was to collect ant samples from two different locations in the Valley of Howard University campus in order to compare, examine and extract their DNA to identify the specimens as either invasive or native species. The samples were collected with ethanol from a flower bed and a nearby sewer within the valley. Following the capture of the ants, a chelex solution was used to extract the DNA from the ants. After extracting the DNA it was sent over to another institution's laboratory to identify the sequencing of these ants. Once the DNA was acquired, we used bioinformatics analysis. In addition to the analysis, DNA Subway was used to create the DNA barcode for our specimen. Along with the use of the blast search to identify similar species in reference to the DNA sequence of our specimen. With the utilization of all these resources, we were able to identify the genus and species of our specimen. Which consisted of the genus being *Monomorium* and the species being *Monomorium minimum*. With this data, scientists can determine how similar our specimen is to other organisms with collected taxonomic information and our DNA sequence.

Exploring Ant Diversity at Howard University: DNA Barcoding Investigation Ant Species

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Ants are important ecological insects that are essential to many ecosystems. Due to their diversity, ants can be difficult to differentiate solely based on morphological characteristics. In this study, DNA barcoding was used to identify ant species based on the sequencing of the mitochondrial COI gene. Ant specimens were collected from various locations at Howard University's campus, and their DNA was extracted, amplified

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by PCR, and sequenced. The obtained sequences were analyzed using DNA Subway bioinformatics tools, such as sequence alignment software, BLAST and MUSCLE to compare with the NCBI database to identify the species. The data shows that the sequence has a high probability of belonging to *Lasius neoniger*, due to a high bit score (1166), sequence similarity (100%), and proximity in the phylogenetic tree. Commonly known as the “Black-Headed Ant”, *Lasius neoniger* is native to the United States and is found in eastern parts of the country. The results demonstrate that DNA barcoding can complement traditional morphological identification methods and provide a faster and more accurate means of identifying ant species. This study highlights the potential of DNA barcoding in species identification and its application in ecological and evolutionary studies.

Keywords: Ants, DNA barcoding, identify

Targeting the JAK/STAT signaling pathway in Hidradenitis Suppurativa: From Bench to Clinic

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Hidradenitis suppurativa (HS) is an inflammatory skin condition characterized by painful nodules and boils in the apocrine gland-bearing regions, such as the axillae, groin, anogenital, and inframammary areas. Though the etiology is unknown, studies have shown cutaneous immune reactions occur around the hair follicle. Ongoing investigations exploring the involvement of cellular immunity in the pathogenesis have shown that circulating factors such as neutrophil extracellular traps (NETS), B cells, and type I interferons promote the inflammation and dysregulation in HS lesional tissue as well as the prominence of CD68+ macrophages. New therapies utilizing Janus kinase (JAK) inhibitors demonstrate improved clinical status and quality of life in HS patients. Yet, there is a paucity of research explaining JAKs involvement in the local and systemic inflammation seen in this condition. Here, we focus on the JAK-STAT pathway to understand its role and determine its potential to transduce intracellular signals contributing to HS pathogenesis and severity. RNA-sequencing (RNA-seq) was done to profile the gene expression in African American lesional HS tissue, Hurley stages 1-3. Preliminary analysis found a significant upregulation of genes in response to IFN γ and IFN α in all Hurley stages of HS. Specifically, in Hurley stages 2 and 3 there was a significant upregulation of genes regulated by NF- κ B in response to TNF α as well as an upregulation of genes by IL-6 via STAT3. Our data supports that the JAK-STAT pathway has a central role in HS pathophysiology.

RNA-seq profiling of HS tissue to determine the precise mechanisms driving disease severity will aid in tailoring optimized treatments.

Differentially Expressed Viral and Interferon-Regulated Genes in Multiple Sclerosis Patients

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Though widely studied, the underlying cause of multiple sclerosis is still unknown. As such, MS and its resulting complications can only be decelerated with therapies, the most common being Type I interferon (IFN) drugs. In recent research, the notion of a viral cause for MS has experienced a resurgence. To investigate the linkage of viruses and MS, we identify differentially expressed genes (DEGs) with an antiviral response in MS patients, thus allowing us to show viral genes and their interactions with interferon-regulated genes (IRGs) in Type I IFN-treated MS patients compared to untreated MS patients and healthy controls (HC). Total RNA from peripheral blood mononuclear cells (PBMC) samples from 30 IFN-treated MS patients (20 RRMS and 10 SPMS), 10 untreated MS, and 10 healthy controls were assayed with highly sensitive Clariom D microarrays. Global gene expression was detected at baseline, 4-6 hours, and 24 hours post-IFN injection. DEGs were then analyzed using the Transcriptome Analysis Console (TAC), Interferome, and Gene Ontology software to identify genes that associate the antiviral response and transcriptional profiles. We selected IRGs and antiviral genes that are potentially significant in different forms of MS and in treated vs. untreated MS to study as a means to help us better understand Type I IFN- regulated antiviral response during MS treatment. From this analysis, we conclude that interferon therapies can be greater understood through gene expression and that a significant amount of differentially expressed genes we identified are interferon-regulated or otherwise connected to antiviral response.

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DNA Barcoding Abstract

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Ants are one of the most abundant and diverse groups of insects on the planet, with over 12,000 species identified so far. Understanding the evolutionary relationships among these species is a complex task due to the vast number of taxa and the lack of easily observable morphological differences. Molecular methods, specifically DNA sequencing, have revolutionized the field of systematics and have become a powerful tool for identifying and studying species. In this experiment, the purpose was to collect ants from different locations and visualize their DNA to create phylogenetic trees that could identify the identity of the specimens. The DNA was extracted from the collected ants and sent to a laboratory for sequencing. The sequenced DNA was then analyzed using bioinformatics tools, such as DNA Subway and BLAST, to match the sequences to known insect species in public databases. Phylogenetic trees were created from the DNA sequences to visualize the evolutionary relationships among the ant species. These trees allowed researchers to compare the genetic similarity between species and determine their ancestry. By comparing the DNA sequences to known insect species, the researchers were able to identify the species of the collected ants. Overall, this experiment provides insights into the diversity and evolution of ants and demonstrates the power of molecular methods for identifying and studying species. The results could have important implications for conservation efforts and understanding the ecological roles of ants in different ecosystems.

Investigation of the Role of Holliday Junction Resolvases in the Repair of Retrotransposon Integration

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Transposable elements are discrete mobile DNA elements that can move around the genome from donor sites to new genomic positions. During integration, transposable elements such as long terminal repeat (LTR) retrotransposons and the closely related retroviruses, generate single-stranded DNA gaps that flank integration sites. These gaps need to be repaired for transposition to be completed. However, little is

known about the mechanism of repairing these gaps for any of the transposable elements. My research seeks to understand how these single-stranded gaps are repaired. This is highly significant because a fundamental understanding of this repair can perhaps identify a universal mechanism among transposable elements and retroviruses. This understanding could help with the development of HIV/AIDS interventions and the development of retroviral vectors with efficient delivery. Effective antiretroviral therapy can consequently be applied to the treatment of cancer. My hypothesis is that Holliday Junction resolvases contribute to transposition by resolving Holliday Junctions (four-stranded recombination intermediates) that result when replication forks convert the DNA single-stranded gaps formed during transposition into double-stranded breaks. Some of the Holliday Junction resolvases we tested include Eme1, Mus81, Rqh1, Slx1, and Slx4. I used an LTR retrotransposon in fission yeast, *Tfi*, as a model system for the study of this gap repair because of its similarities in replication mechanism to retroviruses like HIV-1 and because of the established genetic methods in fission yeast. We found that Eme1 significantly reduces transposition and Rqh1 significantly increases transposition. We further proposed a novel DNA repair mechanism involving the resolvases tested.

Battling Body Image with Nutrition

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Positive body image and maintaining a healthy lifestyle are two very important topics that work hand in hand with one another. Due to its complex nature, researchers have developed various techniques to explore the relationships that body image has with body dissatisfaction and nutritional status because about 24.2% of middle and high school students have body image misperception, in which they consider themselves obese regardless of normal BMI (Lee et. al, 2021). Body image is defined as the way one sees, experiences, and feels about their own body when looking in the mirror or scrolling through pictures, but this perception is easily influenced through social media and the want for an unrealistic body type, but proper nutrition education can counteract these misconceptions. Researchers speculate that people who have higher amounts of negative body image and have not received basic nutrition education will have unhealthy eating habits and behaviors. The purpose of these studies is to learn more about the relationship between body dissatisfaction and nutritional status and to understand if and why there's a relationship between social media use in adolescents, nutrition knowledge, and eating behaviors. A negative perception can hinder healthy

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adaptative eating and potentially leads to eating disorders, such as bulimia nervosa or anorexia nervosa. Although the use of social media within health care is still being thoroughly researched, health care professionals strive to improve health and nutrition care delivery among adolescents and young adults to “offer powerful insights into the lives of young people” (Chau, 2018).

Genetic Variations Affecting ACE2 Protein Stability and Binding Affinity in Minority Populations

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The Angiotensin-Converting Enzyme-2 (ACE2) is the primary target of the spike (S) glycoprotein of SARS-CoV-2 enabling entry into the human body. The genetic variations affecting African/ Latin Americans need further investigation due to a rise in mortality rates within these ethnic groups. For this study, we applied computational saturation mutagenesis approaches to determine the which ACE2 mutations affect protein stability and binding affinity in ACE2- S complexes in the SARS-CoV-2 wild-type and Omicron strains. We observed the missense mutations in ACE2 residues D30 and N330 causing an increase in binding affinity in both complexes. We also identified ACE2 genetic variations in African Americans (rs73635825, rs138390800, and rs766996587) and Latin Americans (rs73635825 and rs781255386) affecting binding affinity in both complexes. Our findings in this study can aid in designing more stable neutralizing peptides to treat patients from underprivileged ethnic groups.

Re-evaluation of Phocidae Auditory Terminology, Emphasizing Osteology of the Ossicular Chain and Middle Ear

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Research on the auditory apparatus morphology of pinnipeds, which include the Families Phocidae (true seals), Otariidae (sea lions and fur seals), and Odobenidae (walruses), is extremely limited. Initial studies on the auditory region and surrounding basicrania reveal evolutionarily conservative features and an incomplete literature record due to incorrect anatomical terminology, inaccurate information, and indistinct, outdated

illustrations. Clarification of auditory terminology and distinct morphologies will allow direct comparisons of semiaquatic pinnipeds to other completely terrestrial and aquatic carnivorans. An extensive literature survey revealed the lack of modern anatomical studies on the middle ear ossicles of pinnipeds. This study utilizes innovative imaging techniques, osteological measurements, and morphological assessment on the middle ear ossicles and the internal auditory anatomy of phocid specimens. Phocid specimen comparisons were made with other terrestrial carnivorans such as Ursidae (bears), Canidae (wolves and dogs), and Mustelidae (weasels) from the Smithsonian National Museum of Natural History (Washington, D.C.) and the Burke Museum (Seattle, WA). Images were processed using specialized photo stacking software. Results confirm that phocid ossicles are extremely derived and specialized for semiaquatic hearing. This level of distinct phocid morphology differs immensely from other terrestrial carnivorans, demonstrating specialized structures even down to the genus level. Currently, it also remains unknown how modern pinnipeds hear in the water at higher frequencies that match those of cetaceans (whales and dolphins). The combination of accurate auditory terminology and new morphological methodology could aid in determining the evolution of semiaquatic hearing and functional specializations of pinniped auditory apparatuses.

DNA Ant Barcoding

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The goal of the lab was to collect ants at a location of our choosing within the parameters of Howard University. From the collection, we can then determine the ants’ species at the collection site through DNA barcoding. The ants were collected through an ant baiting technique. We acquired this technique from Eastfield College Ant Lab. Once the ants were collect, they were stored in a solution and sent to a lab for extraction. PCR was used to amplify the DNA for easier reading. We read the DNA and barcoded it to thoroughly determine the the species.

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The Reproductive Morphology of the Armored Sea Robin

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Fish surveys are vital for understanding characteristics of fish populations. To effectively obtain information about a particular species of fish, it is important to understand the seasonal reproductive patterns of that fish species. The seasonality of the sampling is important because it directly effects what kind of information can be determined. Armored sea robins (*Peristedion miniatum*) are a species of fish that mostly reside at the bottom of the ocean globally. In this study, the reproductive morphology of *P. miniatum* was observed for fish sampled in October of 2016. Our goal was to determine if the fish were reproductively mature by the time they were caught. We determined the level of reproductive activity of 28 individuals by analyzing the Gonadosomatic Index (GSI), which utilizes the ratio of gonad weight to body. Based on their GSI, we determined that most of these armored sea robins were reproductively mature but were not reproductively active at the time they were caught. However, there was a direct correlation between the gonad weight and body weight of the male armored sea robins sample. The female sample of the armored sea robins possessed no correlation. We predict that if these individual armored sea robins were caught closer to their reproductive season, there would be a significant correlation between gonad weight and body weight in both male and female fish, as they maximize the capacity of their gonads for releasing gametes.

Effect of Plant-based Diets on Hypertension in Black Men

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Introduction: Hypertension, one of the most prevalent diseases in the country, continues to pose a major medical and financial burden on the healthcare system. It is estimated that 54% of strokes, and 47% of coronary heart diseases are attributed to high blood pressure. As for the financial burden, it is estimated that blood pressure related costs total 131 to 198 billion dollars annually. The burden of high blood pressure becomes even more severe when the population of black people, specifically black men. The rate of hypertension within African Americans was 56% which is nearly 10% higher than

the national average. There have been various diets that have been recommended, such as the D.A.S.H diet, the paleo diet, and the Mediterranean diet. Research suggests that a plant-based diet could potentially be beneficial in reducing high blood pressure in these populations. Therefore, the purpose of this research is to analyze the effect that a plant-based diet has on the blood pressure levels of African American men. Methodology: A systematic review was conducted using multiple articles that examine the relationship between plant-based diets and hypertension. Keywords include "plant-based diets and hypertension", "effects of plant-based diets on hypertension in black men" and "effect of plant-based diets on hypertension". Expected outcome: The research showed that consumption of a plant-based diet is associated with statically significant lowered blood pressure. Future research will look into the exact mechanisms by which plant based diets reduce high blood pressure.

DNA Barcoding of Ants from Different Species in the D.C. Area

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The environment depends heavily on ants. The environment depends heavily on ants, many of which are essential for aerating the soil, adding nutrients, and providing plants with oxygen and water. Having a greater understanding of the locations and patterns of ants can help to chart environmental predictions. A large variety of ant species live across the United States, and they can be differentiated by phenotype but can be more accurately identified by observing DNA. The Barcoding US Ants project combines participatory research with DNA barcoding in order to increase the accuracy of ant range maps throughout. An ant sample was collected, DNA was extracted using the Chelex method, PCR was performed on the COI gene, then the sample was sent off for sequencing. For further analysis, bioinformatics programs, DNA Subway and BLAST, were used to identify which species of ants were collected. The DNA Barcoding project has advanced the work of scientists nationally, in their observation of ant species; their behavior, and living conditions across various regions.

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Identifying and Characterizing Bacteriophages: Deenasa and Devonte

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Bacteriophages are viruses that infect bacteria. Phages can be used for medical treatment, research advancement, phage therapy, ecology, and many other scientific endeavors. Through the isolation and characterization of mycobacteriophages from soil samples collected on the Howard University campus, this project's goal is to investigate the diversity of phages. Deenasa and Devonte were two of the phages sampled from the soil on Howard University's campus and the bacterial host used was *Mycobacterium smegmatis* MC2 155. This host is significant due to its similar genus to *Mycobacterium tuberculosis*, which causes the tuberculosis disease. The purpose of phage research is to expand the diverse catalog of phages that have been discovered at Howard University along with other phage discoveries. The phage samples were put through isolation and purification, high-titer lysates were generated from which phage DNA was isolated. The genomes were sequenced at the Pittsburgh Bacteriophage Institute, on the MiSeq platform (Illumina Sequencing). The phages Deenasa and Devonte are a part of the B3 subcluster. Deenasa contains 69,888 base pairs and has a 67.5% G+C content. Devonte contains 68,301 base pairs with a 67.6% G+C content. Phage genome annotation is currently on going where PECAAN and DNAMaster and been used for that purpose. The study of bacteriophages will advance our understanding of the evolutionary mechanisms by which bacteriophages have grown to be so diverse and will benefit from the acquisition and understanding of genomic information from a wide variety of clusters, including those that are currently underrepresented.

TGF- β 1 Signaling Pathways in Progression of Non-Alcoholic Fatty Liver Disease in African Americans

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Background: The non-alcoholic fatty liver disease (NAFLD) is the most common chronic liver disease globally and is a concern among African Americans (AA) in the United States because of health disparities. TGF- β 1, one of the three isoforms of TGF- β family has significant role in HSC activation and extracellular matrix production, which further contributes

to the progression of NAFLD. Current study aims at the role TGF- β 1 pathways in the progression of NAFLD and the downstream comorbidities among AA individuals. Methods: Altogether, 47 AA individuals (NAFLD=23, Health control=24) were registered in our study. Sociodemographic, lifestyle exposures, and medical information were recorded. Global gene expressions for transcriptional analysis were performed coupled with Ingenuity Pathway Analysis (IPA®) to understand the key disease pathways involved in the progression of NAFLD disease. Results: Total 2.5% of genes (n=535) were differentially expressed (at >1.5 or <1.5 fold change) out of which 67.4% and 32.5% of genes were significantly (p-value <0.05) up- and downregulated respectively. Downregulation of TGF β 1 highlighting Hepatic Fibrosis Signaling Pathway, Hepatic Fibrosis, Hepatic Cholestasis were the top canonical pathways (p-value <0.0001), that corresponds to top bio-functions, viz., Proliferation of hepatic satellite cells, Progressive hepatic fibrosis, and Acute-Chronic Liver failure. The study emphasized Liver Inflammation, Liver Cirrhosis, among top toxicological outcome with an indication of developing liver cancer in the future. Conclusion: The genes in networks which are dysregulated in AA patients with NAFLD gave us a good clue about forwarding our knowledge in developing biomarker to detect possible risks and the disease state.

Comparison of Renal Function Estimators and their Impact on HIV Pharmacotherapy Eligibility

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The purpose of this research is to determine eligibility discordance in HIV pharmacotherapy upon using the 2021 CKD-EPI GFR estimator without the race variable, in comparison to previous estimators including 2009 CKD-EPI and MDRD. This can allow clinicians to assess and treat a wider variety of HIV patients more appropriately. Retrospective chart review investigating the implication on clinical decision and HIV medication management caused by implementation of the 2021 CKD-Epi without race, in Black Americans. The population consist of HIV infected patients managed at Howard University Hospital Infectious disease clinic between January 1, 2019-August 31, 2022, and on antiretroviral therapy. The objective is to project eligibility discordance in HIV pharmacotherapy using the 2021 CKD-EPI GFR estimator without the race variable, in comparison to previous estimators including 2009 CKD-EPI and MDRD. To determine eligibility based on real-world data, when using the 2021 CKD-EPI GFR estimator without the race variable, in comparison to previous estimators including 2009 CKD-EPI

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and MDRD. The eGFR computed will be compared to CrCl values using the Cockcroft-Gault equation. Results: 100% A.A. population. Med. age 51 y/o, 62% male, and avg. Scr of 1.12. CG and 2021 CKD-EPI were shown to have the same eGFR of 81. 2009 CKD-EPI was higher at 89, and MDRD was 84.6. ART with a renal threshold of 50ml/min had differences among eligibly when comparing the renal estimators. 5% of pateints were ineligible for stribild but 8% were ineligible when comparing CKD-EPI equation with and without race.

Interaction of Catechol-O-Methyltransferase (COMT) Val158Met with neuropsychiatric and opioid use disorders in a cohort of African Americans

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COMT catalyzes the metabolism of dopamine (DA) and other catechols in the brain. We investigated the connection between COMT Val158Met allelic variation (rs4680, A118G) which confers decreased DA uptake at the synapse and is associated with some behavioral health problems, in context of race and gender. 119 individuals (103-African ancestry, 16-European) with and without opioid use disorder (OUD) were genotyped for Val158Met, and revealed no association of allele number with OUD diagnosis. The expression of Val158Met was scored as 0, 1 or 2. When assessed based on ancestry, Blacks expressed mostly 1 or 2 alleles (1.28; SD = 0.68) whereas the inverse was true for Whites with mostly 0 alleles (0.69; SD = 0.70). Psychiatric domains such as Depression, Anxiety, Trauma and Lifetime suicide were scored on a 0- 4 symptom-rating scale. A generalized linear regression model for association between COMT Val158Met and psychiatric domains revealed a negative association with Depression for 0 vs. 1 (estimate = -0.92, SE = 0.34, p = 0.01) and 0 vs. 2 alleles (estimate = -1.00, SE = 0.33, p = 0.005). Furthermore, anxiety was also negatively associated with Val158Met for 0 vs. 1 (estimate = -0.76, SE = 0.38, p = 0.05) but not for 0 vs. 2 alleles (p = 0.10). No significant association with the Val158Met allele was observed for trauma or lifetime suicide. This study suggests people of African ancestry express the Val158Met allele at a higher frequency, and this allele may be associated with decreased depression and anxiety.

Effects of a High Fat and High Fructose Diet on Insulin Signaling in LivARKO Mice via Protein Expression levels of P-AKT

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Polycystic ovary syndrome (PCOS) is one of the most prevalent diseases affecting women of childbearing age. Hyperandrogenism, a common symptom of PCOS, involves action on the androgen receptor (AR) and can induce insulin resistance among 35-80% of PCOS women. Previous studies have suggested that knocking out liver AR can lead to improvements in metabolic and reproductive functions of PCOS. We hypothesize that LivARKO mice on a high fat or high fructose diet will exhibit increased insulin resistance compared to controls, as measured by expression of p-Akt, a protein involved in insulin signaling. Mice were divided into three groups based on an assigned one month diet (control, high fat, or high fructose). Mice were sacrificed and skeletal muscle, white adipose and liver tissue samples were extracted for western blot analysis. LivARKO mice on a 1 month high fat diet (HFD) given insulin displayed significantly decreased expression of phospho-Akt (p-Akt) in white adipose tissue compared to control mice that were administered insulin. Similarly, in liver tissue, LivARKO mice on a 1 month HFD given insulin showed significantly decreased expression of p-AKT compared to control mice administered insulin. Interestingly, LivARKO mice on a 1 month high fructose diet (HFrD) given insulin exhibited significantly increased p-AKT expression in liver tissue compared to control mice given insulin. These results illuminate LivARKO as a potential therapeutic target for insulin resistance in PCOS.

Role of PFKFB3 in Type 2 Diabetes Mellitus

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Type 2 diabetes mellitus (T2DM) is the predominant type of diabetes, accounting for more than 90% of all diabetes cases diagnosed, and it is a heterogeneous and multifactorial disease. African Americans (AA) have a high risk of T2DM and suffer from increasing disparities in the disease burden and adverse health outcomes, compared to other Americans. The 6-phosphofructo-2-kinase/fructose-2,6-bisphosphatase 3

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(pfkfb3) gene encodes for the iPFK-2 enzyme that is involved in glycolysis. Pfkfb3 is involved in several processes and pathways that play a role in T2DM and related complications. Pfkfb3 has been identified as the location of a novel signal for latent autoimmune diabetes in adults (LADA) which is a type of diabetes that has characteristics of both type 1 and type 2 diabetes. We carried out the pathway analysis by Ingenuity Pathway Analysis (IPA®) of Pfkfb3, and 15 related molecules were selected to analyze potential connections between pfkfb3, and networks generated in the transcriptomic data from two participants. Differential gene expression data from two AA participants from the DC area with T2DM were also analyzed with TLDA-384 Well Custom Array in this investigation. The molecular mechanisms and the function of pfkfb3 in modulating T2DM act differently in both the knowledge base and this investigation. Pfkfb3 plays a role in many T2DM-related disease processes and greater understanding of its contribution could lead to better glycemic control for T2DM patients and potential reduction in cancer risk that demands the additional study on the role of pfkfb3 in T2DM.

Folic Acid Supplementation Use Across Different Racial/Ethnic Groups

Presenter's Name: Sofia Ntirampeba
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Introduction: Neural Tube Defects (NTDs) are the second most common congenital malformations in humans. It has been shown that women who had a fetus with NTD were low for the micronutrient, folate. Along with consumption of folic acid through fortified foods, women who are of child-bearing age should consume a folic acid supplement to meet 400 mg/day. Proper use of folic acid supplementation seems to be less common among minorities. The purpose of this study is to examine the impact of folic acid in Black women and the risk of NTD. **Methodology:** This research involves a systematic review of 15 peer-reviewed articles. These articles focus on the consumption of folic acid supplementation amongst women of child-bearing age. **Results:** Since the 1998 US Food and Drug Administration folic acid fortification policy, there has been an increase in folic intake at a population level. However, folic intake levels do not meet the desired goal of 50% of women of childbearing age consuming at least 400 mg/day. Several studies reveal that levels of folic intake vary by race and ethnicity, with Black and Hispanic women having a lower daily folic intake than their white counterparts. **Discussion/Conclusion:** While folic acid fortification in the US has increased the consumption of folate, the use of folic acid supplementation must still occur in order to meet the daily requirement. Public health campaigns should focus on

educating minority groups on the proper use of folic acid supplementation.

Investigating Cutaneous T-Cell Lymphoma Immunopathogenesis and Gene Expression in Skin of Color Patients from Howard University Dermatology

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Mycosis fungoides (MF) is the most common type of cutaneous T-cell lymphoma. There are notable differences in MF presentation in Skin of Color (SOC) versus White skin, such as asymptomatic hyperpigmented and hypopigmented lesions resulting from malignant T-cell interaction from keratinocytes and melanocytes. Therefore, this work aims at elucidating MF immunopathogenesis and gene expression in SOC patients and determining whether clinical presentation differences are dependent on the cytokine type produced by the tumor. We used both hypopigmented and hyperpigmented MF biopsy samples from SOC patients with MF from Howard University Dermatology and compared their gene expression to that of biopsy samples from SOC healthy patients. Preliminary data showed an upregulation of genes such as PRDX1, HLA-DRA, CTNBN1, CSTB, and S100A4 in MF samples versus their healthy counterparts. The MF samples also exhibited downregulation of CCL3, CCRL2, PDGFB, and HOXD4 genes when compared to their healthy counterparts. Lastly, the pathways 'cell cycle and apoptosis', 'antigen presentation', and 'interferon signaling' were increased in MF and decreased in the healthy samples. Overall, these data will elucidate MF gene expression in SOC patients as well as the immunopathogenesis that results in varying presentations. This may facilitate the development of more concise diagnostic criteria and personalized targeted immunotherapies to better health outcomes within a minority population.

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Shear-reversible clusters of HIV-1 in solution: stabilized by antibodies, dispersed by mucin

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The behavior of HIV-1 in culture media was tracked with Dynamic Light Scattering (DLS) and complementary atomic force microscopy (AFM) imaging in the presence of lectins, anti-gp120 Antibodies (Abs), mannosidase, and mucin. After excluding the serum contribution to culture media from extracted DLS data, it is observed that there are clusters/aggregates of about 400-700nm HIV-1 in solutions. The clusters were sheared into single virus particles by filtration but re-clustered back over a short time. It is known that HIV-1 mutates rapidly and is protected by glycan shields of mannose sugars that have challenged the broadly neutralizing of the virus by Abs. In other studies, mannose residues have been reported to be self-adhesive, but it is not known if these mannose adhesions drive HIV-1 to be aggregated in solution, further confounding Ab neutralization. Mannosidase treatment reduced clustering, suggesting the mannose glycan shield is involved in the cluster formation. Mucin molecules (porcine gastric mucin) effectively dispersed HIV-1 clusters, even those stabilized by Abs. It is well known that mucin reduces HIV virulence, but the mechanism has not been clarified. Our findings suggest that mucin inactivates HIV-1 by dispersing its clusters and coating single virus, as opposed to the current perspective that mucin aggregates HIV-1.

Isolation and characterization of subcluster B1 bacteriophages Simielle, DelRivs, Nyala, and Lumine

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The mycobacteriophages, Simielle, DelRivs, Nyala, and Lumine were discovered and studied by Howard university students during the 2022-2023 academic year. The aim of this research was to discover and explore phage diversity on Howard's campus through the isolation, characterization, and bioinformatic study of novel bacteriophages with the intent of expanding the scientific knowledge of bacteriophages. The study of bacteriophages in the host bacterium *Mycobacterium smegmatis* MC2 155 (*M. smegmatis*) is of medical interest as phage-based therapies are being explored

in alternative management and treatment of infections such as *M. tuberculosis*. Using *M. smegmatis* as the host, the mycobacteriophages were isolated from environmental soil samples, purified, and amplified to reveal titers ranging from 2.7×10^9 pfu/ml to 1.0×10^{11} pfu/ml. The bacteriophages were then characterized through DNA isolation and restriction enzyme digests. The DNA samples were sequenced by the Pittsburgh Bacteriophage Institute using Illumina Sequencing. Sequencing revealed that all four mycobacteriophages are lytic, part of subcluster B1, and of the Siphoviridae morphotype. Additionally, they have a circularly permuted genome containing 66.5% G+C-content. Their genome lengths ranged from 68297 to 68551 base pairs. Bioinformatic genome annotation is currently being completed using PECAAN and DNA Master to further characterize the phages identifying their similarities and differences.

Impact of Sleep Quality during Pregnancy

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Introduction: Numerous studies have shown a connection between abnormal sleep patterns and a broad spectrum of adverse pregnancy outcomes, including low birthweight, preterm birth, intrauterine growth retardation, cesarean delivery, gestational hypertension, and gestational diabetes, along with decreased quality of life and higher levels of depressive symptoms. Sleep quality and sleep duration are often compromised in pregnant women and deteriorate over the the course of pregnancy mainly due to physical discomfort and pain. Purpose: The purpose of this study is to examine the impact of sleep quality on pregnant women. Furthermore, the study will examine the impact of sleep health on infant health outcomes. Methods: Using a systematic approach, the study will examine the relationship between sleep quality and health outcomes of pregnant women. The study will extrapolate research articles from 2012-2022 using the keywords, "sleep quality" and "pregnancy". Result: Over 12 articles were reviewed. Discussion/Conclusion: The review is anticipating that better sleep quality has positive associations with healthier maternal and offspring outcomes. Sleep is just as important as nutrition and physical activity in maintaining one's health.

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Nutritional Status and Its Effect on Infection Rates in the Lifecycle

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Malnutrition and infection have always had a complex relationship. The primary cause of immunodeficiency is malnutrition, and we are constantly learning more about the pathophysiology of this interaction. The purpose of this study is to determine the relationship between infection rates and nutritional health and awareness. Methodology This project analyzes the rate and susceptibility of infections over the course of life. Results Malnutrition can increase an individual's susceptibility to infection, and infection can also make an individual more sensitive to malnutrition, creating a vicious cycle. Weight loss, reduced immunity, mucosal injury, pathogen invasion, and impeded growth and development in children are all consequences of insufficient food intake. Diarrhea, malabsorption, anorexia, loss of appetite, diverting resources for the immune response, and urine nitrogen loss all worsen a sick person's nutritional status, resulting in nutrient losses and additional harm to defense mechanisms. Poor immune response to infection is linked to nutritional deficits associated with pregnancy. Breastfeeding is the single best approach to protect babies from infection since it partially makes up for this immune weakness. Malnutrition and nutritional changes, which are frequent side effects of HIV infection, include problems with food intake, nutrient absorption, and intermediate metabolism. These conditions contribute significantly and independently to morbidity and mortality.

Neurogenetic and NeuroPsychiatric Assessment of Co-Morbid HIV and Substance Use Disorder Patients

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HIV+ individuals have faced significant challenges including social stigma, which impact their psychiatric state or their social stability. Many individuals with HIV are also diagnosed with substance use disorder and co-morbid neuropsychiatric problems. The present study evaluates whether HIV interacts with addiction to exacerbate neuropsychiatric disease

presentation and whether risk genes confer susceptibility to addiction or HIV infection. No association exists between genetic addiction risk score or HIV in the study population. Survey instruments such as the life event checklist (LEC), the Addiction Severity Index (ASI) and the Comprehensive Universal Behavioral Health Screen (CUBS) were utilized to generate symptom scores linked to major depressive disorder (MDD) generalized anxiety disorder (GAD), lifetime suicide, trauma) from four groups: Group A (Control, HIV-, SUD-, n=17), Group B (HIV+ only, n=17), Group C (SUD+ only, n=36), and Group D (HIV+ and SUD+, n=34) and approximately 85% of participants identified as African Americans/Black. The SUD+/Grp C had significantly higher incidence of MDD (mean = 1.23 ±.17 (SEM)) compared to control/Grp A (mean= 0.75 ±.17; p=0.04). GAD symptoms showed similar score trends for SUD+/Grp C (1.43±0.19 vs. control/Grp A 0.94±0.23; p = 0.02). For MDD and GAD, Groups B (HIV+) and D (HIV+SUD) did not differ from control or each other. Lifetime suicide or trauma were not different across groups, p > 0.05 for all comparisons. Our findings indicate that SUD (and not HIV) may confer increased susceptibility to MDD and GAD.

Sponsoring agency: DC Center for AIDS Research, National Institutes of Health/NIAID

Key genetic networks of NAFLD in T2DM African Americans

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Background: Non-alcoholic fatty liver disease (NAFLD) is the most common chronic liver disease in the US and underreported in African Americans (AA) with Type 2 Diabetes (T2DM). There has been a considerable increase in NAFLD with high prevalence of T2DM in AA. As NAFLD is asymptomatic, it goes undetected. Undiagnosed NAFLD contributes to liver cirrhosis leading to liver carcinoma in T2DM patients. This study aims to find key biological pathways that identify the status of NAFLD-related genes in T2DM AA patients. Methodology: A total of 12 AA individuals (T2DM n=6, Control n=6) were included in our study. Sociodemographic, lifestyle exposures, and medical information were recorded. Global gene expressions for transcriptional analysis were performed coupled with Ingenuity Pathway Analysis (IPA®) to understand the key disease pathways involved in the progression of NAFLD disease. Results: The mean age and the mean HbA1c of the diabetic group were 57.35±5.99 yrs. and 9.54±2.69 mmol/ mol respectively. Total number of 217 (0.16%) genes were differentially expressed (upregulated=78 and downregulated=139; >+2-fold change). IL18, CCL2, TNF were upregulated (NAFLD-related genes). Liver carcinoma genes which were significantly upregulated (ITGAM, STAT3,

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IL2, VEGFA, JAK3, PIK3CD, RELA, IL10, CSF1, NOD2, MRC1) and downregulated (CSF1R, SOCS3) in AA T2DM patients. Discussion: The genes in the networks which are downregulated in T2DM AA patients give an idea of the progression of NAFLD status allowing the development of early disease biomarkers thereby reducing the development of cancer.

**Smoking and Vitamin C Intake:
Effects on Health Status of Older Adults**

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Introduction: Smoking is a widely recognized risk factor for a variety of health issues, especially among older persons. An important substance called vitamin C may help older folks stay healthy by lowering their chances of developing chronic diseases. The purpose of this study is to look into how vitamin C and smoking affect older persons' health. Methods: 300 senior citizens, all of whom were 60 years of age or older, participated in a cross-sectional study. Self-administered questionnaires were used to gather information on smoking patterns, vitamin C consumption, and health status. In order to assess the amounts of plasma vitamin C, blood samples were also taken. Results: The study findings revealed that 45% of older adults were current or former smokers, with a mean plasma vitamin C level of $57.3 \pm 20.2 \mu\text{mol/L}$. Older adults who smoked had significantly lower plasma vitamin C levels than non-smokers ($p < 0.001$). Additionally, older adults who consumed more than 200 mg/day of vitamin C had a significantly lower risk of chronic diseases than those with lower intake ($p < 0.05$). Discussion/Conclusion: This study shows that older persons who smoke have lower plasma vitamin C levels, which may put them at higher risk for developing chronic illnesses. On the other hand, adequate vitamin C intake may shield older persons from chronic diseases. Consequently, it is critical to encourage older persons to stop smoking and to eat a diet high in vitamin C. For older persons with low plasma vitamin C levels, healthcare practitioners should also take vitamin C supplementation into consideration.

Lung Cancer and Health Disparities in African Americans

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Ethnic background and socioeconomic status are well known to influence lung cancer cases and mortality patterns in the United States. There is evidence of several lung cancer factors which operate in unison to multiply the risks. Observing studies from 1970-2020, Lung cancer occurrence and mortality rates are higher among African Americans than European Americans. In this paper, data will be collected to conclude why these rates are as is; and what the factors are. The report will be conducted by gathering statistics about African Americans and European Americans. We will then divide these statistics into respective socioeconomic categories. Information will be conducted on the two groups to see why the groups have their respective Lung Cancer rates. This Data will be shown by graphing and explaining how the individual groups have the cancer rates they do. A portion of the study population was of lower socioeconomic status and they were current long-term smokers, this will be used as the control group. African Americans were associated with a significantly higher risk of developing Lung cancer. Genetics is one of the main biological factors associated with lung cancer, but there are other factors such as geographical location, alcohol intake, weight, air pollution, smoking, and other environmental exposures which could also contribute to higher rates of Lung cancer in African Americans.

DNA Barcoding US Ants

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Background: DNA barcoding enables effective differentiation and identification of organisms. However, in order to help the scientific community, detailed observations about the creatures and habitat must be made before this process can be carried out. Methods: The ants were collected at Howard University at the coordinates $38^{\circ}55'19''\text{N}$, $77^{\circ}17''\text{W}$. The collection took place on September 8, 2022 at 2:56 pm at an altitude of 42 meters. The greenland habitat had a humidity of 57% and canopy coverage of 0-10%. After collection, the DNA was extracted and the CO1 gene was amplified and sent for sequencing. The DNA was then able to be converted

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into a DNA barcode and a match was found using a national database. Results: The species identified based on the blast was *Tetramorium Caespitum*. *Tetramorium Caespitum* was the species determined by the amplification. *Tetramorium Caespitum* was recognized using the ant pictures, DNA analysis from DNA Subway, CO1 gene amplification, and the Blast. Conclusions: Understanding the interaction between the species and the ecology that exists in their environment is necessary to comprehend the environmental conditions and their effects on newly discovered species. DNA barcoding strives to identify all forms of life by using the data from a number of gene regions. On the map on the Inaturalist website, *Tetramorium Caespitum* ants can be observed along the east coast. In general, DNA barcoding of US ants has helped to improve ant range maps in the country. Subpopulation tracking was made possible by barcoding.

Ecological Correlates with Jet propulsion in Frogfishes

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Frogfishes are anglerfishes that use jet propulsion as an aquatic form of locomotion to navigate the ocean. However, there is little known about the ecology of frogfishes relates to their locomotion. Our study analyzes the cranial anatomy of frogfishes to gain better insight to the aspects that aid in their ability to jet propel. We focused on the branchiostegals, which are important bones for jet propulsion. We analyzed whether branchiostegals were correlated to the latitude of each specific frogfish species. We landmarked six branchiostegals from 35 species of frogfishes. In RStudio, we performed a phylogenetic ANOVA test to compare branchiostegal size to the maximum latitude each species reaches. Branchiostegal anatomy was analyzed using a custom superimposition code to superimpose each branchiostegal of each species onto each other. We found that there is a not significant relationship between branchiostegal shape and latitude, although we found a p-value 0.067 of and an f-value of 3.0112 for our phylogenetic ANOVA. While there was no significant difference found, it is possible that with greater sampling we would find a significant relationship between branchiostegal shape and latitude.

Are People with Dark Colored Skin More Prone to Skin Cancers?

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This study is important because many people of color believe that they cannot have skin cancer. Additionally, there is a lack of research on how skin cancers look on skin of color. This has an importance to public health because there is four-times increased likelihoods of Black patients presenting stage IV melanoma cancer than white patients. : We used the NCBI's PubMed to search the literatures between 2006-2023, and search with the context of "Skin Color + Cancer + African Americans", which resulted 57 results which are searched thoroughly further with discrete research findings. It has been found that it is more common for: African Americans suffering from melanoma to be female than it is to be male. It has been found that Arca lentiginous melanoma is the most common subtype affecting patients of color. The problem persists because people of color are not educated on the risks of UV even though they are slightly protected by melanin. The roadblocks are the medical field lacking inclusivity and desire to learn better for the care of their patients. Measures we can take now creating more primary care physicians emphasizing the skin cancers with people of color. A well-planned educational advising for people of color is equally important.

Analysis of the Optimal Quiet Eye Duration for a Motor Learning Process

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Over the years, much research has been done into cognitive skills, primarily for usage in day-to-day activities such as thinking, reading, learning, remembering etc. One such phenomenon which uses these cognitive skills is the "Quiet eye". Quiet eye can be defined as "for a given motor task, the QE is defined as the final fixation or tracking gaze that is located on a specific location or object in the task space within 3° of visual angle (or less) for a minimum of 100 ms". (Vickers, 2016). Previous studies have investigated many aspects of QE such as its underlying mechanisms, what can affect it, as well as any trends associated with it, but my research will focus on determining the optimal QE duration for an individual. To

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do this, participants used a NeuroBall game app where they would simply aim at a target, from a central point on the phone screen and their QE duration would be recorded throughout each trial, by a built-in timer in the game. Preliminary results suggest that a QE duration of around 800 ms could be the optimal time for which participants will have the most amount of accurate shots.

Detailing the basic cranial region and hearing apparatus anatomy of the Hawaiian Monk Seal (*Neomonachus schauinslandi*)

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The anatomy of phocid hearing apparatuses is relatively unknown due to extremely limited studies. Although diverse skull morphologies are well-documented in semi-aquatic pinnipeds (seals/sea lions/fur seals/walruses), it remains unknown how they hear efficiently in both aquatic and terrestrial environments. Parts of the basicranial region are used as diagnostic characters in morphological studies because the mammalian basicrania is more evolutionarily conservative and therefore less variable in comparison to other parts of the skull. This study focuses on the morphology of the basicranial region and auditory osteology of the Hawaiian Monk seal (*Neomonachus schauinslandi*), an endangered species of Phocidae (true seals) endemic to the Hawaiian Islands. This species is less aquatically derived than other phocids and can be directly compared to otariids (sea lions and fur seals) and odobenids (walruses), who demonstrate similar morphology. Specimens from the Smithsonian National Museum of Natural History (NMNH) were examined. Osteological measurements, morphological descriptions, and modern imaging software analyzed specimens and detail specific morphology. Results demonstrate distinct tympanic bullar morphology in Hawaiian monk seals, especially regarding the malleus which is very distinct from other phocids and other typical terrestrial carnivorans. Once pinniped auditory morphology is established, future functional studies will examine the evolutionary timeline of semiaquatic hearing and how these carnivorans hear in the water. To date, there is no functional anatomical research on pinnipeds due to the lack of information on specific auditory morphology, demonstrating the need for evaluation and comparison of the auditory morphologies of modern carnivorans in relation to hearing.

Understanding hydration and antibiofouling of TMAO-polymer surfaces from atomistic modeling

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Coauthors: Grace Tang Chen, MD; Symon Jahan Sajib; Nathan Wesley Jones

Rimethylamine N-oxide (TMAO)-derived zwitterionic polymers have emerged as a next-generation ultralow fouling coating material for biomedical and marine applications. However, the interaction mechanism between TMAO surfaces and proteins at the microscopic level remains unclear. By performing atomistic molecular dynamics simulations coupled with free-energy computations, we provide insights into the hydration of TMAO-polymer brushes (pTMAO) and their interactions with proteins in pure and saline water. Our work reveals that a condensed hydration water layer formed on the pTMAO surfaces, even in a salty environment, is the key to their ultralow fouling efficacy. Because of the strong hydration, the protein desorption energies for the pTMAO-derived surfaces are small, as quantified from the free energy calculations, and capable of resisting protein adsorption, upon creating an energy barrier, compared to other biofouling surfaces. Our work thus provides an in-depth understanding of surface hydration and antibiofouling behavior of TMAO-derived polymer brushes.

Identification of protein-protein interactions critical for virulence in *S. aureus*

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Staphylococcus aureus, or "staph", is a gram-positive spherically shaped bacterium that can be found on human skin and within the nose. *S. aureus* can cause fatal bloodstream infections. Those most at risk for *S. aureus* infections include IV drug users, diabetics, cancer patients, eczema patients, and lung disease patients. People of color are disproportionately affected by these diseases and therefore are at a higher risk of *S. aureus* infections, particularly from multi-drug resistant strains such as Methicillin-resistant *S. aureus* (MRSA). Studying the factors that influence the effectiveness of *S. aureus* infections will facilitate development improved therapeutics against this multi-drug resistant pathogen. *S. aureus* virulence is influenced by a multitude of virulence factors that influence

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the pathogenesis process. SigS is just one of those virulence factors, which is necessary for pathogenesis, immune evasion, and stress adaptation. However, the factors that control SigS expression are not completely understood. Recently, our group identified a SigS effector locus consisting of two previously uncharacterized proteins that we renamed SigS regulated orfA and orfB, or sroA and sroB. SroA and SroB have opposing auto-regulatory effects on SigS mRNA levels and interact with each other in an in vivo Bacterial Adenylate Cyclase Two Hybrid (BACTH) Assay. We hypothesize that SroA interacts with several other Staphylococcal proteins, specifically RNases, to mitigate its regulatory effect on SigS mRNA levels. We aim to further characterize SroA and SroB interactions, as well as test the ability of SroA to interact with *S. aureus* RNases using in-vivo and in-vitro co-immunoprecipitation assays.

Experimenting with Multimodal AutoML: Detection and Evaluation of Alzheimer's Disease

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By 2050, Alzheimer's Disease (AD) and other dementias could affect 152 million people, increasing social and economic costs for families. To reduce the costs of detection, evaluation, and tracking of AD, this study uses machine learning to predict Mini-Mental State Examination (MMSE) scores. This work relies on Multimodal learning to analyze the combination of acoustic features and raw translated text to predict MMSE scores as both regression and classification tasks. Applying Principal component analysis to 1733 features, we extract acoustic features. Unlike previous work [1], which heavily relies on manually annotated text to derive features, our approach involves using Google's Text To Speech API to get audio transcriptions & passing it as input to our multimodal model. The paper presents an improvement in the performance of classification models and a similar performance on the regression tasks. Compared to the baseline [2], our approach improves to an accuracy score of 82% and decrease test set RMSE by 0.28.[1] Aryal SK, Prioleau H, Burge L. Acoustic-Linguistic Features for Modeling Neurological Task Score in Alzheimer's. In PACIFIC SYMPOSIUM ON BIOCOMPUTING 2023: Kohala Coast, Hawaii, USA, 3-7 January 2023 2022 (pp. 335-346).[2] Luz S, Haider F, de la Fuente S, Fromm D, MacWhinney B. Detecting cognitive decline using speech only: The addresso challenge. arXiv preprint arXiv:2104.09356. 2021 Mar 23.

Exploring the Role of Hydrodynamic Shear on the Pattern and Kinetics of Staphylococcus aureus Adhesion

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Staphylococcus aureus is a common bacterial pathogen that can form biofilms on a variety of surfaces, including medical implants and host tissues. This project investigates the impact of shear stress on the adhesion of *S. aureus* in the early stages of biofilm formation to enhance our understanding of the complex interactions between microorganisms and their environment. We hypothesize that hydrodynamic forces influence the organization and structure of biofilms by affecting the pattern and kinetics of bacterial adhesion. The BioFlux 200 system was used to investigate the adhesion of *S. aureus* under different hydrodynamic shear stress conditions. The results indicate that increasing shear stress from 1 dyn/cm² to 5 dyn/cm² led to a 64% decrease in *S. aureus* surface concentration after one hour and a 49% decrease in the maximum rate of adhesion. It was also observed that shear stress can affect the minimum distance between bacterial cells, which in turn can impact the overall organization and structure of the biofilm. The findings suggest that hydrodynamic forces play a crucial role in the initial stages of biofilm formation and may influence the subsequent evolution of biofilms. Further studies are currently ongoing to evaluate the extent of hydrodynamic influence on adhesion compared to the chemical and biological properties of bacteria. Ultimately, this research could help in the development of novel approaches to prevent and control biofilm-related infections, which represent a significant healthcare challenge.

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Discovering the Biodiversity of Ants on Howard University's Campus

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Coauthors:

Background: To better understand the species range of ants and the presence of invasive ant species across the United States. Ant specimens are collected from various locations, and identified to aid researchers in understanding

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human interaction and environmental factors' effects on ant populations. Aim: The objective of this research was to identify an ant specimen to further the study of the biodiversity of ants on Howard University's campus as well as examine the effect of human interaction on the type of ant identified. Method: Ant specimens were collected by utilizing a hot dog as bait. The baited ants were then submerged in alcohol to be preserved for DNA extraction. The DNA of a singular chosen specimen was extracted utilizing the chelex method of DNA extraction. Then, gel electrophoresis was performed to visualize the ant DNA and indicate successful DNA extraction from our chosen sample. The DNA was then sent to the Cold Spring Harbor Laboratory for sequencing. After sequencing, the DNA Subway and BLAST search were used to potentially identify the species of Ant. Result: Our specimen was successfully sequenced and identified as scientifically named *Monomorium minimum*, commonly referred to as "little black ant" Conclusion: *Monomorium*, is a native species to Washington DC indicating the continued survival of the native species. Scientists will be able to utilize this data to study the existing species of the area, which can later be used to understand whether or not the species is still thriving in the D.C. area in future years.

Free retinol serum analysis in pediatric patients with short bowel syndrome and intestinal failure.

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Coauthors:

Background: Vitamin A is a fat-soluble vitamin that plays an important role in immune function, vision, and growth. Here we analyze the prevalence of vitamin A deficiency (measured as serum free retinol) in pediatric patients with intestinal failure (IF) or short bowel syndrome (SBS) to determine which clinical factors, if any, contribute to vitamin A deficiency in this patient population. Methods: A retrospective review of 32 children with IF or SBS was conducted at a single institution. We examined 6 categorical classifications of our patient population to test for increased risk of vitamin A deficiency, building a univariate logistic regression model for each category. Results: Prior vitamin A deficiency was shown to be predictive of future vitamin A deficient measurements. In patients who had at least one test that was deficient in the year prior, there was a 42% chance of measuring vitamin A deficiency again. In contrast, in patients who had at least 1 vitamin A test during the prior year without any deficient measurements, there was a 1.3% chance of obtaining a deficient vitamin A level. Conclusions: A low risk of vitamin A deficiency was seen over the course of 153 patient-years, suggesting that frequent, repeated vitamin A assessment may not be needed in patients who demonstrate normal vitamin A status early in their post-operative IF course.

Leveraging computational mutagenesis to study gene expression in transgenic fruit flies

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The Curly Su (dMPO) protein, a homolog of the human myeloperoxidase (hMPO), is responsible for wing development in *Drosophila melanogaster*. Like most human peroxidases, dMPO plays key roles in various cellular and physiological processes. The dMPO produces a high quantity of reactive oxygen species (ROS) and contributes to the development and immunity of the fruit fly. The sequences of dMPO and hMPO are similar, making dMPO a good candidate for experimental validation. We performed saturated computational mutagenesis of dMPO and hMPO. We highlighted interesting mutations based on predicted folding energy changes (DDG) and proximity to Post-Translational Modification (PTM) sites. The genome editing approach was used to construct the transgenic fruit flies with G378W, Del 305-687, S590A, K552R, and W621R mutations. We observed wing phenotypes and the overall lifespan of the samples during husbandry and further analyzed the RNA-seq data from the transgenic fruit flies and the wild-type samples. We utilized the R Bioconductor package, BigPint, to visualize differentially expressed genes (DEGS) between treatment samples. The gene ontology analysis of the DEGS provided functional attributes to down-regulated and up-regulated genes. By combining computational and experimental tools, scientists can quickly gain insights into the phenotypic effects of novel missense mutations.

Using Exosomal MicroRNA Signatures to Identify Early Stages of Diabetic Kidney Disease in African American Adults

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Diabetic Kidney Disease (DKD) is a common complication of type 1 and II diabetes. African Americans account for 35% of cases despite making up only 13% of the population. Current biomarkers for DKD are limited in their ability to identify the earliest stages of disease. When left undiagnosed and untreated DKD can progress to kidney failure. Early identification and

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intervention are critical to long-term outcomes. There is a need to identify early biomarkers of DKD. Exosomes are small extracellular vesicles that are reservoirs of cellular content and facilitate intercellular communication. MicroRNAs (miRNAs) are small, noncoding RNAs that regulate gene expression. Previous studies report that miRNAs are found in exosomes and are altered in patients with DKD. Our study aims to characterize urinary exosomal miRNA content in patients with DKD. Study participants are recruited from the Diabetes Treatment Center and the Nephrology Clinic at the Howard University Hospital (IRB-21-MED-25). Exosomes will be isolated from cleared urine. Purity and size of isolated microparticles will be evaluated using NanoSight technology (30nm to 120nm size range) and western blot analysis for exosome specific markers (TSG101, CD63, CD9, and ARF-6). Expression of 5 selected microRNAs, miR-4534, miR-320c, miR-451, miR-362-3p, and miR-877-3p will be evaluated by qRT-PCR. The relationships between miRNAs and indices of diabetes and kidney function will be evaluated. We anticipate differential expression of selected miRNAs in patients with DKD. These findings will provide insight into the use of circulating miRNAs as early markers of DKD, ultimately creating more effective treatments and preventive measures.

miRNAs, Extracellular Vesicles and Autoimmune diseases

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Accumulating evidence indicates that mesenchymal stem cell (MSCs) and induced pluripotent stem cells (iPS)-derived extracellular vesicles (EVs) exhibit immunomodulatory effects by delivering therapeutic RNAs and proteins; however, the molecular mechanism underlying the EV-mediated immunomodulation is not fully understood. In this literature study, we focused on miRNAs present in extracellular vesicles which have been used for treatment of various autoimmune diseases. It was revealed that the majority of miRNAs which affect TLR4 Pathway and NLRP3 Pathway are associated with decrease in inflammation and ultimately immunomodulation in case of autoimmune diseases.


Investigation of the Oxidation of Iodide by Bacteria Genes AD-60 and Sequencing of Significant Mutants

Presenter's Name: Dania Turner
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Hanford site was once a production site for plutonium and is now contaminated with a mix of radioactive (e.g. I129) and other hazardous wastes. Bacteria have been isolated from the soil and groundwater from the site that interact with the contaminants and are targets for research on bioremediation. One of these bacteria is *Cupriavidus necator* AD60 (AD60). Previous work suggests that AD60 can transform iodine species. These transformations could impact the mobility of I129 at Hanford. Therefore, understanding the genetics of AD60 is able to transform iodide could be important for bioremediation. Here we evaluated the ability of AD60 mutants whose genomes have been disrupted by a transposon to transform iodine species. The wildtype (WT) AD60 is hypothesized to excrete an oxidase or another enzyme that oxidizes iodide, therefore after being grown in broth, cells (mutant and WT) were removed, and the spent broth was used in iodide oxidation assays. After an initial screening, a second screen was performed to confirm which mutants displayed significantly lower oxidation than the WT. 648 mutants were screened in 96-well format, with biological and technical replicates. 150 mutants exhibited significantly lower oxidation than the WT in the initial screen. The analysis of data from the second screen is underway. The next steps are to extract DNA from the confirmed mutants, amplify and sequence the disrupted genes for identification. This research will influence the bioremediation efforts at the Hanford site and other sites with similar contamination issues.

A Whole-Food Plant-Based approach to Reducing METS in Black Men

Presenter's Name: Llarance Turner
 Classification: Graduate Student
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According to the Centers for (Disease Control & Prevention CDC, 2022), racial health disparities are persistent problems in the healthcare systems of the United States (US), impacting the health of black men as an "epidemic." Despite the recent overall reduction in morbidity and mortality, black males between 18

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and 44 years of age are at a higher risk for Metabolic syndrome METS (hypertension (HTN), hyperlipidemia, obesity, and diabetes mellitus (DM), all of which are linked to the higher incidences of cardiovascular disease (CVD) and Renal Failure in this population. Studies have shown that dietary patterns and behaviors have significantly contributed to the health deterioration of black men resulting in the development of chronic health conditions. To our knowledge, there is limited data that examine the impact of a whole-food plant-based therapeutic diet on black men. Thus, the "Turner Project" aims to develop, implement and evaluate the impact of a whole-food plant-based therapeutic diet to reduce the risk of heart disease in Black Men. Methods: Using a systematic review to examine the impact of a whole-food plant-based therapeutic diet in black men. Key words include; nutrition, black men, chronic disease, METS. Databases used: Science Direct, Pubmed, Google Scholar. Studies reviewed will have been conducted within the last 10 years. Expected outcome: Findings from this study is expected to find that the research information is void of critical information to improve the health status of black men.

Ant Collection Research Project

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In this assignment, students explored unknown ant colonies around the Howard University campus. We were interested in how humans might affect ant communities, such as the location of species and the number of species in one given area. To fully classify an ant species, you have to use the process of DNA Barcoding, the Chelex method, and Polymerase Chain (PCR) reaction testing. At the start of the process the students used hot dog bait to collect the ant specimens which were placed into an Ethanol solution and sat for a few weeks to dry. After a few weeks of allowing the ants to dry, the students extracted the ants' DNA and placed them into a hot water bath to allow the ants' cells to break down DNA. Lastly, students were able to compare the ants using gel electrophoresis in order to determine the source of the ants. After completing each lab and gaining a better understanding of how DNA barcoding works from an interactive standpoint we can understand why scientists may use DNA barcoding in everyday life. The barcoding process will help to determine, similarly, where the ant specimens could have come from. The DNA that was extracted was sent back to Barcoding US Ants to be analyzed by their DNA barcode to determine the results of where the specimens come from. From the finding, we are optimistic to think that the ants could be from somewhere far off such as a different state or even a different continent.

Biomimetic remineralization for tooth caries prevention

Presenter's Name: Tongxin Wang
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Nearly 90% of adults ages 20 to 64 years have had decay in their teeth in the United States. One of the most important factors for caries is the equilibrium of demineralizing / remineralizing efficacy of human saliva. Saliva's buffering capacity and the concentration of mineral ions are directly related to the equilibrium of demin/remin, because saliva can enhance remineralization by providing calcium, phosphate, and fluoride to enamel and dentin. The key to control the remineralization is to control 1-dimensional growth of hydroxyapatite (HA) crystal as well as 2-dimensional arrangement of HA needle-like structure. The reason why saliva is almost the perfect remineralizing solution is that the protein and other biological molecules within the saliva can form the well-assembled structure like a template to induce/control the remineralization process. Therefore, it is imperative to develop a strategy to optimize and control the demin/remin process in saliva, thus tooth caries can be well prevented. Inspired by the effect of the proteins, this project developed a new biomimetic polymer, which has the similar structure or functional groups as the protein in saliva. The polymer may combine with mineral ions and act as a reservoir, which can release mineral ions gradually. In addition, upon the controlling effect of the polymer, HA mineralization could be well controlled, and enamel-like HA needle structures have been developed. This biomimetic remineralizing system can be used for dental varnish or sealant for tooth enamel remineralization and early caries prevention.

Validating the Boggiano Intermittent Feeding Paradigm as a Chronic Model for Binge Eating Prone and Resistant Behaviors

Presenter's Name: Haley Warren
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Binge eating disorder (BED) is characterized by the overconsumption of food over a short period of time. Various models in the literature have been characterized as suitable paradigms for binge eating behavior. However, many of these models have not been substantiated over a chronic period (several months) of time as defined by the DSM-V for BED. We

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seek to validate the longevity and accuracy of the Boggiano intermittent palatable food preference test for binge eating behavior. Female Sprague Dawley rats (n=12/group, 250-300g) were given 30g of high fat/sugar pellets (PF) and the PF intake was measured at 0-hour, 1-hour, and 4-hour time increments. The median 4-hour PF intake was utilized to establish the upper, middle, and lower tertile where animals are characterized as binge eating prone (BEP), binge eating neutral (BEN), or binge eating resistant (BER). The data were collected from BEP and BER animals during various feeding tests, across four months of testing. Once the feeding phenotypes were established, additional tests were conducted more than three months after being established. Data show that PF intake of BEP and BER animals did not significantly differ ($p < 0.05$) over the span of the three feeding tests conducted and validates the consistency of the feeding phenotypes across several months. This model provides a reliable and consistent model over a chronic period which makes this model a reliable model to gain a better understanding of the etiology of binge eating.

Interplay of Periodontal Changes and Pancreatic Malignancies

Presenter's Name: India Washington
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Periodontal disease is common worldwide which is characterized by the inflammation of the gums, can lead to tooth loss if left untreated. Pancreatic cancer is one of the deadliest cancers, with a 5-year survival rate of only 9%. Recent studies have suggested that periodontal disease may be a risk factor for pancreatic cancer that includes bacterial translocation from the oral cavity, which can lead to chronic inflammation and immune system dysfunction. Recent research has also shown that periodontal infection plays a role in aggravating systemic disease. Methods: This presentation is based on a particular study of Ungureanu et al., 2023 that performed over 21 years on 59000 African American women with a follow up of 21 years published in World J. of Clinical Cases and researched thoroughly of which important facts are presented here. The study reveals that participants who had poor dental health had higher chances of pancreatic cancer. Furthermore, studies have shown that patients with periodontal disease have elevated levels of inflammatory markers such as C-reactive protein (CRP), which is also associated with pancreatic cancer. Additionally, recent research has indicated that certain oral bacteria, such as Porphyromonas gingivalis, may play a role in the development and progression of pancreatic cancer. While the link between periodontal disease and pancreatic cancer requires further investigation, early detection and treatment of periodontal disease may help reduce the risk of developing

pancreatic cancer. Therefore, it is crucial to educate the public about the importance of maintaining good oral hygiene habits.

Developing a high-throughput selection assay for isoprenoid biosynthesis

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Isoprenoids are a large class of natural organic compounds that play a well defined role in the formation of photoprotective pigments, hormones, and electron carriers in plants. Protein engineering and synthetic biology techniques were used to engineer isoprenoid biosynthetic pathways in Escherichia coli to induce high levels of production of different isoprenoids. The first goal of the carotenoid (a colored subclass of isoprenoids) biosynthesis project was to develop a high throughput assay that utilizes the photoprotective properties of canthaxanthin, which is a downstream product of the isoprenoid pathway introduced into E. coli. This was done by building the pathway, screening the pathway for color, and then engineering the circuits for improvement in color by using blue light as a selection pressure. The second goal was to create libraries of a key bottleneck protein, DXS and use the previous developed assay to select for improvements. Variants that were able to confer the best photoprotection were phenotyped for improved carotenoid production.

The Impacts of Poverty on the Health of Older Adults and Effective Interventions to Alleviate the Effects

Presenter's Name: Nia Weston
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Poverty is one of the most important social determinants of health in the older adult population. In 2021, 5.8 million Americans, 65 and older lived in poverty, with a 10.3% poverty rate overall. However, 12.9% of older adults aged 80 and older lived in poverty, with 9.5% aged 75-79, 9.7% aged 70-74, and 9.6% aged 65-69. Older adults living in poverty experience higher rates of disability, death, chronic disease, mental illness, nutritional problems, and a decline in emotional health. Therefore, it's critical that we understand how poverty impacts older adults and what interventions will mitigate the effects in order to address the problem. This study aims

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to examine the physical, mental, and nutritional impacts of poverty on older adults and identify effective interventions to alleviate the effects. Methodology: A systematic review will be conducted to assess the impact of poverty on older adults and effective interventions. Electronic databases including PubMed, Google Scholar, and the Howard University Library database will be utilized. This study will synthesize research articles from 2013- 2023, using the keywords, “poverty” and “older adults”. Results: With 15 articles reviewed, negative consequences such as food insecurity, low self-care capacity, depression, malnutrition, disability, and chronic disease have been observed. SNAP, Medicare, Medicaid, and SSI can alleviate these effects. Discussion/Conclusion: These findings reinforce the consequences of poverty on older adults and support the spread of effective interventions such as SNAP, Medicare, Medicaid, and SSI. Developments of new interventions should be put in place to continue combatting poverty among older adults.

The tardigrade’s ability to utilize cryptobiotic process of anhydrobiosis through tun formation causes no inhibition to the organisms’ speed

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This paper examines the effects that anhydrobiosis takes on a tardigrades ability to move. When tardigrades are exposed to extreme conditions, they utilize cryptobiosis to reduce body surface area and transpiration by about 50% and lower metabolism to 0.01% of normal function. The most common form of cryptobiosis is anhydrobiosis, the ability to live without water, but very little research exists on the long-term effects of cryptobiosis. We hypothesized that if the tardigrade utilizes the cryptobiotic process of anhydrobiosis through tun formation, then the organisms’ speed will be inhibited. The tardigrades baseline locomotion was determined by recording their movement under 40x magnification, then interpreting the video using ImageJ software. The tardigrades were then dried to activate anhydrobiosis. The tardigrades were reintroduced to water and given time to return to their active state, and their post anhydrobiotic locomotion was determined. We found that tardigrades experience a steep increase in locomotion and activity after exiting anhydrobiosis. The increase in locomotion may have occurred due to the unstable environment causing the tardigrades to hunt for food to store energy if they must re-enter anhydrobiosis. Understanding the full scope of the cryptobiotic properties may help humans venture farther in space than ever before.

miRNAs, Extracellular Vesicles and Autoimmune diseases

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Accumulating evidence indicates that mesenchymal stem cell (MSCs) and induced pluripotent stem cells (iPS)-derived extracellular vesicles (EVs) exhibit immunomodulatory effects by delivering therapeutic RNAs and proteins; however, the molecular mechanism underlying the EV-mediated immunomodulation is not fully understood. In this literature study, we focused on miRNAs present in extracellular vesicles which has been used for treatment of various autoimmune diseases. It was revealed that majority of miRNAs which affect TLR4 Pathway and NLRP3 Pathway are associated with decrease in inflammation and ultimately immunomodulation in case of autoimmune diseases.

The Impact of Adolescent Gut Microbes on Mental Health

Presenter’s Name: Helina Woldeamlak
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Introduction: One of the leading causes of mortality and morbidity among young people worldwide is mental health disorders. Anxiety and depression are just a few of the mental health issues that have been linked to imbalances in the gut microbiota. Purpose of the Study: The purpose of this study is to assess the relationship between gut microbes and their effect on adolescents’ mental health. Methods: Using research articles found through academic search engines published between 2016-2023, a systematic review was conducted to assess the relationship between gut microbes and their effect on adolescents’ mental health. Using 10 articles, we will discuss, compare and contrast the effects of gut microbes and their ultimate effect on adolescents’ mental health. Results: A shift in the balance of beneficial to harmful bacteria affects the production of neurotransmitters, which control one’s mood. Teens can be more susceptible to mood disorders, anxiety, and depression, which can alter their mental state. Promoting a healthy gut microbiome through dietary changes, lifestyle adjustments, and probiotic interventions may be a successful strategy for treating teenage mental health issues.

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Discussion/Conclusion: By reviewing the growing body of research on the relationship between gut microbes and adolescent mental health and the necessary step to improve gut microbiota balance. According to studies, changes in the gut microbiome can interfere with mood, behavior, and health. To fully comprehend the intricate relationships between gut microbiota and outcomes in terms of mental health in this age group, more research is required.

Role of STING in immunotoxin-induced antitumor immunity in HNSCC

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Over 90% of the HNSCC tumors overexpress EGFR receptor. Immunotoxin often comprising a tumor antigen-targeted antibody and a toxin that kills cancer cells has been approved in treating some hematopoietic malignancies. We produced an immunotoxin, hDT806 with specificity for overexpressed EGFR and/or EGFRvIII mutation and demonstrated its anti-HNSCC efficacy. We found the antitumor efficacy of hDT806 may involve immune responses. Here, we investigated hDT806's immunomodulation effect on HNSCC. The HNSCC line JHU-029 was employed and the JHU-029 with exogenous STING overexpression, designated as JHU-029-STINGEX, was established. The *in vivo* effects were determined in the mouse xenograft models of JHU-029 versus JHU-029-STINGEX. Western blot and Immunohistochemistry (IHC) analysis were performed. hDT806 significantly upregulated key proteins in the type I interferon (IFN I) pathway, increasing the level of phospho-TBK1/TBK1 and the downstream effector STING in the JHU-029 cells. Further, IHC analysis revealed intratumoral hDT806 (2 µg/day, 5 d) increased the expression of STING and STING signatures (including IFN α 1, IFN β and CXCL10), and MX1, a marker of IFN I activity, in the JHU-029 xenografts. To evaluate a key role of STING, we established xenograft models of JHU-029 and JHU-029 with STING overexpression in mice. Indeed, the mouse xenografts of JHU-029-STINGEX exhibited a substantially suppressed tumor growth and reduced tumor weight, compared to their JHU-029 xenografts counterparts. Collectively, our data shows a role of hDT806 as a stimulator of tumor intrinsic type I interferon signaling, which may bridge the innate and adaptive immunity and contribute to the antitumor activity in HNSCC.

Computational Saturation Mutagenesis of SARS-CoV-2 ORF3a protein

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Coauthors: Vidhyanand Mahase, Adebisi Sobitan, Xin Li, Shaolei Teng

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been causing a global health emergency. Viral ORF3a protein is one of the viral determinants of SARS-CoV-2, as its functions are linked to the induction of cell and tissue damages, disease severity, and cytokine storm that is a major cause of COVID-19-related death. Thus, the analysis of ORF3a protein mutations is useful for understanding the mechanism of pathogenesis of SARS-CoV-2. In this study, we applied the computational saturation mutagenesis approaches, including structure-based energy calculations and sequence-based machine learning predictions, to investigate the effects of ORF3a coding mutations on protein stability and protein-protein interaction. We found the mutations in residues P159 and L203 can decrease the ORF3a stability. We computed the folding energy changes upon mutations in protein interface and discover that missense mutations in residues G188 and G187 can weaken the binding affinity of ORF3a dimer. These findings facilitate understanding the molecular mechanism of ORF3a in the pathogenesis of SARS-CoV-2.

Diagnosis, Management, and Prevention of IgE-Mediated Food Allergies in Children: A Systematic Review

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Background: Food allergies in children are a growing source of concern. Over 4% of children worldwide are thought to have food allergies, with substantial increases over the last 20 years. Between the years 1997 and 2011, the frequency of food allergies in children aged 0 to 17 years old rose from 3.4% to 5.1%. Immunoglobulin E (IgE)-mediated food allergies result in abnormal immune responses. Children who are diagnosed consequently have shorter stature, vitamin and mineral deficiencies, feeding issues, comorbidities, and gastrointestinal inflammation. Therefore, this study aims to examine current diagnosing, management, and prevention methods available for children with food allergies. Methodology: A systematic review was conducted to examine current diagnosis methods,

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management techniques, and prevention initiatives for IgE-mediated food allergies. Pertinent articles from databases such as PubMed, NCBI, MDPI, and Google Scholar were used. Results: It was determined that conducting an oral food challenge is the best method to identify if a child is allergic to a food allergen. The LEAP study supports the early oral introduction of allergens like peanuts into the diet, as it has resulted in a decrease in children developing peanut allergies compared to those who follow elimination diets. Expected Outcome/Conclusion: Continued updates to clinical guidelines by prominent health organizations can assist in establishing a systematic and educational procedure for treating food allergies. Further research can provide consistency in definitions, diagnostic standards, and management strategies that clinicians can use to enhance patient outcomes.

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BUSINESS

Inventory Pooling for Mobile Money Agents in the Developing World

Presenter's Name: Karthik Balasubramanian
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In the past decade, systems that enable people to send and receive money with their cell phones, called mobile money platforms, have grown at an astonishing rate in the developing world. However, mobile money agents, who perform the critical functions of converting cash to electronic value and vice versa for customers, are often stocked out of cash or electronic value. Additionally, a significant barrier to opening and operating a mobile money agency is the high working capital requirements to finance inventories of cash and electronic value. We develop a framework for an inventory pool of electronic value that can significantly decrease the working capital burden on agents, while also increasing inventory service levels. This framework achieves these objectives by harnessing not only the power of traditional variation pooling, but also the "recycling effect" resulting from the fact that agents can remit electronic value back to the pool when they satisfy demand for cash. We test this model with a large dataset of mobile money transactions from Zambia, and show that a basic inventory pool can decrease system-wide inventory requirements by over 74% and increase system-wide revenue net of cost of capital by over 8%. We also describe extensions to these models that should be developed before implementing a pooling framework in the field to ensure regulatory compliance and incentive compatibility.

The Future of Black Capitalism: The Effect of Modern Media on Black Businesses During the COVID-19 Pandemic

Presenter's Name: Camille King
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Entrepreneurship for Black business owners can significantly increase personal wealth and create millions of jobs across the country. This study seeks to determine how modern media has impacted Black businesses (entrepreneurship) pre-pandemic and during the pandemic. The ability to become a successful entrepreneur varies when taking into account demographics such as race and gender and geography. The bigger issue addressed in this paper is the difficulty of increasing "Black Capitalism" due to obstacles faced by Black entrepreneurs. The present study will investigate how modern media has impacted Black businesses between the years 2019-2022, through the lens of Black Business owners in the Northeastern Region. The Uses and Gratification theory will assist in understanding how Black business owners had to transition to online branding to increase business growth, and why consumers relied on modern media to increase their exposure to new and existing services and products during the COVID-19 pandemic. This study will use a mixed method of qualitative and quantitative research. Qualitative research will include journal descriptions, photographs, interviews, and other observations of the individuals. Oftentimes, qualitative approaches result in more questions that are needed to answer the research questions. An important part of qualitative research is description. Quantitative research approaches evaluate statistical tests with the common goal of picking the best test that matters for the situation.

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CREATIVE ARTS & DESIGN

African American Multigenerational Housing over the lifespan

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“Per evaluation of the given area, the implication of an intentional affordable housing development is bound to contribute to the community's overall prosperity, allowing low income senior residents access to quality units. With consideration of the range of AMI within SouthEast DC as well as for the minority African American community, these developments are intended to meet residents where they are, allowing them a place to call their forever home. Efforts are geared towards three main focus points, sustainability, flexibility, and comfortability, to ensure an efficient design for multigenerational affordable housing. Affordability should be reflected in the operation and durability of a home as well as the construction cost and purchase price. The design should reduce utility costs as well as utilize materials with longer life cycles to reduce maintenance and replacement costs, increasing the lifespan of the home. The overall design strives to develop a flexible residential structure that can accommodate 80 affordable units, as well as encourage and nurture entrepreneurship within the community. Further, these units should accommodate a growing community, admitting to the “grown in place” concept. These socially sustainable spaces are designed to adapt to the development and progression of an individual or family as they age in place for the intended 55+ community. This new modular development has the potential to influence the focus area by crafting opportunities for a prosperous African American neighborhood.”

Enhancing Youth Low School Performance through human centered design.

Presenter's Name: Tamar Wells
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Presentation Type: Poster Presentation
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This presentation will explore the use of human-centered-designed (HCD) youth community centers placed in vacant re-adaptive spaces to empower low-school performance for better testing outcomes. These spaces are created for young teens aged 13 to 19 to improve low-school performance. This exploration will reveal the multiple purpose after-school programs serve within the community of young adolescent teens. With research presented through human-centered design (HCD), color theory, and biophilic design, the needs and wants of up-and-coming generations will be better understood in an effort to prepare them for the next stage in life after high school. The age range for this research is important because the prepubescent age is seen as the beginning stages of teenage life, whereas 19 is the age teens are beginning to “cross over” into adulthood. The teenage years are very prominent years that impact us as adults. The HCD, engages personal stories, makes sense of specific needs and insights from those stories and generates prototype ideas that benefit the community. The color theory explores how the use of color positively impacts the moods and behaviors of the youth. The biophilic design looks at the use of nature and its impacts on bringing the outdoors in. These three theories are integral to improving low school performance and promoting increased test scores.

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EDUCATION & OUTREACH

The Effects of COVID-19 on Player Performance and Game Availability in the National Football League

Presenter's Name: Chauncey Bridges
 Classification: Professional Student
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Presentation Type: Poster Presentation
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Coauthors: Jasmine Walker, Orett Burke, Kiyanna Thomas, Azuri Hughes, Lawrence Garvin

Purpose: The purpose of this study is to evaluate the acute effects of COVID-19 on player performance and game availability in the National Football League (NFL). Methods: Players who tested for COVID-19 during the NFL's 2020-2021 and 2021-2022 regular and postseasons were identified. Dates of COVID/reserve list placement and activation were recorded along with player demographic information. Position-specific performance metrics and percent of snaps played were collected and compared for the 2 consecutive games immediately preceding and following COVID-19 diagnosis. Results: A total of 279 cases amongst 262 players were studied for game availability and 264 cases were analyzed for player performance. All players that tested positive missed an average of 1.0 ± 0.8 games and were on the list for 8.0 ± 4.7 days. For game availability, there was an overall downturn in offensive snaps (-6.43%) and defensive snaps played (-1.96%) and slight increase in special teams snaps played (2.89%). However, none of these changes were statistically significant ($P = .28$, $P = .38$, and $P = .39$, respectively). For player performance, the only significant change was a decrease in tackles for loss (TFL) amongst linebackers from 0.4 ± 0.8 to 0.2 ± 0.3 TFLs per game ($P = .04$). Otherwise, there was no statistically significant change in player performance and trends varied within different positions. Conclusion: The current study demonstrates that there was not significant change in acute player performance or game availability following COVID-19 diagnosis during the NFL 2020-2021 and 2021-2022 seasons.

The Relationship Between School Climate, School Context and School Structures

Presenter's Name: Ashley Clark
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Coauthors:

There has been an ongoing growing interest in school climate research because of its ability to affect a variety of student outcomes including but not limited to academic achievement, bullying, delinquent behavior, high school dropout rates, student health and risk taking. Therefore, understanding the ways in which school climate affects student outcomes is of particular importance. African American students have historically underperformed despite interventions aimed at their academic performance; a school climate model could be leveraged to create the intended positive changes in schools that serve African American students. This research aims to explore the relationship between perceptions of school context, school structures and school climate, as well as collect and analyze suggestions for school climate improvement of K-12 staff members in schools that serve majority African American students. Staff members are being recruited through their schools and an online survey has been utilized to collect the data. The online survey includes Likert-scale questions, demographic questions, and one open-ended item. Quantitative and qualitative data analysis are being utilized.

Lead Exposure Effects on Chicago Children

Presenter's Name: Temitope Creppy
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Chicago has the most active lead pipes of any city in the U.S. with 95%. Excessive lead consumption is most concerning for pregnant women and children, as it is absorbed in higher levels and remains in the bones. Elevated serum lead levels is linked to various neurodevelopmental and chronic medical issues including decreased overall brain volume, growth retardation, increased rates of ADHD and long-term renal and cardiac effects. Given the high level of potential exposure in Chicago neighborhoods, I performed a literature review with the goal of characterizing the lead toxicity and psychosocial outcomes in Chicago children. The majority of lead pipes disproportionately affect low-income minority communities in the city's Southside and Westside neighborhoods, which are primarily composed of Black and Brown families. Children in these communities have 12x blood levels than the national average. Additionally, children in this community have higher incarceration rates with rates are up almost 6% which is a 60% gap between white children without toxic levels. Chicago Children are 32% more likely to fail state tests by the third grade, 13% of reading test failures, and 14.8% of math test failures. While these differences are due to systemic racism

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resulting in racial and class inequities, reducing lead exposure in pregnant mothers and children is an intervention that needs to be immediately established. Thus, I propose psychosocial intervention of pediatrics lead testing, clinical trials, outreach programs, and awareness be conducted in communities of underrepresented demographics to combat these health inequalities.

An Interprofessional Approach to Oral Healthcare During Pregnancy

Presenter's Name: Nyree Dawson
 Classification: Junior Faculty/ Lecturer/ Instructor
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Presentation Type: Poster Presentation
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Coauthors:

Oral health is an essential component of overall health and especially during the prenatal period. Pregnancy may increase the risk of developing gingivitis, periodontitis, dental caries, and other oral conditions. Unfortunately, statistics suggest that underserved pregnant women do not seek preventative dental care or maintain good oral health during the prenatal period. Additionally, periodontal disease has been associated with adverse pregnancy outcomes, but research fails to establish a causal relationship. Healthcare providers and pregnant people may be uninformed that dental care during pregnancy is safe and that the state of a birthing individual's oral health may impact and correlate with their child's future oral health. Although there are guidelines from multiple reliable sources regarding the safety of dental treatment during pregnancy, healthcare providers across disciplines may not routinely discuss oral health as a part of prenatal care. Therefore, improving interprofessional collaborative practice for individuals providing care for pregnant people within the dental profession and other disciplines may improve health outcomes for mothers and their children.

The Impact of Social Competence on Social Anxiety and Fear of Negative Evaluation among Third Grade Children

Presenter's Name: Tamyra Dickens
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Presentation Type: Poster Presentation
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Coauthors: Maya Burris, Parisia Hutchinson

Bronfenbrenner (1979) discusses the role of the social environment in promoting positive development in children. Within the social environment, peers and teachers play a critical role in child development. In addition to the importance of the so-

cial environment, third grade is a critical juncture in development as children are at the end of the early childhood period. The goal of the study is to examine the relationship between perceptions of social competence, social anxiety, and fear of negative evaluation among third grade children. Researchers have found relationships between fear of negative evaluation and social anxiety in middle school students. The goal of this study is to examine these relationships in younger children. The study used data from the Early Childhood Longitudinal Kindergarten class 2010-2011 (NCES, 2001) to investigate predictors of social anxiety and fear of negative evaluation among third grade children. A multiple linear regression was conducted to examine the relationships between social competence, fear of negative evaluation, and social anxiety. Preliminary results show relationships between perceptions of competence, fear of negative evaluation, and social anxiety. Gender and racial differences will be discussed. Implications for policy and practice and additional findings will be presented.

The Importance of Early Mental Health Representation to Save Black Youth

Presenter's Name: Nia Goodall
 Classification: Undergraduate Student
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Presentation Type: Oral Presentation
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Coauthors:

The goal of this study is to examine the connection between the rise of mental health disorders in Black youth and the lack of Black mental health representation in children's literacy. The current conversations about mental health are typically white-centered, largely excluding Black youth and contributing to a lack of understanding. This study is vitally important, so schools and educators can provide students and their families with access to representative literature that will undoubtedly improve their overall well-being. Questions guiding this research include - Will early representation of various mental health disorders contribute to Black children being properly diagnosed? If children understand the symptoms of mental health disorders through literacy, will they be more likely to seek help? If there is a rise in mental health representation, will there be a decline in Black youth's suicide rates? To understand this topic further, I conducted qualitative research to write a children's book dummy that centers a young Black girl's journey as she is diagnosed with depression. Through my research, I discovered that one of the best ways to tend to mental health needs is transparency - children need to be aware of what disorders look like and how to care for their mental health in general. This picture book gives students the opportunity to validate what they might be feeling, but also guides them on ways they can seek help. As suicide rates for Black youth continuously rise, students must understand the importance of their mental health.

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Putting Success in the Budget for DCPS

Presenter's Name: Courvaun Hill
 Classification: Graduate Student
 School/College: Social Work
Presentation Type: Oral Presentation
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Coauthors:

4th grade results from literacy and math proficiency exams highlight the achievement divide between white students and students of color in the DC Public School System. The Office of the State Superintendent of Education for DC reported PARCC exam from the 2021-2022 year that shows this wide gap. The 4th grade data shows 81.59% of white students, 28.98% of Hispanic/Latino students, and only 16.7% of black students meeting proficiency. (OSSE 2021-22 State Level PARCC & MSAAData). Educational segregation can be seen by following the matriculation patterns of DCPS schools, graduation rates and demographics of varying schools across the wards. This gap has been created through years of strategic institutional methods, however DCPS and OSSE could shift the tides of support and the direction resources pour into. These two agencies control budgeting and funding for the schools in the district. OSSE has the power to direct and create policies dictating where funding and school expenses are allocated. OSSE's involvement in allocating funds to prevent major literacy decline in 8th graders shows that financial efforts can be used to help with this achievement (OSSE, 2022). DCPS current budget follows an "equal distribution for all" model that ultimately negates needs specific to minority and at-risk populations. An analysis of the research evaluates the methods of DCPS budget allocation and ultimately pleads the case of policy evaluation to focus on equity and addressing the needs of vulnerable populations, thus closing the gap, and increasing success for DCPS and its students.

Exploring Social Studies Curriculum Through a Black Lens

Presenter's Name: Kennedy James
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 School/College: Arts & Sciences
Presentation Type: Poster Presentation
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Coauthors:

Throughout their K-12th education, students will learn about the origins and history of American slavery many times. In these lessons, slavery is presented very clinically; often times, the facts of slavery are presented without any perspective or uniting theme, concentrating on the violence perpetuated against enslaved persons. As a result, in association with BRISCLAB, I have developed social studies curriculum for 7th- 9th grade students that threads a theme of resistance and

resiliency through the history of slavery. BRISCLAB, or Black Representation in the Science/STEAM Curriculum Lab, is a lab designed to increase curriculum curated by black researchers and educators for all students. As a black researcher in this lab, I develop curriculum that centers the black experience and highlights overlooked perspectives. My current research focuses on the Gullah/Geechee Nation, a unique community of descendants of enslaved Africans that have retained many cultural links to their African ancestors. The Gullah/Geechee Nation demonstrates resiliency through culture by preserving and protecting their homeland, their language, and their various customs, religious beliefs, arts and crafts, and diets. The purpose of this curriculum is to equip teachers with lessons designed to establish humanity for enslaved Africans and their descendants and to provide students with the ability to draw connections between the history of slavery and its current effects. Overall, this research aims to develop a student's knowledge base of slavery and its consequences with a foundation of humanity and a perspective of resilience.

Complexities of Identity: A Qualitative Study of HBCU STEM Doctoral Students Pursuing a Career in Academia

Presenter's Name: Briayanna Johnson
 Classification: Graduate Student
 School/College: Education
Presentation Type: Poster Presentation
 Faculty Advisor: Veronica Thomas
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Coauthors: Elizabeth Ricks, Veronica Thomas

Background: There is a long-standing history of racial disparities in the STEM (science, technology, engineering, mathematics) field. Although scholars have recognized the historical roots of the underrepresentation of minorities in STEM, little focus has been given to the narratives of successful STEM doctoral students attending Historically Black Colleges and Universities (HBCUs). These students provide a unique lens for understanding the intersection of race and STEM. Using a critical race theory framework, this study examined HBCU STEM doctoral students and their pursuit of an academic career, exploring the challenges they face, the strategies they use to navigate these obstacles, and their perceptions of their intersecting identities. Methods: Researchers conducted focus groups with eleven HBCU STEM doctoral students from a variety of STEM disciplines. Students (five male, six female) were of African/Black descent. All participants intend to enter the professoriate. Results: Findings revealed insights into the narratives of HBCU STEM doctoral students, particularly how their ethnic identity interfaces with their STEM identity and how they envision themselves as a STEM professor and researcher. Four overlapping themes emerged from the students' responses: representation, intersectionality, inclusivity and affirmation, and changing the narrative. Conclusions: This study gives voice to the perceptions of Black HBCU STEM doctoral students. While HBCU STEM doctoral

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students recognize obstacles related to institutional racism, lack of resources and support, they persist in STEM with the intersecting goals toward personal accomplishment and uplifting people and communities of color.

The Impact of Parenting Styles and Family Structure on Social Competence among African American Elementary School Children

Presenter's Name: Nneka Okoro

Classification: Undergraduate Student

School/College: Education

Presentation Type: Poster Presentation

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Coauthors:

Bronfenbrenner (1979) discusses the impact of the microsystem on the development of social competence in children. Bronfenbrenner indicates that parent-child relationships exist within the microsystem and this system has the most direct influence on a child's development. Therefore, this study will examine the impact of parenting and family structure on the social-emotional development of young children. This study will specifically examine the extent to which maternal warmth, parenting styles, and family structure influence perceptions of social competence in African American elementary students. This is a critical period of development as children are beginning to develop their sense of industry and agency. The study used data from the Early Childhood Longitudinal Kindergarten class 2010-2011 (NCES, 2001) to investigate predictors of social competence among African American elementary children. Multiple linear regression was conducted to examine the relationships between maternal warmth, parenting styles, family structure, and perceptions of social competence. Preliminary results show relationships between maternal warmth, parenting styles, family structure, and perceptions of social competence. Gender differences will be discussed. Implications for policy and practice and additional findings will be presented.

A Look at the Effects of Mentorship on Black Undergraduate STEM Students

Presenter's Name: Jasmine Prime

Classification: Undergraduate Student

School/College: Arts & Sciences

Presentation Type: Poster Presentation

Faculty Advisor: Catherine Quinlan

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Coauthors:

This presentation is part of a larger project related to a mentor-mentee program in STEM at an HBCU. This presentation explores literature to understand current mentoring research

and mentoring models and their effect on underrepresented undergraduate STEM students. Mentoring is necessary to increase diversity, inclusion, and equity within STEM disciplines and STEM careers. The research questions sought to understand existing mentoring research, the effects of mentoring on STEM students, and how to use mentoring to support underrepresented students. The completed literature reviews were contrasted to see the approach, effectiveness, and methodologies used to establish mentoring practices and models at collegiate institutions. STEM departments at Howard University have begun to incorporate mentoring in their programs to support and retain undergraduate STEM students. Findings show that the mentoring model was used to combat factors that impact retention. One mentoring model employed a comprehensive support system for students. This model consisted of partnering with the university's Center for Academic Success. These addressed the learning styles, metacognitive strategies, study styles, research experience, mentor/mentee interactions, and academic advisement. Another mentoring model provided financial support so that students can focus on their coursework. Lastly, one university model used a blended modeling approach which led to different opportunities. Further research is required to understand why and how mentoring is essential for Black STEM students and their long term success within STEM.

Explorations of Spanish Moss by Elementary-Aged Black Homeschoolers From The DMV

Presenter's Name: Catherine Quinlan

Classification: Senior Faculty

School/College: Education

Presentation Type: Poster Presentation

Faculty Advisor: Catherine Quinlan

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Coauthors:

Elementary aged students of the Black Homeschoolers of DMV group began their explorations using the cultural capital of black heritage as an engaging context. The students were interested in the Spanish moss. As a phenomenon they made observations and inferences which led to their research questions. They were interested in understanding how the Spanish moss worked to lower blood pressure. Why won't you pick it up from the ground to use it rather than pick it off of the tree? The students used various kinds of reputable data such as inaturalist, to answer questions such as, where does Spanish moss grow, and other resources to explore what it is used for. Liv Brock will present on how you grow Spanish moss at home. Aryelle Fountain will present on the characteristics of the species that share Spanish moss, more particularly the similarities with pineapple. Eleana Fountain will present her findings on the chemistry of the Spanish moss. This was borne out of her curiosity about how poisonous the Spanish moss might be. Michael Quinlan will present his findings on plant species related to the Spanish moss. Their

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findings suggest that there is a distinction between freshwater and saltwater biomes as they compared which swampy areas has more Spanish moss. Students learned that Spanish moss has specific chemical property as it is used to lower blood pressure and as a packaging material. The findings have important implications for understanding the cultural capital of Native American heritage and Black heritage.

Black Representation In the STEAM Curriculum (BRISC)

Presenter's Name: Catherine Quinlan
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In this presentation I will share both the project outcomes and evaluation for the NSF funded project on Creating and Evaluating a Culturally Representative STEM Curriculum Supported by Next Generation Science Standards, which is ending this semester. This project resulted in several multimedia products including video clips and an animation along with handouts and research papers. Among the findings in this research is the research methodologies using pragmatic approaches for meaningful inclusion of Black heritage and lived experiences in the science curriculum. The findings showed that pragmatic approaches were needed to effectively capture the lived experiences and narratives of African Americans in the United States, such as the African American Gullah-Geechee, and of Black heritage in order to create meaningful science related engaging contexts and science content. The 5E model was used to create lessons. Findings also show that this work has important implications for understanding the epistemological views of the nature of science using the Views of the nature of science questionnaire, version C. This project led to important outcomes and products that can be used to further research on inclusion of Black heritage. Currently, students are training in curriculum development and in interdisciplinary research by tackling subject areas related to their own field of study in secondary education and elementary education. STEM students explore the importance of mentoring and peer-mentoring in the HBCU setting.

Longing for the "HBCU Experience": A Case Study Exploration of Campus Involvement During the Pandemic

Presenter's Name: Kathleen Rzucidlo
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Coauthors: Natalie Munoz

Using an intrinsic case study design, this paper examined the campus involvement experiences of students at an HBCU. By applying Strayhorn's theory of sense of belonging, findings revealed barriers and challenges students face, pandemic-associated trauma, and detailed explanations of how students make sense of their "HBCU experience" during the pandemic.

Dis-"Cypher"-ing Cannabis: How Cannabis Affects Communication and Cognition

Presenter's Name: Nailah Smith
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Coauthors:

Autism spectrum disorder (ASD), attention-deficit hyperactivity disorder (ADHD), and epilepsy are pervasive conditions that can affect communication skill development across the lifespan. Despite their adverse side effects, pharmaceuticals are often prescribed to mitigate the deficits caused by these conditions. Cannabis has been documented to improve many of the symptoms that directly or indirectly affect cognitive-linguistic skills and other areas of communication. Speech-language pathologists (SLPs) are often critical members of the interdisciplinary team that treat these individuals. Therefore, SLPs should be aware of the impact of commonly prescribed pharmaceuticals for these conditions as well as alternative therapy options so that they can make appropriate considerations for treatment and support families as they navigate the medical landscape. This presentation will provide SLPs with an understanding of how the endocannabinoid system regulates various bodily functions and how this system interfaces with cognitive-communication skills and other skills that SLPs address within the scope of practice as they serve people with ASD, ADHD, and epilepsy.

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Association of Western Diet with Breast Cancer in African American Women

Presenter's Name: Michaela Spears
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Presentation Type: Oral Presentation
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Coauthors:

African American women have the highest breast cancer mortality rate and prevalence. Studies suggest it may be because African Americans consume more foods along a Western dietary pattern, which has less vegetables and minerals. The Western and Western-like dietary pattern has been found to increase the risk of breast cancer because it is high in glycemic load and fatty food patterns (Agurs-Collins, 2009). As a result, there is a greater risk of obesity, cancer, and chronic illnesses. This study examines if increasing consumption of vitamin A in addition to focusing on diets prioritizing vegetables, potassium, and calcium can help decrease the risk of breast cancer in African American women. Retinoids and carotenoids acquired through diet or supplementation have been shown to decrease the risk of breast cancer in White women, but there is lacking studies examining the effects on African American women. African American women have been reported to have lower vitamin A intake and status based on serum retinol concentrations compared to White women statuses (Bitsie et al., 2021). I analyzed three different articles focusing on dietary patterns in premenopausal African American women that stated whether different diets and increased consumptions of vitamin A had a positive or negative relationship with the development of breast cancer. Focusing on obesity and the evolution of nutrition for cancer prevention in racially/ethnically diverse populations is necessary in order to reduce breast cancer prevalence in African American women and provide health equity.

Cultivating Courage in the Classroom

Presenter's Name: Dougziana Thomas-Chan
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Coauthors: Nia Goodall

The goal of this study was to look at the role courage plays in student success in and outside of the classroom. This study was important as it speaks to the importance of social emotional learning which aligns with the Educating the Whole Child approach to ensuring student success. Questions guiding this research include (1) How is courage developed? and (2) How does it improve student engagement, learning and performance? Qualitative research was conducted to lay a foundation for a project involving the creation of a picture book. From the research, it was found that courage is a valuable and transferable skill that should be taught to students. It was also found that social emotional competencies are built when there are intentional activities implemented. Courage is an essential component of a growth mindset which has been proven to greatly improve learning and success. These findings are important to establish a basis for creating a picture book that centers a student navigating their thoughts and emotions which brings to life the encouragement of social emotional learning in the classroom. As students are equipped to manage and understand themselves, they will be better able to engage with others and be competent contributors to their communities.

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ENVIRONMENTAL SCIENCES & STUDIES

Oxidation of Iodide by *Cupriavidus necator*

Presenter's Name: Alejandro Alexander
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Coauthors:

The Hanford Site was used to produce plutonium in support of World War II. Consequently, large quantities of radioactive waste materials such as radioiodine (I129) have contaminated soil and groundwater at the site. This project aims to identify genes in bacteria involved in the biotransformation of iodine at the site. *Cupriavidus necator* was isolated from the site and designated as strain AD60. Previously in the lab, transposon EZ-Tn5TM <KAN-2> was inserted into *C. necator* AD60 (AD60) to generate a mutant library that could identify the genes responsible for iodine transformation. AD60 mutants were screened using a colorimetric iodide oxidation assay to identify transposon mutants that oxidize iodide to a significantly lesser extent than the AD60 Wild-Type (WT). Briefly, 960 mutants were grown in triplicate in 96-well plates, after 48h of growth in TSB broth. The cell-free spent broth, hypothesized to contain excreted oxidases, was combined with phosphate buffer and potassium iodide. Triiodide was produced as a byproduct of the oxidation reaction and was measured spectrophotometrically, and mutant values were compared to WT values using one-way ANOVA. Mutants with significant differences from WT were rescreened for confirmation. Twelve mutants were confirmed to oxidize significantly less iodide than WT. DNA extraction, followed by random amplification of transposon ends (RATE) PCR, and gene sequencing are in progress for the twelve mutants. Knowing the genes responsible for iodine transformation will inform strategies for the bioremediation of the Hanford Site and improve existing knowledge of iodine cycling by bacteria in the environment.

Initial and Secondary Growth Kinetics Analysis of *Shewanella oneidensis* MR-1 cultures in Complex and Minimal Media

Presenter's Name: Olabisi Bello
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Coauthors: Elan Holston, Mahtab Waseem

Radioiodine-129 (I129), in the form of iodate, organo-iodide, and iodide, is one of the major groundwater contaminants

at the Hanford Site in Washington State due to the leakage from nuclear waste storage tanks. *Shewanella oneidensis* MR-1 is a bacteria strain that can reduce silver and uranium and has shown potential to act as a bioremediation agent that converts the iodate to a less harmful, more easily remediated iodide compound. We hypothesize that to maximize the growth of *S. oneidensis* and take advantage of its reductive capabilities, planktonic cultures need to be initially grown in Tryptic Soy Broth (TSB) and then resuspended in glucose-based minimal media (GM9) for the bioremediation of iodate. We also propose that after 24 hours, the bacteria cells in GM9 will remain viable enough to perform further iodate reduction. UV Spectrophotometry was used to monitor the growth of *S. oneidensis*. Preliminary data suggest that the growth of *S. oneidensis* in TSB is significantly greater than the growth in GM9. This emphasizes the need for an initial cultivation in TSB to have sufficient bacteria cells for the bioremediation in GM9. Additionally, the data indicate that the bacteria cells remain viable in GM9. Further work is in progress to model the bacteria's growth kinetics in the different media. Success of this project will result in an established methodology for the investigation of planktonic *S. oneidensis* cells as a bioremediation agent against iodate. This may then be scaled to design novel microbial bioreactor systems for contaminated groundwater treatment.

The Global Sustainable Strategies to Achieving Net Zero Carbon in Buildings

Presenter's Name: Bianca Briscoe
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Coauthors:

This research will display the variety of efforts and practices that achieve net zero energy use outside of the United States. It will expound on the impact of materiality on the buildings energy input and output, and how countries internationally have implemented materiality choices that reduce energy inputs/outputs. This research will also discuss the impact on incorporating lighting strategies to achieve net zero, and the global case studies who have those strategies in practice. This research will also explain the impact of ventilation on energy usage, and provide examples of buildings with successful natural ventilation strategies that achieve net zero. I will also discuss the energy and water collection methods and its importance to achieving net zero energy usage. This will be supported with building precedents of different sizes with successful energy and water collection strategies. This

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research will also explain the building certifications available to set a standard for obtainable net-zero strategies. I will conclude the research by connecting the strategies and goals of net zero building usage to emphasize the need to connect our buildings to the environment, and consider our impact and footprint in the world for the long term.

Effects of operating parameters on membrane fouling

Presenter's Name: Hamid Ghaffari Nazarlou
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It is significantly important for environmental engineers to evaluate and simulate the application of pressure-driven filtration methods in bench-scale before implementing them in an industrial application. The microfiltration method is increasingly used to remove suspended solids from liquid wastes prior to ultrafiltration and nanofiltration processes. Furthermore, inorganic membranes, such as stainless-steel membranes, offer technical advantages, including greater separation, higher flux, and higher thermal, mechanical, and chemical stability. However, fouling of the membranes poses a significant challenge to the use of microfiltration method in separating of solids from liquids. As a consequence, it is necessary to gain an understanding of the dynamics and mechanisms that drive membrane fouling. For this purpose, the bench-scale tests were developed using the visualization cell unit to investigate the effect of typical operating parameters such as transmembrane pressure, particle size, solution chemistry, and temperature on membrane fouling. As a final step, the filtration cell was modelled using COMSOL Multiphysics. Following that, various operational and process conditions was evaluated, including fluid velocity, pressure, concentration, and the size of particles on the membrane permeation flux. The obtained results revealed that COMSOL Multiphysics allows us to couple multiple physics phenomena, which can provide a more comprehensive understanding of the system's behavior. Furthermore, the application of COMSOL Multiphysics on membrane filtration offers several advantages for researchers and engineers, including more precise modeling, reduced experimental costs and time, improved membrane design, and a better understanding of membrane fouling behavior.

Analysis of the Effect of Mycorrhizae on Growth and Primary Sex Ratios of Sorrel (*Rumex acetosa*)

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Rumex acetosa, commonly known as garden sorrel, is a dioecious weed of the Polygonaceae family. Sorrels have long been a source of scientific inquiry due to their heteromorphic chromosomes, a rare phenomenon in plants. Dioecy is also uncommon and has raised many novel ecological questions—especially regarding the mechanisms that influence female bias in *Rumex acetosa*. Arbuscular mycorrhizal fungi (AMF) are obligate symbionts that form mutualistic associations with plants to aid nutrient uptake and increase plant growth. While AMF is ubiquitous in vascular plants, there have been inconsistent observations of AMF associations in the Polygonaceae family. Using a greenhouse experiment, we investigated the effects of AMF on growth in *Rumex acetosa* by observing biomass between AMF and non-AMF cohorts. We also sought anatomical evidence of AMF associations by performing root staining protocols. Our results showed there was a significant difference in aboveground biomass between cohorts but not in belowground and total biomass. Additionally, we were unable to find any anatomical evidence of AMF colonization. We further investigated the composition of *Rumex acetosa* populations by using molecular methods to screen for plant sex. Primary sex ratios were evaluated using a PCR method to amplify a genetic marker only found on a Y chromosome. As expected, we found primary sex ratios were not 1:1. Our results suggest *Rumex acetosa* benefits from AMF in soil, leading to the need for further investigations of root anatomy to verify these associations.

More Than Miami Heat: How Chronic Heat Is Impacting Miami's Little Haiti Neighborhood

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Some believe relying on satellites, models, and technology will be a societal saving grace, and one that will remove the human elements of prejudice and error from science. Similarly to how our society functions, however, the implicit biases that favor particular groups of people over others also manifest themselves in how data and artificial intelligence are read,

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conducted, and used. Oftentimes decision makers are often not making predictions about the potentially devastating effects of natural disasters or current experiences of climate change with Black people and other historically marginalized groups in mind. Miami's predominately Black, immigrant, and working-class Little Haiti neighborhood is a prime example of this phenomenon. Results in inaccurate readings that could be the difference between life and death in a state where hurricane season—and the newly inaugurated heat season—is roughly half of the year. I hope to bring my work to recenter and rethink data science methodologies focused on issues of race to fill the gaps left by traditional science.

Chemicals & Indoor Air Quality

Presenter's Name: Theophile Ngangmeni

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Presentation Type: Poster Presentation

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According to the U.S. EPA (United States Environmental Protection Agency), poor indoor air quality (IAQ) is the third leading cause of death, claiming an estimated 335,000 lives per year. Therefore, it is important to be familiarized with the factors contributing to poor IAQ in order to prevent it—a substantial level of public awareness must be had in order to effect positive change. Sadly, despite being one of the biggest contributors to overall health and well-being in homes and various other construction types, IAQ may not be very well known. This research seeks to gain a comprehensive amount of knowledge on IAQ—what it is, why it's important, and how to deal with it—and to relay the information to all manner of people through visual graphics and otherwise representative media. To that end, a public survey putting numbers to those unacquainted with the topic was implemented. In doing so, it also revealed, to some extent, a general measure of cognizance on the issue. To eliminate bias, the survey was completed by people of varying backgrounds, resulting in a fairer sampling of the general populace. The survey results will be used to better cater the research to the less informed.

Poverty vs Obesity

Presenter's Name: Serenity Robinson

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There is an increasing obesity problem among American adults and children, especially in the pediatric and young adult populations. The rates of food insecurity have increased over the past decade, as have the rates of obesity, and these two seemingly contradictory conditions are connected. Despite not consistently finding a correlation between this and men, research suggests there is one between women. In the past few decades, obesity prevalence has doubled from 15.0% to 32.2%, due to inadequate resources and under-resourced communities. There is no consistent relationship between people's age, ethnicity, household income, and gender, so studies on people cannot be generalized. It's worth addressing modifiable risk factors, which can even drastically impact outcomes. Humanities philosophy still does a poor job of addressing issues such as the normative underpinnings and justifications of interventions aimed at bodily autonomy, health, self-esteem, parental autonomy or perceptions of beauty. (Porter 2018) An analysis of poverty and obesity in the lower classes is conducted for the purpose of examining their interaction. Throughout this study, peer-reviewed articles were reviewed to identify obesity risk factors, the philosophical basis of obesity, and how poverty affects obesity. It is difficult to compare the results of studies that use different measurement scales. Nevertheless, combining studies can be a useful tool to prevent and manage obesity in low-income communities as well as malnutrition in society as a whole. In order to achieve better results regarding the struggle between poverty and obesity, further research is needed to better understand the risk factors.

Data Pollution and Savage Algorithms

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Presentation Type: Poster Presentation

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This project entitled "Data Pollution and Savage Algorithms" examined environmental issues including air and water quality, heat, and rising water levels in selected communities across the United States. Those communities included Brentwood-DC, Curtis Bay-MD, Twin Parks-NY, Little Haiti-FL, Miscocokee Village-FL, Manchester-TX, Mossville-LA, and Grand Bayou Village-LA. The purpose of this project is to find discrepancies between EPA data and localized data as well as the experiences of the citizens. To get a better understanding of the community's assets, maps were drawn in order to better observe environmental impacts from highways, dumps, factories, etc. These maps were created using Google Earth, Google Maps, and ArcGIS. The results show hundreds of thousands of vehicles expelling smog in minority communities as well as significant holes in the EPA's resource testing procedures. In the future, a heavier focus will

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be put on Curtis Bay, Baltimore. Maps of tree coverage, vacant lots, and other potential greenspaces will be drawn to help the community visualize and eventually implement air quality control solutions.

Ozone Recovery

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The stratospheric ozone layer protects surface life from harmful solar ultraviolet radiation (Ball et al., 2017). The Clean Air Act prohibits the knowing release of ozone-depleting and substitute refrigerants during the course of maintaining, servicing, repairing, or disposing of appliances or industrial process refrigeration (Environment Protection Agency). The poster presentation displays an action plan for a master's thesis that explains ozone recovery and answers the following questions: 1. What changes can we expect in our atmosphere after its "recovery"? 2. What problems (in terms of radiation, pollution, etc.) will we still face? 3. With the same approach as the Montreal Protocol, how do we combat these problems and ensure that another ozone hole does not happen again in the future? Methodological approaches of the research include analyzing ozone data and maps as well as accurate climate models.

Curtis Bay Air Quality Issues

Presenter's Name: Nathan Van-eck
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This project discusses a two-year study on the extent of societal, cultural and historical bias in earth science data, which negatively impact predominately African American, Hispanic and tribal communities. While the health and safety of marginalized communities should be prioritized due to the historical legacies of systematic oppression and underrepresentation, data has overlooked solutions and instead, created more problems. Research on the Curtis Bay community in Baltimore, Maryland has presented strong correlations between health conditions and poor air quality data. Sadly, these problems are becoming more consistent and detrimental to the Curtis Bay community. My observations and antlers hope to bring more attention to the issue of climate

change and air pollution not only in Curtis Bay, but all of South Baltimore.

An Immodest Proposal: A Consortium of Ethical, Sustainable Ecovillages to Reduce Global Poverty

Presenter's Name: Charles Verharen
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Coauthors: John Tharakan, Flordeliz Bugarin, George Middendorf, David Schwartzman, Peter Schwartzman, Gada Kadoda, Bekele Gutema, Enrico Wensing

This paper's theoretical section offers a framework of values that members of a global consortium of sustainable ecovillages may use in their deliberations on the consortium's ethical principles. The paper's practical section first examines Professor Godfrey Nzamujo's application of three ethical principles in his Songhaï ecovillage model, including autonomy, autochtony and authenticity. A section on the applied ethics of successful Indian ecovillages, health center and ashrams follows. The paper then reviews parallel movements, such as work on a Sudanese Barefoot College, that help ramp up foundations for ethical ecovillages. The paper extends the discussion to include applications for urban ecocenters. The conclusion features Professor Abdul Kalam's proposal for a global network of ecovillages and urges the development of a web-based portal for network information exchange.

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ETHICS, LAW & RELIGION

Alternatives to incarceration: Is restorative justice diversion more effective in deterring first time offenders from recidivism in Washington and California?

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For the past three decades, crime rates in the United States have been on a steady decline, yet the rate of incarceration has exponentially increased. Only in the recent 15 years has there been a downward trend in imprisonment. Despite this, aggressive punitive policies of the 70s, 80s, and 90s has residually created a U.S. prison population that accounts for 25% of the world's prisoners. With overcrowding and dwindling resources exacerbating the inflated prison population, state courts have turned to restorative justice diversion to reduce carceral numbers. To evaluate restorative justice diversion as a viable tool to mitigate mass incarceration, we examine how impactful it has been on recidivism in two of the states with the most comprehensive diversion legislation and expansive programs— California and Washington. Data was obtained through online state criminal records, FBI reports on incarceration, recidivism reports from community-based organizations, and comparative studies from Washington and California policy research institutions. Results suggest that counties, where DA's offices offer pre-charge diversion programs, have smaller rates of recidivism and overall crime than counties that do not. This held true even when comparing large urban counties, with smaller and rural counties. This research suggests recommendations for improving existing programs and provides support for other states and counties seeking to implement restorative justice diversion.

Bankruptcy in Black and White: The Effect of Race and Bankruptcy Code Exemptions on Wealth

Presenter's Name: Matthew Bruckner
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Bankruptcy law in the United States is race-neutral on its face but, in practice, race matters. Our original research provides

an empirical look at how the facially neutral laws that allow debtors to retain assets in bankruptcy cases result in disparate outcomes for Black and White debtors. Racial differences in asset retention in bankruptcy cases play a role in perpetuating wealth inequality between Black and White debtors. The data demonstrates that facially race-neutral bankruptcy laws contribute to racially disparate outcomes by allowing White debtors to keep larger amounts of both personal and real property. First, in DC the median White filer kept slightly more than \$2,300 of their personal property than Black filers, despite reporting similar overall personal property values. The largest contributors to this disparity are retirement savings and vehicles. The median White debtor in our sample enters bankruptcy reporting lower values of both of these assets but sought to exempt more of these assets when they leave bankruptcy. Second, unlike personal property, where Black and White debtors enter bankruptcy with about the same amount of property, White debtors enter bankruptcy with more home equity than Black debtors (\$431,750 compared with \$249,000 at the median). Unsurprisingly, then, White debtors also leave bankruptcy with more home equity (e.g., the median Black filer retains roughly 70% less in home equity than White filers).

Are you my doctor? Exploring the legal implications of nurse practitioners, most prevalent in underserved communities, being treated as physicians.

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Nurse practitioners first made their rise in the 1960s as part of an initiative designed to prepare nurses to provide comprehensive care to serve a variety of needs that a patient required. Nurse practitioners were never designed to act as physician substitutes, but rather as an additional option for patients seeking healthcare. Due to a variety of factors, there is an increase in the number of people entering the profession of nurse practitioners rather than becoming physicians. As the healthcare industry changes, there has been an expansion of the scope of practice of nurse practitioners. Now, more than ever, nurse practitioners are able to gain independence and establish autonomy by providing medical care without the oversight or management of a physician. Under full practice, nurse practitioners can prescribe, diagnose, and treat patients without physician oversight and can operate their own practices in the same ways physicians do. Twenty eight states and the District of Columbia have approved full practice

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status for nurse practitioners, a choice that allows them to assess, diagnose, interpret diagnostic tests, and prescribe medication completely independent of a physician. Despite the similarities between the professions, full practice nurse practitioners are still held to different standards of care than that of a similarly specialized physician. I propose that primary care nurse practitioners under full practice regulation, who provide independent medical care similar to that provided by a physician, should be held to the legal standards of a reasonably well-trained primary care physician.

**The Place of Speech in West African Coup D'états:
A Consciencist Analysis of Transitional Governance and
State Sentiment**

Presenter's Name: Jy'mir Starks

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Presentation Type: Oral Presentation

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The transitional governance structures of Mali, Guinea, Chad, and Burkina Faso, brought on by coup d'états, are analyzed through an augmented Consciencist Communication Theory that utilizes a Kemetite interpretation of speech and governance. The purpose of the study is to recognize the role of speech within contemporary African governance that is not limited to the conceptual tools of the Western European intellectual tradition. The study will be conducted through a content analysis of speech acts from the governing body that are interpreted qualitatively and of societal sentiment from the governed body that are interpreted quantitatively. The intellectual tradition of Kmt-Nubia BaNtu-Kongo is utilized to engage the transitional governance structures of these states in order to provide an analysis of African phenomena that is grounded in Africana traditions. The study is significant in that the findings will be analyzed from an Africana intellectual base, with the implications being that if African traditions of speech are utilized within the governance process, then the societal sentiment will be approving of the governing body. This is a preliminary venture into Africana Legal Study that seeks to serve as a bridge from the discipline of Legal Communications towards a canon of thought that is firmly grounded within the African Deep Well of Thought.

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HUMANITIES

Contracting in the Void: Finding Black Women Within Mills' Corrective Justice Theory

Presenter's Name: Justina Blanco
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This project argues that Mills' articulation of corrective justice within the racia-sexual contract does not adequately account for the conceptual invisibility Black women experience not just as nonsubjects but as nonobjects. Drawing on the work of Patrice Douglass and Frank B. Wilderson this project builds on the central tenets of Afro Pessimism by applying them to social contract theory. This framework highlights three issues for Black women within Mills' corrective justice frame; the conceptual invisibility of the Black feminine, the difference between 'natural' and 'social' difference and the impossibility of an opposing just subject for Black women. These issues are addressed through the dissolution of the 'subject', taking Shatema Threacraft's employment of Martha Nussbaum's capabilities approach further to alter the conceptual frame of racialized, gendered corrective justice. In proposing a surreal contract this project seeks to address racialized gendered injustice as a multidirectional form of injustice as opposed to the unidirectional distributive nature of racialized economic justice. Focusing on the capabilities that remain inaccessible to Black women and other 'subjects' allows this adaptation to Mills' theory to function in the conceptual void Black women exist in within Western society.

From Riots to Reporting: How America's Political Climate Affects News

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The purpose of this study is to examine the different ways that America's political climate affects news production. One goal of the study is to use research in order to show the relationship between America's political climate and news production. Historical context as well as a detailed literature review will exemplify specific instances in the nation's more recent history to show the correlation between politics and news. Mixed methodology is the research method to be used in this study,

along with detailed comparative analysis. As for the theory that best aligns with this research, the Agenda Setting Theory will demonstrate how mass media outlets, like a news service, influences the public. Additional aims of this study include extensively demonstrating the importance of reporting politics accurately in the media, exemplifying the use of truth and avoidance of misinformation and disinformation, which both lead to the distortion of factual knowledge. Ultimately, the predicted outcome of this study will exhaust how broadcasting local and national political events in the media can affect all Americans. This research is to be exhaustive, illuminating, and descriptive.

"Digital Underground:" A Multimodal Critical Discourse Analysis of K-12 Black-Oriented EdTech

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EdTech provides an immersive mediated learning experience for students. Scholarship has suggested that education technologies are more than instructional materials containing factual information (Apple & Christian-Smith (1991), they have become channels of communication (Webcrawler, 2013) that convey messages concerning political, economic, and cultural knowledge (Apple & Christian-Smith, 1991). Scholars have found that mainstream educational technology in its print, audiovisual, and digital media forms reinforce dominant discourses of race, contributing to the marginalization of Black students. Conversely, Black-oriented education technology has been established to counter the marginalized status of the Black community within the education system by centering Black socio-historical realities amongst educational content (Young, 1999). Researchers have examined Black-oriented education technologies in their print and audiovisual media forms, but a gap exists in the literature on the presence of Black-oriented K-12 digital EdTech platforms. Thus, this study uses the theoretical framework of critical race theory and its tenet of storytelling and counter-storytelling and the methodological approach of a multimodal critical discourse analysis to explore three K-12 Black-oriented and Black-woman owned digital EdTech platforms as discursive communication texts. More specifically, I examine how the multimodal discourse on K-12 Black-oriented digital EdTech creates conditions for the emergence of these platforms as counter-hegemonic structures and how as a complex whole, these digital platforms express the relationships between power, ideology, and language. Preliminary findings suggest

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that the multimodal discourse on K-12 Black-oriented digital EdTech represent the disruption of dominant ideologies of race by centering Black students, Black epistemologies, and Black cultural experiences.

Food or Foe? Western Perspectives Toward Entomophagy

Presenter's Name: Kelsey Coates
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Consumption of insects (entomophagy), while standard practice as a nutrient source in various communities across the globe, is not common in western societies and research on perspectives in the western world is relatively new. We aimed to systematically examine personal biases and challenges associated with entomophagy and to investigate the correlation between prior exposure to the practice and acceptance. Using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we searched six online databases using terms related to "Entomophagy," and "Western Perceptions." We included articles published in English from 2007 and 2023, that assessed consumer attitudes and beliefs of adults towards entomophagy in western countries, regardless of gender or ethnicity. We excluded systematic reviews, studies that involved children, evaluated insects as animal feed, and involved the use of entomophagy in medical practices. Two reviewers screened, selected, and coded articles independently. Reviewers collaborated to settle discrepancies in selection and quality assessment. Results were documented based on major findings across studies. The initial search yielded 2,901, of which 29 articles (participants n= 11,909) qualified for the review. Twenty-seven-articles (n=10,685) identified several challenges including sensory perception, food neophobia and disgust, peer acceptance, unfamiliarity, effects on health and the environment, and curiosity. We found only two studies (n = 1,224) that examined the relationship between acceptance and prior knowledge, and both revealed a positive relationship between the variables. To date, entomophagy is not well accepted in western societies. Future research should uncover effective tools for increasing acceptability and value for the practice.

Dr. Merze V. Tate - Scholar Diplomat

Presenter's Name: Rachel Craddolph
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Dr. Merze V. Tate was a woman of firsts including first Black woman to earn a degree at Oxford, first Black woman to receive a PhD in government from Harvard, and first Black woman in the History Department at Howard University. A diplomatic historian, Tate did not focus her work on domestic issues, which was extremely rare for the time. She saw the struggles abroad against imperialism as connected to the struggle of African Americans in the United States. Current scholarship on Tate looks at her from an intellectual perspective while weaving in her travels. Tate traveled extensively and one can see how these travels influenced her work. The main purpose of this research will focus on Tate's international travels and centering her within the literature on Black women's internationalism. Tate traveled throughout Europe in the run up to World War II and was a Fulbright scholar in India. These travels sparked an interest that influenced how Tate approached her research. It is important to situate Dr. Tate in black women's internationalism. Dr. Tate because she was one of few Black people researching and publishing on international relations. A field that is dominated by white men, Dr. Tate was a trailblazer whose work explored colonialism, imperialism at a crucial time in U.S history. Exploring her travels adds to the scholarship on black women's internationalism and once again Black women were not on the sidelines when it came to international relations.

The Arabization of Africa and Its Double Destruction of the African Identity: SUDAN

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In this work, I present a critical analysis of the impact of Arabization in Africa and how it has systematically erased and destroyed major components of indigenous African identity, with a particular focus on the country of Sudan. Major historical events such as the Arab Slave Trade and Arab occupation of Sudan, are largely ignored in the Arab World and are rarely taught both in the Western and African systems. Due to Western colonization and the additional Arab occupations of some African states, such as Sudan, Arabophone African states

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have experienced a “double” colonization. I will delve into the psychological, physical, and political impact that this “double destruction” has brought upon native Sudanese and African peoples including the erasure of their indigenous languages and identities (such as the Nubian language), the perpetuation of separationist sentiments of an “Arab” North Sudan and non-Arab South Sudan, the spread of anti-Blackness and separationism between North and Sub-Saharan Africa, and the complete shifting of Sudanese and African self-perception in regards to ethnicity, identity, and regional affiliation. The theoretical approach I will be using will be colonial theory which will explain the psychological effects of the colonizer/occupier to colonized/occupied peoples relationship. This will be supported by the conceptual framework of Arabization and its erasure of native African cultural affiliation and identity. Key terms in this research include Arabization (ta’rib), colonization, separationism, and indigenous peoples. I will be using the historical method of research and an analytical approach of this subject.

Investigating Food Insecurity in Black Dominated Communities in Baltimore City: A Critical Research Method

Presenter’s Name: Miriam Hagan
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Background: After the migration, African Americans found mass employment in new industrial jobs, although their conditions were often poor relative to white workers in Baltimore. The material and social collapse heralded by deindustrialization, and intense racial conflicts, led to the abandonment of urban centers, depriving Black cities of resources, including access to grocery stores with healthy affordable foods within 0.5 miles. The purpose of this research was to investigate food insecurity in Black dominated communities in Baltimore city. Methods: This research was conducted using critical textual analysis, critical historical methods, and critical ethnography. A total of 123 Tweets within 2015 to 2021 were analyzed using critical textual analysis to investigate how Black Baltimoreans responded to Food insecurity in their city. The ProQuest database was searched within the timeline of 1950 to investigate how African Americans exercised agency via media (i.e., The Afro news) to raise awareness about racial discrimination in their community; a total of 53 editorials were analyzed. Critical Ethnography was conducted for 4 hours to investigate the availability and quality of fruits and vegetables in Lexington Market. Results: Food insecurity, racial discrimination, and redline are three key pivot points of the black dominated communities in Baltimore city, and Lexington market pulls them together in a unique and powerful way. Blacks visiting

Lexington market are experiencing unavailability and poor quality of fruits and vegetables (F&V), which may influence food choices, and so does cost, as observed on the field, which may lead to an onset of preventable disease conditions.

Local Marvels and a Rhetoric of Skepticism in Tacitus’ Annals

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Tacitus, in his Annals, discusses marvels associated with local geographies and religious practices. How Tacitus embeds these marvels into his historiographical narrative differs from other historians, not least because he attends to the particulars of where a marvel is spotted and its relevance to their local environments, especially outside of Rome (Keitel 1999, Davies 2004, Shannon 2013). The phoenix in Book Six serves as an illustrious example (Syme 1958, Keitel 1999, Woodman 2017). This paper argues that the appearance of marvels in the Annals provides Tacitus with the opportunity to employ and model a rhetoric of skepticism (cf., O’Gorman 2000). This skepticism does not necessarily call a marvel into question – Tacitus admits that some marvels are true and significant for understanding their local community. Rather, Tacitus thematizes what had become an expected feature of Roman annalistic history. Tacitus makes marvels part of a historical inquiry that critiques the ways in which the language of the spectacular played a role in the political and historical discourse of the Julio-Claudian period, particularly on the margins of the empire. This paper reflects Tacitus’ interest in local communities outside of the Roman center by focusing on marvels that occur on the empire’s periphery: I examine marvels associated with specific places in Africa (Egypt and Carthage), unspecified locations in Germany, and the Euphrates. By modeling skepticism, Tacitus encourages his audience to adopt for themselves an interpretative authority over marvels that would normally be the emperor’s in the political sphere.

“Dazed and Confused”: How different and differing framing of COVID by government and popular media contributed to public confusion and noncompliance

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Language is not neutral; instead, according to the linguistic relativity theory language influences human behavior. The COVID-19 pandemic shocked the world, killing millions of people. The purpose of this study is to expand the theories of framing, cooperative principles, its maxims, and linguistic relativity to analyze the portrayal of COVID-19 by the government and popular media outlets to gain a better understanding of the public confusion and noncompliance surrounding the pandemic. The study will do so by uncovering the ways that government officials and popular media portrayed COVID-19 as a threat. The analysis centers on a set of representative examples from 2020 press conferences of both the former President and Dr. Fauci, as well as immediate responses from the media to those conferences. In one interview with NBC news, when talking about the pandemic, Trump stated, "Right now the risk is still low, but this could change"; however in that same interview Dr. Fauci warned that "the coronavirus could become "a major outbreak." (Haberma) This study will show how when too much, and contradictory, information is provided to the public, people may lean on what is familiar to them, that is various media outlets, which, while serving as connecting devices for people, can be also the sources of confusing and even false information. The importance of this study is that it brings attention to how different framing of the COVID-19 pandemic prompted different responses; and contributes to our understanding of the role of government and media's influence on public behavior.

Rethinking the Classics: Black Women Classical Scholars, Then and Now

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Today, America is plagued by ethnonationalism and white supremacy relying upon the authority of classical antiquity to forward their agenda. The reality, however, of classical antiquity is that it is not just the history of ancient Greco-Roman culture, but rather the study of ancient civilizations, the first of which began in Africa. The empires of Africa spread their influence throughout the Mediterranean and into the Levant and Europe, creating the cultures we know today like Greece and Rome. The diverse nature of classical antiquity was why it became an essential part of academic study for African-Americans in the nineteenth century and on to this very decade. Unfortunately, the field of study to which the West has traditionally been indebted has suffered for decades from the lack of diversity within its numbers. The field of Classics would not be what it is today if it were not for African American classicists, and, in particular, African American women.

Savages and Sable Subjects: Anti-Black Racism and Demonization of New Orleans Voodoo in the Nineteenth Century

Presenter's Name: Christopher Newman
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 School/College: Arts & Sciences, Graduate School
Presentation Type: Oral Presentation
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Prior to the Haitian Revolution, the religion of Voodoo maintained a primarily safe and uninterrupted presence throughout New Orleans. Practiced by free and enslaved Blacks, Voodoo thrived within the larger Creole culture of the Louisiana territory. However, after the Haitian Revolution, white New Orleanians began to demonize Voodoo as an evil superstition related to Haitian Vodou and more frightening, inspired the rebellion in Saint-Domingue. This mischaracterization would emerge from anxieties of rumors of slave uprisings, in no small part caused by an influx of free Black migrants and slaves from Saint-Domingue entering New Orleans. Theological objections were not the primary impetus for white aggressions toward Voodoo, however. Instead, as this discussion argues, anti-Black racism mythologized Voodoo as a form of witchcraft and devil worship, a belief which consequently still persists. This discussion uses primary sources like personal and government correspondence, journals and newspapers throughout nineteenth century Louisiana, and secondary resources from scholars in the field of Caribbean and Southern Louisiana Studies to chart the development of anti-Voodoo sentiment following the Haitian Revolution. Critical to this discussion is analyzing how and why white fears were a contagion which spread throughout New Orleanians' imaginations, shaping anti-Black/anti-Voodoo rhetoric. This discussion will conclude with a brief analysis of New Orleans Voodoo contemporarily to offer a critique of its modern commoditization to argue that once Voodoo was largely no longer feared it could be, and unfortunately has been exploited without full consideration of its cultural and racial histories.

Black Women and Literature: From Complexion to Complexity

Presenter's Name: Jayda Pickett
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Coauthors:

Literature is a tool that readers rely on to explore the world and gain different perspectives. Authors often utilize literary works to bring awareness to important social issues expressed

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through their characters. The author's decision to bring societal problems to the forefront can be counterproductive and diminish character complexity. For example, the intention to shed light on colorism and internal self-hate through literary works with Black female protagonists may overshadow characters themselves. Namely, characters tend to be one-dimensional and only depicted in relation to social issues, which takes away from character development, oversimplifies their identities, and potentially further reinforces generalizations in society. This study analyzes the depiction of Black female protagonists across time to understand how literary works address societal issues. Specifically, this project examines the first and last works of author Toni Morrison, *The Bluest Eye* (1970) and *God Help the Child* (2015). Toni Morrison's novels both focus on themes of colorism, oppression, and the destructive role of the white aesthetic, often leading to internal self-hate. While the novels do a great job of unpacking these themes and spreading awareness, the narratives do not provide a well-rounded scope of their protagonist's identities, leaving them solely in the lens of their struggles. By performing a close reading and thematic analysis of these novels, while also incorporating the analytical framework of Intersectionality, this study explores the counterproductive nature of highlighting societal issues through characters in literature. It argues for the incorporation of a more complete scope of Black life within literature.

**Breaking the Silence and Eliminating the Taboo:
Using a Peer Educator Model to Educate Black Women
about Uterine Fibroids in Houston TX**

Presenter's Name: Kimberly Prosper
 Classification: Graduate Student
School/College: Graduate School
 Presentation Type: Oral Presentation
 Faculty Advisor: Otto Chabikuli
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Coauthors:

Uterine Fibroids are one of the most prevalent gynecological disorders in women. Regrettably, many women are uninformed of what uterine fibroids are and the adverse effects they can have on a woman's health. Millions of women in the United States suffer from uterine fibroids, which are benign tumors that develop in the uterus. Symptoms of uterine fibroids include painful periods, heavy menstrual bleeding, and pelvic pain. African American women are disproportionately impacted. There is currently no effective preventative therapy. To alleviate the symptoms of uterine fibroids, a hysterectomy, a major surgical procedure, is usually performed. African American women receive the most hysterectomies to remove uterine fibroids and are unlikely to explore alternate uterus-sparing options. There is a knowledge gap concerning uterine fibroids symptoms, treatments, diagnosis, and prevention options among African American women. The first step in establishing health equity for Black women will be to increase

access to accurate and reliable health information. The capstone project is a proposal for a program to educate black women in Houston, Texas, about uterine fibroids using evidence-based instructional materials and methods. The proposed program would recruit and train black women as peer educators to improve the knowledge of uterine fibroids in the community. Pre- and post-assessments will be conducted in the first and eighth weeks of the proposed program to evaluate its efficacy. The proposed program will help strengthen black women's capacity to communicate this knowledge to other women, which will help overcome the stigma and silence surrounding uterine fibroids disease.

Bullerengue and Maroonage in Colombia's Atlantic

Presenter's Name: Mesi Walton
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Through the cultural practice of Bullerengue music, song and dance - the town of María la Baja has been able to overcome the self hate that developed from years of racism, discrimination and invisibilization. Community members have been leading initiatives to transform the mindset by emphasizing how unique and rich their culture is. Through Black beauty campaigns, curriculum development, the creation of cultural festivals and tapping in to the elders as a lead resource, María la Baja serves as an example of how a people can change their narrative through self-determination and collective work and responsibility. Stemming from the historic legacy and identification as descendants of freedom fighters and liberators, the people of this town tap into their ancestral legacy to re-create a curriculum that is self-affirming and honors their past and their present to re-direct their future. Bullerengue is one of the cultural phenomenons used as a connector to the lessons of life, of academics and of community. This paper will highlight the voices of María la Baja, a community of Palenque ancestry that leans on their history and strength as a self-sufficient and self-determined people to own and be proud of their Africanity, Blackness and María la Baja heritage.

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PHYSICAL SCIENCES & ENGINEERING

Bracing for Impact: Modeling Hypothetical Detonations with NukeMap and Python

Presenter's Name: Ali Abdus-shakoor
 Classification: Undergraduate Student
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Presentation Type: Poster Presentation
 Faculty Advisor: Saurav K Aryal
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Coauthors: Saurav K. Aryal

The threat of tactical nuclear usage looms with rising geopolitical tensions between nuclear-armed states. However, often the environmental impact of nuclear deployment is understudied. Usage of accurate data regarding the explosion radius, crater, fallout, and thermal effects of hypothetical nuclear detonations is necessary. To model these effects, we utilize NukeMap [1], a web application that supports wind direction, tonnage, and detonation altitude for nuclear explosions by location. For the web scraping of NukeMap, Python programming with the Selenium [2] library was utilized. As of now, the program can reliably extract data regarding estimated casualties, estimated injuries, fireball radius, light blast damage radius, moderate blast damage radius, radiation radius, thermal radiation radius, and fallout contours for various levels of radiation for a given location, tonnage, detonation altitude, wind speed, and direction. Using these extractions and data regarding waterbodies from OpenStreetMap Water Layers and Biodiversity occurrence records from Global Biodiversity Information Facility, we aim to evaluate the impact of different nuclear detonations on the environment. The study contributes to the literature regarding the impact of tactical nuclear detonations to inform not only military strategy but also address humanitarian concerns, support arms control negotiations, and raise public awareness of the risks associated with these weapons. [1] Eaves, E. (2017). NUKEMAP creator Alex Wellerstein puts nuclear risk on the radar. *Bulletin of the Atomic Scientists*, 73(4), 211-214. [2] Gojare, S., Joshi, R., & Gaigaware, D. (2015). Analysis and design of selenium webdriver automation testing framework. *Procedia Computer Science*, 50, 341-346.

Unlocking the Road Ahead: Predicting Future Car Locations with Rank Learning

Presenter's Name: Sameer Acharya
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Coauthors: Saurav K. Aryal

While the advent of self-driving automobiles is promising, they rely on centralized location data sharing to fulfill their potential. This sharing risks physical harm, cybersecurity attacks, stalking, and mass government surveillance. As a potential alternative, this study focuses on predicting the most likely destinations of an automobile, given its current state (velocity, acceleration, and geolocation). The dataset utilized includes 11.8 million rows of trip details for approximately sixteen thousand trips in Southern California. Each trip contains multiple frames that record the car's current state in a 100-millisecond interval. Since short-distance locations are best handled with car-to-car communication, we focus on a prediction interval of 10 seconds and skipped frames to ensure the target interval. Next, OpenStreetMap data is used to generate all possible destinations the vehicle can reach within ten seconds. A rank learning model, LambdaMART, implemented with the Light Gradient Boosted Machine Model, is trained to rank all possible nodes while minimizing Normalized Discounted cumulative gain (NDCG). This approach pairs the car's current instantaneous state (current velocity, acceleration, and location) with all possible nodes it can reach within 10 seconds and ranks them based on its most likely heading while focusing on predicting the highest-ranked nodes. Additionally, a comparison was made between the distance calculated using basic kinematics and the actual distance covered by the car based on the dataset. The results showed that the calculated distance was lower than the actual distance due to the velocity and acceleration variations across a 10-second interval.

Evaluating Impact of Emoticons and Pre-processing on Sentiment Classification of Translated African Tweets

Presenter's Name: Gaurav Adhikari
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Africa has long faced developmental challenges due to climate and geopolitical issues, resulting in a lack of funding and resources and a low output of research publications. Natural Language Processing research has also been hindered by inadequate preservation and support for Africa's numerous languages. Although research has been performed on sentiment classification for African languages (Aryal et al. #), it has relied on models pre-trained on low-resource languages and did not evaluate the impact of emoticons and domain-specific preprocessing. This paper examines the impact of emoticons and pre-processing on sentiment classification for

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English translations of 11 African languages. Using AfriSentiSemEval datasets, Roberta (Hugging Face) and Twitter-Roberta (Hugging Face) models are fine-tuned, and standard classification metrics are used to assess performance. The impact of emoticons and user tags on sentiment classification for African languages translated into English was evaluated, and no significant performance difference was observed with or without them. The best-performing model was better at identifying positive sentiments than negative or neutral, suggesting that translations from Google API may be more accurate for positive sentiments. More research is needed to improve the predictive performance of sentiment analysis, such as evaluating word-level translation, hyperparameter optimization, and addressing unbalanced datasets. The study concludes no significant performance differences with emoticons and pre-processing and no distinction between standard Roberta and domain-specific Twitter-Roberta, and emphasizes the need for sentiment analysis research in African languages.

Aryal, Saurav K., et al. "Sentiment Analysis Across Multiple African Languages: A Current Benchmark." 2023.

Hugging Face. "RoBERTa." https://huggingface.co/docs/transformers/model_doc/roberta.

Hugging Face. "TwitterRoberta." <https://huggingface.co/cardiffnlp/twitter-roberta-base-sentiment>.

Quantum Invariant Theory and Twisting of Quantum Groups

Presenter's Name: Awn Alqahtani

Classification: Graduate Student

School/College: Graduate School

Presentation Type: *Poster Presentation*

Faculty Advisor: Xingting Wang

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We will discuss the quantum invariant theory and how the quantum symmetries of algebraic objects are reflected in the twisting of quantum groups.

Tuning the synthesis of PS and PMMA grafted BaTiO₃ nanoparticles with focus on control of molecular weight, dispersity, and graft density for dielectric applications.

Presenter's Name: Ikeoluwa Apata

Classification: Graduate Student

School/College: Graduate School

Presentation Type: *Oral Presentation*

Faculty Advisor: Dharmaraj Raghavan

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Coauthors: Bhausahab Tawade, Dharmaraj Raghavan

Parametric control of molecular weight, dispersity, and graft density is fundamental to the formulation of polymer-grafted inorganic nanoparticles for next-generation polymer

dielectrics. The objective of this study was to investigate the role of various ATRP polymerization techniques such as Atom Transfer Radical Polymerization (ATRP), ATRP, and Activator Regeneration by Electron Transfer (ARGET) with the sacrificial initiator in achieving improved parametric control of poly (methyl methacrylate) grafted- and poly(styrene) grafted- BaTiO₃ nanoparticles (PMMA-g-BaTiO₃ & PS-g-BaTiO₃). FTIR, TGA, 1H-NMR, GPC, TEM, and DLS analyses were performed to evaluate the structure of the polymer grafted on the nanoparticles. For all the polymerization procedures adopted, we observed that in general PS-g-BaTiO₃ nanoparticles showed moderation in molecular weight and graft density (Ranges from 83,900 to 30,400 g/mol and 0.122 to 0.067 chains/nm²) compared to PMMA-g-BaTiO₃ (Ranges from 230,000 to 44,620 g/mol and 0.071 to 0.015 chains/nm²). Reducing the polymerization time during ATRP has a significant impact on the molecular weight of polymer brushes grafted on the nanoparticles. PMMA-g-BaTiO₃ synthesized using ATRP had the highest molecular weight and broader dispersity, compared to synthesis conducted using ATRP with sacrificial initiator, and least for ARGET. ARGET with sacrificial initiator offered the best control to achieve low molecular weight, and narrow dispersity for both PS-g-BaTiO₃ (37,870 g/mol & 1.259) and PMMA-g-BaTiO₃ (44,620 g/mol & 1.263) nanoparticle systems. This study paves the way for selecting appropriate synthetic approach for achieving dielectric properties desired for targeted applications. (A modified version of the work is invited for submission to *Molecules*). Funded: NSF DMR-1901127-POL

Skin Tone Detection using K-means Clustering

Presenter's Name: Surakshya Aryal

Classification: Undergraduate Student

School/College: Engineering & Architecture

Presentation Type: *Poster Presentation*

Faculty Advisor: Saurav Keshari Aryal

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Coauthors: Saurav Keshari Aryal, Gloria Washington

Computer vision (CV) has huge applications in today's world. However, many algorithms in CV, like face and emotions detection, have been found to be biased against certain groups, leading to inequalities and discrimination in these applications, often due to imbalanced datasets. In the context of skin tone detection, the primary challenge is the need for labeled datasets and the lack of standardization of skin tone scales to use. Our goal is to develop a robust skin tone detection algorithm as it has many commercial applications. Skin tone can be used as a variable for other algorithms and it can be used reliably to detect bias in other algorithms. For our research, we picked the "Labeled Faces in the Wild" dataset. It contains images of people in different poses and lighting conditions. By excluding a controlled environment, we can train and test the algorithm on diverse skin tones in various natural settings. Currently, we use the K-means clustering

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algorithm to detect skin tone across two different color spaces - RGB and CIELAB. This will be extended across additional datasets and the results will be saved accordingly. We are currently using the Monk scale for detecting and classifying skin tone but we plan on using additional scales such as Fitzpatrick. We are exploring additional algorithms and data features that can be used to improve skin tone detection. In the future, we plan to use both manual human annotations and automatic detection algorithms to compare the performance of algorithms and use supervised learning techniques.

Implementation of BANG-BANG and PID control algorithms in autonomous vehicles

Presenter's Name: Marvin Atwell
 Classification: Undergraduate Student
 School/College: Engineering & Architecture
Presentation Type: Oral Presentation
 Faculty Advisor: Dr. Michaela Amoo
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Coauthors:

Determining the perfect algorithm in autonomous platforms is a crucial task. The designing process must consider the ease of implementation, the reaction time, and the domain in which the algorithm could be used. Taking these into consideration along with the cost of manufacture, the designing process could be pretty tedious, and the designer could succumb to making a SWAP analysis. Two such control algorithms will be discussed in this paper along with their pros and cons and the best application scenario for each case. BANG-BANG algorithm also called the hysteresis control is a feedback control technique that switches between two states abruptly based on an input. This algorithm can be applied to the brake systems of autonomous vehicles among other things. The PID is an acronym for Proportional, Integral, and Derivative. These are three variables that when applied to a control system can affect the correction applied to the output. The algorithm is applied to the car's steering, throttle, and brake systems in order to manage errors in tracking. The aim of this research is to develop a PID and a BANG-BANG controller for an autonomous car that can provide accurate and reliable control of the vehicle's speed and direction, in addition to responding to sudden changes in the environment. We have started coding a sample for future implantation.

A.I. Modeling of Climate Change to Understand Human Health Impacts

Presenter's Name: Jonathan Barnes
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Presentation Type: Poster Presentation
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Various parameters impact climate change. If action isn't taken soon, the world faces drastic consequences. Many aerosol types play a role in harmful effects on human health. We have gaps in our knowledge on which Particulate Matter (PM) impacts health. JPL's Regional Climate Model Evaluation System (RCMES) is a comprehensive system for evaluating climate models on regional and continental scales. We aim to develop an AI-based model that makes air quality analysis and prediction models. This system can potentially support future data collection for the Multi-Angle Imager Aerosols (MAIA) NASA mission.

Implementation of the Near Field Refractor Problem Solver Algorithm

Presenter's Name: Cade Boggan
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Coauthors: Nora Fischer

A near field refractor is an interface between two media of propagation that refracts light to a desired target in accordance with Snell's Law and satisfying a given energy conservation constraint. The study of the near field refractor is primarily of interest in the design of compact optical systems used in street lighting, automotive headlights, medical lighting, and fiber optics. This project is an implementation of a computational algorithm that is recently developed in the work of Gutierrez and Mawi, On the Numerical Solution of the Near Field Refractor Problem, Applied Mathematics and Optimization, Vol. 84 Issue (2021) to obtain a near field refractor. By using MATLAB, a plot for the desired near field refractor model was constructed.

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Jet Flow- Shockwave Interactions in a Hypersonic Flow using a Continuum Method

Presenter's Name: Chavonne Bowen
 Classification: Graduate Student
 School/College: Graduate School
Presentation Type: Oral Presentation
 Faculty Advisor: Sonya Smith
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Coauthors:

The shockwave-boundary layer problem describes the phenomena in which a shockwave impinges a boundary layer causing flow separation, local regions of high heat transfer, and flow attachment. Notably, the viscous boundary layer moving over the surface creates aerodynamic heating and drag which is important for studies involving flight design and performance for re-entry vehicles in hypersonic flows. Atmospheric conditions for several geometries at high speeds are computed using the Reynolds-Averaged Navier Stokes (RANS) equations in the simulations of turbulent boundary layers using the computational fluid dynamics (CFD) software, ANSYS Fluent. Flow physics was evaluated for a flat plate, wedge, and cone geometries to examine the effect of boundary layer methods with and without a side jet. In addition, boundary layer analysis is conducted for properties related to heat transfer, flow separation, and boundary layer development. Results show that the Fluent simulations successfully predicted the flow patterns of interference for shockwave/boundary layer interactions. Furthermore, in all cases, adverse pressure gradients ($dp/dx < 0$) were present as the thickness of the boundary layer and viscosity increased due to the deceleration of velocity at the wall surface. Notably, with the presence of the jet, the boundary layer is more developed as shown in the shape factor profile where the momentum thickness is significantly greater compared to the absence of the jet. Separation locations and heat transfer correlations were calculated using Fluent data and compared to empirical correlations. The nature of these preliminary results of viscous effects and aerodynamic heating will be presented.

Jet Flow- Shockwave Interactions in a Hypersonic Flow using a Continuum Method

Presenter's Name: Chavonne Bowen
 Classification: Graduate Student
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moving over the surface creates aerodynamic heating and drag which is important for studies involving flight design and performance for re-entry vehicles in hypersonic flows. Atmospheric conditions for several geometries at high speeds are computed using the Reynolds-Averaged Navier Stokes (RANS) equations in the simulations of turbulent boundary layers using the computational fluid dynamics (CFD) software, ANSYS Fluent. Flow physics was evaluated for a flat plate, wedge, and cone geometries to examine the effect of boundary layer methods with and without a side jet. In addition, boundary layer analysis is conducted for properties related to heat transfer, flow separation, and boundary layer development. Results show that the Fluent simulations successfully predicted the flow patterns of interference for shockwave/boundary layer interactions. Furthermore, in all cases, adverse pressure gradients ($dp/dx < 0$) were present as the thickness of the boundary layer and viscosity increased due to the deceleration of velocity at the wall surface. Notably, with the presence of the jet, the boundary layer is more developed as shown in the shape factor profile where the momentum thickness is significantly greater compared to the absence of the jet. Separation locations and heat transfer correlations were calculated using Fluent data and compared to empirical correlations. The nature of these preliminary results of viscous effects and aerodynamic heating will be presented.

Hierarchical arrangement of proteins in spider silk filaments allows development of large toughness and resistance characteristics

Presenter's Name: Preethi Chandran
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Coauthors: Gabrielle Torain, Nyvia Lyles

Spider silk filaments exhibit strength and toughness characteristics per unit mass superior to materials like steel. The high resilience of the silk filaments, along with its desirable biocompatibility and biodegradability properties, has increased interest in using it as a biomaterial for regenerative medicine applications. It is not clear how a material made up of soft protein subunits held together by short-range inter- and intra-protein interactions can achieve high resistance and high extension characteristics. We argue that the hierarchical arrangement of proteins in spider filaments allow capitalizing on short-range catch forces by placing them in sequence with trip mechanisms like unraveling or unfolding dashpots. The latter prevents the over-loading of the catch forces and therefore their rupture. To investigate the hypothesis, catch forces were modeled as exponential springs and protein unfolding/unraveling was modeled as two-way dashpots. A force-strain equation for spider silk filaments was derived for four hierarchical arrangements of springs and dashpots.

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Various mechanics experiments in literature on spider silk were modeled. All combinations but one gave overall force and stretch patterns seen in experiments without the stress and strain exceeding on any catch or dashpot element to levels capable of rupturing single protein. The behavior of different silks and from different spider species could be captured by changing the spring and dashpot resistances in ways that reflected differences in the amino acid composition. Understanding the design principles of how spider silk filament achieve large toughness and stiffness with soft constituents allows us to design strong biomaterials.

Propagation of Excitons and Spin waves in CrSBr

Presenter's Name: Emma Charles

Classification: Undergraduate Student

School/College: Arts & Sciences

Presentation Type: Poster Presentation

Faculty Advisor: Kim Lewis

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Coauthors:

2D Semiconductors have the potential to improve spintronics due to the versatility of Van der Waals heterostructures that can be engineered. They could provide a foundation for better controlled charge and spin carriers and open the door to optically modulated magnonics. It has been an ongoing challenge to interconnect semiconducting transport properties and spin configurations. Previous work has shown evidence of strong magnon-exciton coupling in CrSBr on ultrafast timescales. CrSBr is unique in that it remains a semiconductor in its magnetic phase allowing the prospect for coupling between optical excitations and the magnetic order. The Delor group have developed stroboSCAT, an extremely sensitive technique for imaging energy flow in materials on fs-ns time scales. In this project we will investigate the propagation of excitons and spin waves in CrSBr using stroboSCAT at cryogenic temperatures. Increasing our understanding of transport in these materials will lay the groundwork for future research of 2D magnonic materials using stroboSCAT, and the development of spintronics devices.

Microstructure and Fatigue Performance of Additively Manufactured 316L Stainless Steel

Presenter's Name: Melody Chepkoech

Classification: Graduate Student

School/College: Engineering & Architecture, Graduate School

Presentation Type: Poster Presentation

Faculty Advisor: Dr. Owolabi Gbadebo

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This study analyzes the properties of 316L stainless steel (SS) fabricated via laser powder bed fusion (L-PBF). The

mechanical and microstructural properties of the L-PBF 316L stainless steel samples were compared with those of a standard wrought 316L material. Microstructural examination of the L-PBF 316L SS material is performed by optical microscopy and scanning electron microscopy equipped with an electron backscatter diffraction detector. Tensile tests were conducted at a strain rate of 0.001s⁻¹, while fatigue tests were conducted at a ratio, R= 0.1, and a frequency of 15 Hz. The L-PBF 316L samples depicted better tensile properties compared to the properties of standard wrought samples. An average of 614 ± 15 MPa ultimate tensile strength, 475 ± 21 MPa yield strength, and 72 ± 3.5 % elongation to failure were obtained. An average stress amplitude of 83.7 MPa generated a fatigue life beyond 2 x 10⁶ cycles and was thus considered the fatigue endurance limit. The fractured surfaces revealed the presence of dimples depicting a ductile fracture mode. EBSD results were used to obtain KAM maps that showed the degree of strain localization, the grain boundaries that showed the distribution of low-angle and high-angle grain boundaries, and IPF maps that showed the preferred crystal orientation of the grains. The EBSD results showed the change in preferred crystal orientation from <110> to <101> as the samples were deformed. The results indicate that the microstructure of the materials affects the mechanical properties of the L-PBF samples.

Machine learning approach to process and analyze large spectral data sets of lunar analog minerals

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Classification: Undergraduate Student

School/College: Arts & Sciences

Presentation Type: Poster Presentation

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Coauthors: Prabhakar Misra

The Neural Network Environment Learning Spectroscopy Signals project (NNESSL) aims to create an AI algorithm that can accurately match Raman spectra taken at 532 nm wavelength to a database of lunar minerals. The goal is to narrow the unfamiliar spectrum down to several possibilities based on the error, and calculate the concentration of certain minerals, such as the end members of the sulfide, oxide, phosphate, and silicate groups. NNESSL aims to recognize common lunar minerals, including organic compounds. The peaks are studied through trainable weight and bias parameter backpropagation by taking the intensity and Raman shift coordinate points in a CSV and running it through several layers of analysis. It compares the hit quality index between the inputs and weight vector to the weight and known mineral spectra, then narrows the list down to several possibilities and runs through a least-squares regression to compare the data. It will determine the best nonlinear transfer function from a variety of possibilities, including Rectified Linear Activation (ReLU), Sigmoid, Swish, and Softmax, to specify the internal processing of each node and minimize the error. In addition,

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the use of ordinary, weighted, alternating, or partial least squares will be judged based on the activation layer errors and how the input is transformed through the different nodes of the network. Python data processing has been used on Raman spectra in environmental science, so NNELSS holds promise to be usable for processing and analyzing large sets of lunar samples.

Toxics and Extreme Weather Effects for Different Insulation Materials

Presenter's Name: Alyse Dees
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Coauthors:

Background: Climate change has caused a massive shift in the climate patterns. We will continue to witness changing and unpredictable weather patterns and more extreme natural disasters. It is estimated that large scale floods will increase in frequency. Precipitation is already increasing and intensifying in a warming climate, a greater number of hurricanes will reach category 4 or 5, and record breaking temperatures and droughts have triggered a series of large wildfires. When these extreme conditions take place, buildings and building materials are either damaged or completely destroyed. Energy efficiency of buildings is a key part of efforts to reduce emissions and the longer term climate change impacts. Insulation is one key material used to improve energy efficiency, but these materials can introduce toxic chemicals into buildings and the environment. This research sought to understand what toxic chemicals are used in different insulation materials and what could happen to those chemicals and materials during extreme weather conditions. Methods: Through research and literature review, 6 types of wall insulation were investigated for their resistance to two types of weather conditions: fire, and water. Background research was done on each material to provide information about their chemical health. The materials were ranked based on their performance in each condition. Conclusion: Considerations of toxic content and resiliency to natural disasters must be a part of material decisions. The best insulation determination will vary by geographic, and trade offs may be necessary. Further research is needed to test these materials in a controlled environment.

Evaluating the Robustness of Open-Source Face Verification Models

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Computer vision models exhibit performance bias due to skin tone or the presence of noise. Such bias can lead to inaccurate results, which can have serious consequences, particularly in facial recognition or criminal justice. With the growing popularity of open-source models and software, this study aims to evaluate performance bias for Face Verification/Identification approaches publicly available and utilized in commonplace smartphone applications such as FaceID. The study utilizes twenty-four disparate face datasets containing diverse demographics (race/ethnicity, age, sex) and capture conditions (capture device, quality, occlusions, postures, lighting). We evaluate eight models (DeepID, Facenet, OpenFace, SFace, ArcFace, Facenet512, DeepFace) across each dataset using cosine and euclidean distance. Standard binary classification metrics of accuracy, precision, and recall are utilized to quantify the quality of the results across each dataset and model. To account for the pairwise comparison of over 5 million images, specific computational optimization algorithms were performed to make the problem tractable. Most models achieved mean accuracy in the 90-95% range when comparing images of different subjects but struggled greatly with same-subject images. The performance degrades further when images have noisy or postural variations. As expected, novel machine learning models, such as Facenet512, Facenet, and OpenFace, outperformed statistical and feature-based approaches. The lack of precision in publicly available models poses security risks since a false positive could result in possible jail time or missed flights. Future work will focus on improving the precision of these systems and quantifying the impact of skin tone and noise levels on model performance.

Implimentation of a Floating Point Arithmetic System

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Floating-point representation is an unencoded member of a floating-point format which represents either a finite number, a signed infinity, or some kind of NaN (Not a number). The most common framework devised is the IEEE 754 - 2008.

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Floating point operations are a crucial part in hardware applications. The most common floating point operations is Floating point addition. To design our own Floating Point Adder we relied on research papers which led us to focus on key areas. The relevant areas discussed were single precision mode of operation, architecture and timing, FPA algorithms and pipelining. The result of our work was a floating point adder 2 stage combinational adder with a barrel shifter. All components of the FPA were designed using the ModelSim software and written in VHDL. Lastly the design was implemented using Vivado and tested on the NEXSY A7 FPGA board to ensure that it functioned as expected. All design requirements were met and the Floating Point Adder was determined to be operational. The next step in our research is to develop a 2 or 3 stage pipelined Floating Point Adder.

Developing machine learning models for molecular dynamics simulations of atmospheric aerosols

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Solvation and heterogenous chemical reactions play a vital role in the absorption of small gas molecules in atmospheric aerosols. In addition to experiments, computational tools can significantly contribute to our fundamental understanding of these phenomena. However, the use of more accurate computational methods is prohibited by the associated computational cost. Often time classical MD (molecular dynamics) are used due to its low computational cost. But in many complex environments these classical models are inadequate to describe the required solvation and reactions. Instead of classical force field, DFT (density functional theory) based ab initio MD (AIMD) and its machine learned prototype can be used as a more accurate alternative to study solvation and reactions in complex environments. In this talk, I will discuss how the modern machine learning techniques can be used to extend the time scale and length scale of standard AIMD simulations.[1,2] Specifically, I will discuss the development of a reactive force field[3] to describe reactions of N₂O₅ (an atmospherically important small gas) in water and at the air-water interface. References:1.Zhang, Linfeng, et al. "Deep potential molecular dynamics: a scalable model with the accuracy of quantum mechanics." Physical review letters 120.14 (2018): 143001.2.Niblett, Samuel P., Galib, Mirza and Limmer, David. "Learning intermolecular forces at liquid-vapor interfaces." The Journal of Chemical Physics 155.16 (2021): 164101.3.Galib, Mirza, and Limmer, David. "Reactive uptake of N₂O₅ by atmospheric aerosol is dominated by interfacial processes." Science 371.6532 (2021): 921-925.

Theoretical modeling of magnetic phase evolution in bulk n[Bi₂Te₃] x MnBi₂Te₄

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The concept of electronic topology and the associated exotic states in quantum materials (QMs), such as the family of MnBi₂Te₄(MBT), brings an excellent opportunity for developing next-generation nanodevices, especially those requiring high quantum mechanical coherence properties. MBT is an intrinsic antiferromagnetic topological insulator and displays Quantum Anomalous Hall Effect. This form of MBT requires a large magnetic field to present ferromagnetism; however, it has been discovered that this can be remedied by adding (n) Bi₂Te₃ quintuple layers to the system. A new experiment has also found phase transitions from antiferromagnetic states to ferromagnetic to paramagnetic, with each transition related to the bulk thickness of Bi₂Te₃. In this work, we use density functional theory (DFT) to observe how differences in energies and band structure reveal antiferromagnetic to ferromagnetic to nonmagnetic phase transitions of n[Bi₂Te₃] x MnBi₂Te₄ (nMBT) derivative compounds. In addition, we plan to present differences between slab surface state structures and bulk structures and each form's resulting impact on the nMBT derivatives' electronic and magnetic properties.

Characterization of the Chemical Interaction of Laponite Filler with Model Latex

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Nanofiller loaded polymer provides a unique opportunity to enhance properties such as thermal, mechanical, barrier, hydrophobicity, and flame retardancy of polymer. The property enhancements are often dictated by the extent of nanofiller dispersion in the polymer matrix, and the interaction of the nanofiller with the polymer. The primary objective of this study is to investigate the chemical interaction of laponite nanofiller with model latex. Here, we use polyacrylic acid (PAA) as the model system for investigating acrylic latex interaction with laponite by casting libraries of film under various pH conditions. We use FTIR and TGA characterization methods

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to provide structural information of laponite interaction with the latex. We observed, a shift in the carbonyl of PAA and Si-O of laponite peaks towards lower wave number as a function of pH of the medium with the maximum shift at pH 7. We also observed highest onset decomposition temperature and highest char yield when the pH of the medium was 7. The peak shifts in IR, onset decomposition temperature and char yield were found to depend on the molecular weight of PAA used in the formulation of Laponite-PAA nanocomposite. Since pH has a major role in the observed trends, we speculate that there are electrostatic interactions between deprotonated PAA and positively charge edge of laponite. This phenomenon could influence the bulk properties of laponite filled PAA nanocomposite. The findings of the study can have a strong bearing on the design of next generation coatings, sealants, and adhesives.

Tribo-electrification Behavior of Milled Yellow Pea Powders

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To address the projected global hunger by 2050, sustainable plant-based proteins necessitate replacing or complementing animal-based proteins. This study combined the milling and tribo-electrostatic separation approaches to assess protein enrichment from yellow pea flour. Yellow pea was milled using pin and Ferkar milling systems equipped with 0.14- or 0.5-mm screen sizes. The milled flours were then pneumatically transferred into a Polytetrafluoroethylene tribo-charger tube at flowrates of 7–14 LPM and fractionated by two oppositely-charged plates holding ± 3 to ± 12 kV voltages in the fractionation chamber. The negatively charged plate (NCP) attracted protein, whereas the flours on the positively charged plate (PCP) and chamber bottom (CB) were starch-enriched. Based on General Linear Models, laminar flow (7 LPM) and moderate plate voltage (± 6.5 kV) produced optimal protein concentrate using 0.14-mm pin-milled flour. This condition recovered 62% protein and increased protein content from ~ 20 to 57%. Regardless of screen size, particles obtained higher specific surface area through pin milling. Hence, 0.14-mm pin-milled flour acquired the highest charge by collision, allowing for greater attraction of protein particles to NCP fraction. Plate voltage increased the NCP fraction's protein recovery but was ineffective on protein content due to electrode fouling at strong electric fields. Most of the starch granules attracted to PCP fraction in laminar flow, agglomerated with overcharged protein particles at turbulent flow (14 LPM), and attracted to NCP fraction, thereby reducing protein enrichment. This research provides key optimization information for non-destructive legumes protein enrichment.

Acknowledgment: The project was funded through USDA-NIFA-AFRI Grant #2020-67021-31141.

Investigation of critical behavior of layered ferromagnetic Cr₂Te₃

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Presentation Type: Oral Presentation

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High quality single crystal Cr₂Te₃ was synthesized by Chemical Vapor Transport (CVT) method. Single crystal XRD shows trigonal symmetry (P-31c). Critical behavior of ferromagnetic Cr₂Te₃ was investigated by bulk isothermal magnetization around the ferromagnetic phase transition. From this data, we estimate modified Arrot plot, the Kouvel-Fisher plot, critical isotherm, Widom scaling and determine critical exponents β , γ , δ values & Curie temperature $T_c = 168.3$ K. After the scaling, the isothermal magnetization curves below and above the critical temperatures collapse into two independent universal branches which signifies the reliability of the critical exponent values estimation. The determined exponents match well with those calculated from the results of the renormalization group approach for a two-dimensional Ising system.

Optimized Preparation of Polymer-Grafted Barium Titanate Nanocomposites using Atomic Transfer Radical Polymerization

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Presentation Type: Poster Presentation

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There is a strong demand for portable and efficient energy storage devices with optimum charging and discharging characteristics for a variety of applications. We have used various synthetic approaches (Atom Transfer Radical Polymerization (ATRP), ATRP with sacrificial initiator, and Activator Regeneration by Electron Transfer (ARGET) with sacrificial initiator) to synthesize core-shell nanoparticles which can be used to formulate polymer nanocomposite films with a range of graft chemistry. In this study, polymer-grafted nanoparticles were synthesized using Atom Transfer Radical Polymerization (ATRP) by varying the reaction times used to synthesize precursors. The precursor BaTiO₃ nanoparticle was prepared by varying the hydroxylation reaction times

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followed by silanization and anchoring of the initiator. ATRP of the initiator functionalized nanoparticles was performed with styrene and methyl methacrylate as monomers. The successful grafting of polystyrene (PS) and polymethyl methacrylate (PMMA) on BaTiO₃ nanoparticles was confirmed by thermogravimetric analysis (TGA) and Fourier-Transform Infrared Spectroscopy (FT-IR) measurements. Proton Nuclear Magnetic Resonance (1H-NMR) analysis of the cleaved polymer showed characteristic signals corresponding to PS and PMMA. The hydrodynamic radius of the polymer-grafted nanoparticle increased upon the polymer grafting as observed using Dynamic Light Scattering (DLS). Gel Permeation Chromatography (GPC) measurements of the cleaved polymer and Transmission Electron microscopy (TEM) characterization of the polymer-grafted nanoparticles will be performed to evaluate the role of reaction times on the structure of polymer-grafted nanoparticles. The findings of the research can have a strong bearing on the design of next-generation hybrid dielectrics.

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In-situ Standoff Raman Spectroscopy Using a Cube Rover and a Long-Distance Microscope for Lunar Science and Exploration

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In-situ standoff Raman spectroscopy has been identified as an important innovation for space exploration. A significant mission set to include the technology will be the European Space Agency (ESA)/ExoMars carrying the Raman Laser Spectrometer System. Our research focuses on creating a proof-of-concept for an in-situ Raman system that will be deployed on a commercial Cube Rover designed for surface exploration on the Moon. In conjunction with a long-distance microscope to collect the Raman signal and direct the excitation beam, this project will show the viability of three different optical configuration methods. The three different methods of Raman spectroscopy acquisition, namely direct excitation of a lunar analog mineral sample, excitation via mirror redirection, and excitation via passthrough using a long-distance microscope, this proof-of-concept explores the collection of a Raman signal on the rover and its transmission to a lander containing the spectrometer. This project seeks to optimize the signal-to-noise ratio, decrease losses over a distance in the optical fiber transmitting the signal, and determining an optimal optical configuration for in-situ standoff Raman spectroscopy for lunar exploration.

Visualizing Flow Effects on a Quadcopter using Wind Tunnel Testing

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The use of small, Unpiloted Aerial Systems (sUAS) in the collection of in-situ atmospheric data are possibly more effective than existing methods to include weather balloons, towers, and satellites. Incorporating rotary-winged sUAS as a reliable platform to perform routine vertical sampling of the atmospheric boundary layer requires extensive testing to understand flow effects of these systems. In a previous experiment, a DJI Matrice 100 quadcopter was simulated in ANSYS Fluent to evaluate the aerodynamics of flight while in hover via numerical analysis. However, a comparative wind tunnel smoke test needed to be completed to visualize physical flow effects and vortex shedding around the body of the drone and the propellers as well. The quadcopter was tested in an Aerolab subsonic wind tunnel with a 17" test section. Due to the size of the wind tunnel, a down-scaled, functioning, and proportionate model of the DJI Matrice 100 was designed in Fusion360 and 3D-printed with a Makerbot Replicator Z18. The accuracy of replicating the proprietary DJI 1345s propellers was the foundation of obtaining valid wind tunnel results for forces and moments as a function of wind speed. The contribution of this paper provides flow visualization results to further justify the placement of atmospheric sensors on a rotary-winged sUAS as a comparative study to that of the computational fluid dynamics paper.

Hypersonic Heat Transfer Correlations

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As the power and speed of aerospace vehicles increase, so does friction which is converted into heat by the internal drag on the vehicle. Hypersonic heat transfer correlations are vital for understanding aerodynamic heating without resorting to costly and time-consuming experiments. The research objective is to compare heat transfer correlations and to show where the space shuttle flight envelope predictions breakdown using the computational fluid dynamics software CFD++. The space shuttle flight re-entry envelope is a highly active area where many hypersonic vehicles are being developed for use. This

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region ranges from 25 to 300 kilometers in altitude and Mach numbers of 1 to 30. A predetermined set of varying velocities and altitudes in the flight envelope were tested to evaluate the heat transfer for a cone geometry of 5-, 15-, and 25-degree half-cone angles. The Taylor-Maccoll equations were utilized to make shock angle predictions for cone geometries for grid generation, scripting, and automation efficiency. A screening tool was developed with scripting to mark any case with an underpredicted shock angle leading to an incorrect flow field. By using simulations with the Taylor-Maccoll equations, the prediction of shock on blunter cone angle were accurate especially at a higher velocity and altitude. Preliminary results for this study will be presented to illustrate the nature of the data retrieved within the re-entry envelope.

Implementing a Graph Neural Network-based Bundle Adjustment on a FPGA-based SLAM Autonomous Platform

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Autonomous Platforms such as self-driving cars utilize Simultaneous Localization and Mapping (SLAM) algorithms to survey an unknown environment. SLAM algorithms such as Oriented Fast and Rotated Brief SLAM (ORB-SLAM) are software based and computationally intensive which make them difficult to implement in real-time. Researchers have explored different approaches to accelerate ORB-SLAM for real-time applications. One of the popular approaches is accelerating the most time consuming process in the ORB-SLAM algorithm, which is the bundle adjustment. Bundle Adjustment is usually framed as a non-linear least squares optimization problem where the objective is to find 3D point positions and camera parameters that minimize the reprojection error when dealing with a set of measured image feature locations and correspondences. The standard algorithm to solve the Bundle Adjustment problem is the Levenburg-Marquardt (LM) Algorithm, which is an iterative technique that locates a local minimum of the multivariate function. To accelerate bundle adjustments, researchers have explored a mix of software and hardware solutions. Software researchers have explored replacing the LM algorithm with a Graph Neural Network (GNN) that minimizes the reprojection error by representing the sets of images as a connected graph and learning from previous bundle adjustment optimization problems. Hardware researchers have experimented with implementing the LM algorithm in a Field Programmable Gate Array (FPGA) to utilize parallel computing and high processing speeds while using low power. In this work, the goal is to combine both of the previous approaches and implement a Graph Neural Network-based Bundle Adjustment on a FPGA-based SLAM Autonomous Platform.

Dispersion Effects of Laponite Filler on the Hygroscopic Properties of Nanocomposite Latex

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Nanofiller loaded polymer provides a unique opportunity to tune the hydrophobic properties of polymers. The objective of this study was to investigate the role of processing methods on the dispersion and property enhancements of Laponite filled polyacrylic coatings. Several processing methods were used to disperse Laponite, including planetary shear mixer (PM), ultrasonication, and hand mixing. The dispersion of the fluorescent tagged Laponite in the polymer matrix was mapped by confocal microscopy. PM and hand mixing yields a more homogeneous sample than the unmixed samples. For hygroscopic studies, we prepared unaged and aged laponite filled samples of various thicknesses. For nanocomposites samples of thickness less than 1 mm, the water absorption of nanocomposite was lower than that of unfilled samples. On the other hand, for thicker nanocomposite aged and unaged samples (greater than 2 mm), the water absorption of control sample was lower than that of the filled samples. These results strongly suggest that loading of Laponite, processing method and thickness of Laponite filled nanocomposite has a strong bearing on the water sorption capability of next generation coatings.

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Thickness-dependent properties of color centers in hexagonal boron nitride: a first principles study

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Since the discovery of quantum emission from hexagonal boron nitride (hBN) in 2016, a significant research effort has been directed to determine the chemical identities of the color centers responsible for the observed quantum emission. In the process, works have shown that properties of the as-yet unidentified color centers, such as their photo-stability and

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luminosity, are affected by: (i) the number of hBN layers, (ii) the presence of a substrate and (iii) even the twist angle between the layers. In addition, experiments show a wide spread in emission frequencies of the color centers. However, the mechanisms that result in the observed changes in properties have not been identified, although there is some indication that the strain in the hBN layers may be playing a role [Phys. Rev. Research 2, 022050(R) (2020)]. In this work, we used density functional theory to explore whether the presence of multiple layers is a source of strain due to “interlayer-friction”. We also determine the size of the thickness-dependent changes in excited state properties, and show how it contributes towards the spreads in quantum emission frequencies that have been observed in experiment.

Evaluation of the Effect of pH on Porcine Gastric Mucin III via Dynamic Light Scattering

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Porcine Gastric Mucin III (PGM III) is composed of O-glycans. Confirmation of the terminal sugar on PGM III is done via lectins. This experiment had three parts: A time stamp experiment to find out how much time it took the mucin to equilibrate once Hydrochloric acid was added; How lowering the pH affects mucin aggregation; and whether reversibility was possible using Sodium Chloride and PBS. In order to activate the exoglycosidases that are used to cleave the sugars on PGM III, a temperature and pH change are required. As we review aggregation effects of this pH change, this research is valuable in making certain that pH-induced aggregation is not confused with sugar-sugar cross aggregation. Aggregation was measured at six different times: 15minutes, 1hour, 2hours, 3hours, 4hours, and 1day. We found that after 15 min PGM III was able to equilibrate after the addition of Hydrochloric acid except for pH 4.8-4.3. This is because of a phenomenon called Sol-Gel in which the mucin is trying to assert whether to become more gel-like (aggregate) or stay in liquid form. We found that mucin begins to aggregate starting at pH 5, which is a pH used to activate our sialidase in the cross-aggregation experiments. We also found that mucin reversibility was successful at pH as low as 3. This experiment helped us confirm that in order to prevent errors in analyzing cross-aggregation data, it is imperative to increase the pH of the mucin again once the sugar has been cleaved.

Optimization and Characterization of condensed DNA Nanocontainers having protein cargo for gene editing

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DNA becomes condensed in the presence of positively charged polymers such as Polyethylenimine (PEI). The BAN Lab has used this phenomenon with mannosylated PEI (PEIm) which compacts DNA into nanoshells under certain conditions. The nanoshells are an opportunity to be a novel transfection platform capable of co-delivering DNA and protein into cells, which is currently non-existent. The overall goal of this project is to optimize and characterize the entrapment of proteins in the shells while also testing the function of the system in delivering intact proteins through the use of CRISPR CAS9 mediated gene editing . The parameters that were varied were the amount of shells, the amount of protein, the amount of DNA, and the type of media used during the transfection. The metrics for optimization were transfection efficiency, protein stability, and cytotoxic effects. GFP DNA with either CAS9 or BSA-TRITC protein were used to create the nanoshells. Transfection efficiency and cytotoxicity were tracked using fluorescence microscopy and FACS, encapsulation was tracked with Atomic Force Microscopy (AFM), and particle stability was tracked with Dynamic Light Scattering (DLS). Preliminary results suggest that the method has optimal transfection efficiency in complete media rather than conventional transfection media, and nanoshells can also be formed within a range of protein and DNA amounts. Further studies are being done to determine the best conditions for successful protein delivery for gene editing. Optimization of the platform and generalizing it for various protein types will enable co-transfection of protein and DNA with gene editing applications.

Investigating Plant Protein Separation Behavior in Mixtures of Dietary Fibers Utilizing the Tribo-Electrostatic Technique

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Plant protein mixtures were separated into protein- and dietary fiber-enriched fractions using a dry tribo-electrostatic separation technique. Binary mixtures of protein with dietary fiber compounds (i.e., cellulose and lignin) at 10%, 30%, 50%,

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70%, and 90% protein contents were first fluidized in dry air and tribo-charged using a nylon tube, then fed into an electrode plate-type chamber to be separated. The mixtures' separation efficiencies depended on dry air flow rate, tribo-charger tube material, diameter and length, and the electric field strength. Fractions attracted to the negatively charged plate (NCP) were rich in protein and had positive protein enrichment levels based on the mixtures' initial protein. However, the fractions attracted to the positively charged plate (PCP) and those that fell at the chamber bottom due to gravity were depleted of protein and had negative protein enrichment levels. As the protein composition of the protein-cellulose mixture increased, all fractions experienced a significant increase in protein content with approximately constant protein separation efficiencies. Likewise, the protein-lignin mixtures experienced similar trends of increased protein content in all separated fractions at the same conditions. However, their protein separation efficiencies were reduced as the mixtures' protein composition increased. The protein enrichment level of the NCP fractions obtained from protein-cellulose binary mixtures was significantly higher than the protein-lignin binary mixtures. The tribo-charging investigation will predict the particle-particle interactions to ascribe mixtures' chargeability to protein enrichment and separation efficiency.

Acknowledgment: This project was funded through NSF-HBCU-UP-RIA (#1900894) and the DOW SURE program.

Exploring Exoplanet Diversity through Network Analysis

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The discovery of over 5,000 planets outside our solar system has expanded our understanding of planetary science, but our current classification system limits our ability to identify and articulate novel categories of planets. To push the boundaries of our understanding, a novel network analysis method is proposed to identify exoplanetary kinds, discover sub-classes of hot-Jupiters, and reveal the role host stars play in planetary diversity. Over three years, a four-stage planetary network analysis framework will be implemented, including data curation and rescue, planet-planet network design, composition data network design for hot-Jupiters, and a bipartite star-planet network. These networks will explore planetary kinds and identify important properties that differentiate them, refine similarities within hot-Jupiter populations, and tie together previous findings to better understand how stars are related based on similarities of their planets. We will present preliminary networks and exploration of the exoplanet parameter space that demonstrate potential

trends and features that this project will shine light upon. This study aims to provide a foundation for planetary informatics studies and a multidimensional planetary classification scheme.

Factors Impacting COVID-19 Mortality and Spread: Combining Clustering and Supervised Modeling

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To address the challenge of grouping countries by their COVID-19 outcome progression and evaluating important factors, particularly in the context of a highly transmissible viral pandemic, we propose a two-step algorithm. First, we use unsupervised learning to label countries based on their daily COVID-19 case and death progression. These labels serve as ground truth for supervised and interpretable models such as logistic regression, Random Forest, Support Vector Machine, k-Nearest Neighbor, Quadratic Discriminant Analysis, Linear Discriminant Analysis, Decision Tree, AdaBoost, Gaussian Naive Bayes, and Multilayer Perceptron, which take input variables of interest. We model the input features as predictors of the learned progression label and use the best-performing model, after hyperparameter tuning, to evaluate the impact of factors and how they affect model fit as an indicator of their relative importance to real-world outcomes. While we have made significant contributions to the current research literature, further work is needed to improve model performance, and we may need to consider better methods of feature importance evaluation.

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Feature Importance Analysis for Mini Mental Status Score Prediction in Alzheimer's Disease

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Alzheimer's Disease (AD) affects 1 in 9 seniors. Acoustic-linguistic features show promise for AD detection [1]. However, few studies have analyzed the predictive importance of these features. This study trains models with top 54 features from State-of-the-art (SOTA) [1]. Then the best model is analyzed with SHapley Additive exPlanations (SHAP) to improve AD detection and predict MMSE scores. This study utilizes the ADReSS Challenge dataset, it contains audio/transcript data from 156 patients. We trained 4 models including lightGBM, SVM, kNN, linear model with SGD optimization, with the top 54 features [1], fine-tuned with Bayesian Hyperparameter Optimization, using SHAP values to predict MMSE scores through regression. The best performing model was lightGBM and through SHAP there were a top 6 features of lightGBM with Automated Readability Index (ARI) having the most significant impact. ARI measures text understandability, is related to MMSE, and shows the strongest overall association compared to other features. This finding suggests that ARI's capability to capture language impairment and morphosyntax is valuable in predicting cognitive decline in dementia patients. We were able to analyze ARI but there is a need to look into the other 5 features as well. This study provides a foundation for future investigations into features that may assist in predicting MMSE scores and the onset of Dementia.

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Design and Optimization of a Standoff Raman Optical System for Lunar Exploration

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The Howard University Raman CubeRover Team is developing an optical telescope relay system for standoff Raman spectroscopy for integration onto a Lunar CubeRover made by Astrobotic. The mechanical, thermal, power, data, and WiFi requirements of the CubeRover have been documented for integration into the rover. Several Computer Aided Designs have been developed for integrating the optical system onto the rover and relaying the signal back to the lander. Two proof-of-concept optical configurations have been demonstrated in the Laser Spectroscopy Laboratory in the Department of Physics & Astronomy at Howard University for collecting a Raman signal using: 1) an optical fiber cable and collimating lenses to collect the light and send the signal to a spectrometer and 2) a long distance Maksutov-Cassegrain catadioptric microscope to collect the light and relay back to the spectrometer via a fiber optic cable. Both configurations have been shown to successfully collect and analyze a Rayleigh signal. For the Raman signal, lunar analog minerals, specifically calcite and gypsum, are being studied in a dark environment to collect their Raman signal with reasonable signal-to-noise. Additional experiments are being conducted to enhance the signal-to-noise ratio of the Raman signal from the two samples.

Addressing Datagaps in Ear Biometrics Research: Diverse Ear Dataset

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The Artificial Intelligence (AI) biometric research community has predominantly focused on the face, iris, and finger biometrics, often overlooking the ear's potential as a reliable and effective biometric. However, the ear is a unique feature that is fully formed at birth, develops predictably, is less invasive, and differentiates monozygotic twins. Furthermore, the ear can add additional information for multimodal biometric recognition approaches. To advance the use of ear biometrics in human identification, the AI biometric community must fully explore and exploit its potential. However, research datasets in the current literature for ear biometrics lack real-world variability. As such, this research aims to develop a robust and reliable dataset to fill this current data gap. The images in the dataset were retrieved from publicly available sources. The gathered images are annotated with metadata such as Fitzpatrick skin tone, identities, gender, occlusion, pitch, roll, and yaw. Additionally, for each image, we manually label a mask for the location of the ear. We have curated a set of 1065 images, of which 759 have been fully annotated. Future work will be to perform established experiments [1] to validate the efficacy of our dataset. In the future, biometrics researchers can utilize our dataset to evaluate performance biases against

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skin tone, pose, occlusion, and variability. [1] Aryal SK, Barrett T, Washington G. Evaluating Novel Mask-RCNN Architectures for Ear Mask Segmentation. In Proceedings of the 2022 11th International Conference on Bioinformatics and Biomedical Science 2022 Oct 28 (pp. 46-53).

Zero-Shot Classification Reveals Potential Positive Sentiment Bias In African Languages Translations

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We employed the AfriSentiSemEval dataset, a recently released resource that provides annotated tweets across 13 African languages for sentiment analysis. Our analysis was performed on ten different languages and a combined dataset comprising all ten languages. However, given the persistent data limitations for specific languages [1], we translated each language to English using the Google Translate API and employed two distinct methods of translation: a single-tweet approach and a word-by-word approach. Evaluations were carried out for both sentence-level and word-level translations utilizing a pre-trained large BART model to perform zero-shot classification. We obtained class probabilities by feeding the model with three candidate labels—positive, neutral, and negative—and subsequently querying each translated tweet. Notably, the proposed approach yielded exclusively positive sentiment predictions for both translations and all languages. Upon analyzing the predicted probabilities within 1 standard deviation from the mean, we observed that the predicted probabilities were overwhelmingly positive across all languages. This outcome may stem from two potential factors warranting further investigation: loss of sentimental information during translation, and a bias toward data samples exhibiting positive sentiment harbored by the translation models, the data utilized to train them, and the algorithms employed. References: [1] Saurav K Aryal, Howard Prioleau, and Surakshya Aryal. Sentiment analysis across multiple african languages: A current benchmark. In SIAIA @ AAI, 2023. [2] Mike Lewis, Yinhan Liu, Naman Goyal, Marjan Ghazvininejad, Abdelrahman Mohamed, Omer Levy, Ves Stoyanov, and Luke Zettlemoyer. Bart: Denoising sequence-to-sequence pre-training for natural language generation, translation, and comprehension. arXiv preprint arXiv:1910.13461, 2019.

DFT study on the origin of chiroptical properties in 2D mixed achiral-chiral hybrid lead perovskites

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2D chiral hybrid organic-inorganic perovskites are an emerging class of multifunctional materials. Mixing organic achiral cations with the chiral ones creates new avenues to tune the chiroptical properties, e.g., circular dichroism (CD) response, to a greater extent. However, how the achiral-chiral cation mixing contributes to engineering the electronic and chiroptical properties is not well understood. By employing DFT calculations, we provide insights into the structure-property relationship in the mixed achiral-chiral system. Our work demonstrates that the achiral-chiral cations mixing leads to stronger asymmetric hydrogen bonding between chiral organic cations and inorganic sublattices, resulting in larger octahedral inversion asymmetry, which in turn engender larger spin-splitting and enhanced CD signals.

Different passivation schemes to control properties of near-surface silicon vacancy in silicon carbide

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Silicon carbide (SiC) hosts a number of spin-active color centers, such as the negatively charged silicon vacancy, which are important for use in quantum applications. In their role as qubit-candidates, these defects are inevitably placed in a nanostructured host. This is mostly done in order to enhance the signal from the defects. A recent work showed how finite size and surface effects not only modify the frequencies of the quantum emission from the color centers, but also adversely affect a defect's photo-stability [PRX QUANTUM 3, 020325 (2022)]. Using density functional theory-based calculations, we have explored chemical means of mitigating the detrimental effects of surface states in the as-created SiC nanostructures. We show that surface passivation with hydrogen and/or mixed hydrogen and hydroxyl groups can effectively remove surface states from the SiC bandgap, thereby reducing their hybridization with the defect states of the near-surface defects. This can also effectively reduce/remove the observed blinking and charge-state conversion of these defects from the bright negatively charged to the neutral dark state.

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Structure Driven Light-Matter Interactions in Photonic Materials

Presenter's Name: Eric Seabron
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Next generation information platforms based on planar integrated photonics and free space optics have shown significant promise for information processing and computing, as shown by the development of Integrated Microwave Photonics, Optical Neuromorphic Computing, and Quantum Photonics platforms. Our research utilizes experimental methods and Multiphysics simulations to explore interesting correlations between fundamental light-matter interactions and photonic device functionality in the Visible to midIR and THz regime. We are particularly interested in understanding how to use structurally driven anisotropy to modify or tune a material's "effective" optical properties. In this talk, we will introduce phase change chalcogenides on nanostructured silicon (PCNS) as a novel optical metamaterial with an actively tunable effective permittivity and anisotropic thermal diffusivity which leads to intriguing, lower power, dynamic behavior. We will also show how PCNS can be used to modify the resonant behavior of THz metasurfaces by creating small perturbations in regions of strong optical mode confinement. In addition, we will explore hyperbolic optical media with extreme in-plane anisotropy which supports interesting polariton interactions such as spatial confinement, power flow manipulation, and tunable resonant behavior. We will show how resonator geometry influences the optical behavior of mid-Infrared phonon-polaritons in highly anisotropic hyperbolic media which led to new fundamental physics and functionality for mid-IR photonics applications.

Design & Synthesis of Dithiocarbamate Ester Derivatives of the Tetrahydroisoquinoline Sub-Structure of Emetine for Studies in Prostate Cancer Cell Lines

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Prostate cancer is the uncontrollable growth of cancerous cells from the gland epithelium that acquire the ability to scatter. One of the main methods of prostate cancer treatment is hormone deprivation. Unfortunately, this method eventually leads to a version of prostate cancer that is treatment

resistant, castration-resistant prostate cancer. Currently, there are hormone therapies and chemotherapies that treat castration-resistant prostate cancer. Emetine is a natural product alkaloid that has the ability to inhibit ribosomal protein synthesis, which could be useful in cases of metastasis or treatment resistance. Emetine was studied in several phase I-II clinical trials from 1969-1974; however, the observation of toxicity in these clinical trials caused the development of emetine as an anticancer drug to end. Nonetheless, the Bakare Research Group has set out to develop an emetine analog that is only active in the tumor microenvironment. This research project is an extension of a previous study discussed in the published article, "Design, Synthesis, and Cytotoxicity Studies of Dithiocarbamate Ester Derivatives of Emetine in Prostate Cancer Cell Lines". This study found that alkylating emetine dithiocarbamate salts led to lower cytotoxicity and appreciable potency. This project explored the importance of the emetine substructures by utilizing the same alkylating agents, the same conditions, and 6,7-dimethoxy-1,2,3,4-tetrahydroisoquinoline, the bicyclic portion of emetine, to synthesize dithiocarbamate derivatives. These new emetine analogues will be screened for their cytotoxic activities in prostate cancer cell lines and compared to the data obtained from the full emetine analogs.

Investigation of Quantum Effects, Vibrational Modes, Absorption Bands of Various Quantum Dots through Experimental and Computational Methods for Sensing Applications

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Quantum dots (QDs) are nanoscale semiconductor materials with unique optical and electronic properties that make them promising candidates for various applications, such as optoelectronics, photonics, sensing, and bioimaging. Our research focuses on quantum dot molecules for qubits and the use of Raman spectroscopy and UV-VIS spectroscopy to study various QDs, such as CdSe, CdTe, Perovskite, etc. mixed with solvents (e.g. hexane and toluene) for sensing applications. We are exploring the possibility of using Raman spectroscopy to monitor the structural changes in QDs in response to external stimuli such as temperature, pressure, and different light excitation wavelengths. Computationally, LAMMPS has been used to model and simulate the vibrational modes of QDs. The ACCESS platform is being utilized to execute LAMMPS code for the QDs and visualize their vibrational modes. The results obtained are then compared with experimental data. The DXR SmartRaman spectrometer is used to obtain the Raman spectra of the QDs, and the vibrational modes are assigned

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to the peaks, which are then compared to the vibrational data obtained from LAMMPS. We are trying to improve the sensitivity and selectivity of the spectroscopic characterization of the QDs and explore the potential of QD-based Raman and UV-VIS spectroscopy for quantum sensing applications.

Financial support from the NSF Excellence in Research Award # DMR-2101121 is gratefully acknowledged.

The Use of Python Programming to Calibrate and Post Process Atmospheric Sensor Data

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The use of the python programming language in research continues to provide cheaper and more efficient ways to post process large data sets during research and development. This research utilizes Python 3 libraries to program a Raspberry Pi 3B+ to read data from an Alphasense OPC-N2 in near real time and perform data analysis. The Alphasense OPC-N2 is an Optical Particle (OPC) sensor measuring particulate matter (PM) on the magnitude of PM1, PM2.5, and PM10. The OPC was calibrated in July 2021 at a Department of Energy and Environment (DOEE) Air Quality (AQ) facility in Washington, DC with two known reference instruments, the BAM 1022, measuring PM2.5, temperature and relative humidity, and the Vaisala T/RH Probe, measuring temperature and relative humidity. The data from these atmospheric sensors was manipulated using python to attain matching frequencies as the OPC-N2 and reference instruments had different sampling intervals. The calibration between instruments established a baseline for the efficiency of the OPC, thereby justifying the accuracy of using Python 3 to program the sensor and post process the data. The successful calibration of the OPC provides the validation standards for the atmospheric sensor prior to its placement on a small, unpiloted aerial system (sUAS) to be flown around another known reference instrument.

Residual Resistivity Ratio of Niobium and Copper

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Task 3 of the Cryogenics Project(T3CP) aims to find a method to reliably evaluate the residual resistivity ratio(RRR) of material samples in order to assess its capabilities to be used in machinery that operates in space. By ascertaining a substance's RRR, it can more accurately be evaluated for superconductive properties applicable to energy storage and surge protection. T3CP is tasked with measuring the electrical resistivities of copper and niobium samples at temperatures ranging from 293K to 4k, in order to determine their RRRs. Sample wafer resistivities will be acquired through the use of the four-point probe method, in which four tungsten probes run a source current through the sample and measure the voltage across the sample, providing the information required to calculate said wafer's resistivity. The materials that will be used are copper and niobium. Copper due to its extensive use as a conductor at various temperatures and niobium due to its high critical temperature, allowing it to reach superconductivity at temperatures as high as 9.7K as opposed to 0K. Once resistivities of the copper and niobium samples are found, they will be charted using Mathway and MeasureLink software onto graphs plotting wafer resistivity by wafer temperature. Once the RRRs of copper and niobium samples have been found they can then be assessed for purity by comparing found RRRs with theoretical values.

Fast-Tracking Your Geospatial Queries with RTree-based Point-in-Polygon and Nearest Neighbor Search

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The point-in-polygon (PIP) and Nearest Neighbor Search (NNS) problems are fundamental computational geometry problems with practical applications across multiple fields, such as geospatial queries, autonomous navigation, computer vision, and robotics. However, combining PIP with NNS can be challenging because of the computational complexity involved and the potential for overlapping polygons for large datasets. This work proposes the utilization of an RTree data structure to speed up PIP queries for a given point to speed-up NNS without sacrificing completeness. First, we generate 200 random points within a predefined polygon for the DMV area. The DMV area is split into to generate 1.2 million random rectangular polygons. Each point and polygon is associated with 50 random numeric and categorical variables. We compare three approaches for a 10 NNS: (1) Perform NNS with k=100 and filter out with PIP searches, (2) Perform PIP and NNS for all points, and (3) Fit an RTree, perform PIP search and NNS search for returned Polygons. Of these approaches, (1) is not guaranteed completeness, (2) is correct but slowest, and (3) is our proposed method which trade-off building an

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RTree to speed up PIP queries and NNS. While the fit time was slower (1m37s) for the third approach than the first and second approaches (4.5s and 1.5s), the third approach performed a complete NNS in 17s, while the first and second approaches took 13s and 1h50m, respectively. Future work is to expand our work to evaluate more query points, memory usage, and time to add new polygons.

Bioremediation of radioiodine contamination via *Shewanella Oneidensis* MR-1 biofilms – a proposed design and kinetic study

Presenter's Name: Tochukwu Uyanne
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Coauthors: Mahtab Waseem, Tafadzwa Chigumira, Olabisi Bello, Brady Lee

Radioiodine-129 contamination of the Columbia River has had serious effects on the ecological health of the area and the quality of life of thousands of people who depend on the Columbia River system. Radioactive waste leaking from the Hanford site, a decommissioned nuclear weapons plant, has contaminated the area with over a million gallons of radioactive waste. Research has shown that *Shewanella Oneidensis* MR-1, a gram-negative bacterium, can reduce heavy metals like silver, lead and uranium via microbial dissimilatory reduction. In this study, we hypothesize that *S. oneidensis* can be used as a microbial reduction agent within a bioreactor to reduce radioiodine content in wastewater. Early results suggest that *S. oneidensis* can reduce radioiodine by up to 27% over 24 hours. Further studies will investigate the application of *S. oneidensis* biofilms in a novel plug-flow reactor system, utilizing A.I. assisted generative design to determine the optimal structure of the biofilm scaffold. In addition, the reduction capabilities and the kinetics of the reactor system will be analyzed under aerobic and anaerobic conditions. The results of this work can lead to the commercial scaling and deployment of bioremediation reactors to address radioiodine contamination at the Columbia River and other places experiencing heavy metal pollution.

Modeling Aerosol Microphysics in Ice Giant Atmospheres

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Coauthors: Joseph Wilkins, Peter Gao

The atmospheric composition of the ice giants, Uranus and Neptune, encodes key details of their formation and evolution, and also informs our understanding of exoplanetary systems. An important component of ice giant atmospheres are the clouds and hazes that impact atmospheric radiative transfer, dynamics, and chemistry, and are often used to track wind speeds and direction. In this work, we use the 1D Community Aerosol and Radiation Model for Atmospheres (CARMA) to simulate the aerosol distributions, processes, and interactions in the atmospheres of Uranus and Neptune. CARMA computes the size and vertical distribution of aerosol particles given material properties such as saturation vapor pressure and surface energy, and allows for the nucleation of one material on another. Here we will present our initial results showing how CARMA treats different ice giant condensates after we input them into the base model. For our future work we plan to simulate the stratospheric hazes and tropospheric clouds separately, then assess how they interact with each other, such as whether the former can provide nucleation sites for the latter. We will also evaluate the role of meteoritic material in nucleating aerosol layers.

Advancing The Detectability of Atmospheric Species in Terrestrial Atmospheres

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Coauthors:

Understanding the production method and atmospheric impacts of aerosols is on the forefront of terrestrial exoplanet research. Proposed missions such as LUVOIR are set to provide further insight on biosignatures and habitability with the use of advanced detection methods. In order to better observational capabilities, the advancement of detection instrumentation is necessary. In order to better comprehend and characterize the various atmospheres of rocky planetary bodies, we propose the implementation of Planetary Remote Sensing using Silicon Carbide (PReSSiC) UV detectors. The PReSSiC detector uses silicon carbide materials which will provide higher sensitivity and more detailed spectra of high-value targets such as Venus and rocky exoplanets in UV. The following research will compose of three primary stages to further our understanding of aerosols, specifically SO₂ and Ozone, in terrestrial atmospheres.

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Atomistic Simulations of Crosslinked Polyamide Membrane for Water Desalination

Presenter's Name: Tao Wei
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Presentation Type: Oral Presentation
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Reverse osmosis through a polyamide (PA) membrane is an important technique for water desalination and purification. Since the atomic-scale structure is directly related to the performance of the membrane, investigation through atomic scale simulation under both equilibrium & non-equilibrium condition is very important. A realistic model of cross-linked membrane has been developed by employing house developed hierarchical cross-linking procedure. The density distribution, water content uptake, pore-size distribution and salt rejection has been analyzed under equilibrium and nonequilibrium states. Our simulation shows pore size distribution with the majority of the pore radiuses around 0.20 nm, giving rise to the membrane's water-ion selectivity. The feasibility of water-ion separation through such subnanopores is indeed controlled by the strength of the ions' dehydration free energy in addition to the size of a hydration cluster. The results also demonstrated that hydrogen bonding among water molecules in formation of water chains in less crosslinked area facilitates their transfer through the PA membrane subnanopores. More importantly, we successfully simulated nonequilibrium transfer at the realistic pressure difference as low as 5 MPa which is close to the experimental conditions and provided precise description of the process. Our study provides fundamental understanding of structure-function relationship for PA membrane, which is critical for the polymer membrane experimental design.

Variation of the Moon's Solar-Induced Hydrogen Cycle during a Solar Storm

Presenter's Name: Kennedi White
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Observations of surficial OH/H₂O in regolith grains on the Moon's surface indicate variability on diurnal timescales consistent with the variability of the solar wind proton flux and local surface temperature. Recent Monte Carlo models accounting for hydrogen diffusion and the degassed H₂ exosphere support the theory of solar wind implantation being the primary driver of the lunar hydrogen cycle. In this presentation, we will report modeling results of the dynamical response of surficial OH content and the H₂ exosphere during a Coronal Mass Ejection event, for which the proton flux can be a factor of 20 larger than nominal solar wind conditions. Observations of the response of hydrogen in the lunar environment during a solar storm event would provide strong support for solar wind implantation being the principal mechanism producing surface OH content and H₂ exosphere.

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SOCIAL SCIENCES

Mercenaries, Conflicts, and the Military-Industrial Complex in Sub-Saharan Africa

Presenter's Name: Jean claude Abeck
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Presentation Type: Poster Presentation
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Coauthors:

Three significant trends and security shifts began in 1990, threatening sub-Saharan Africa: a military-industrial complex after apartheid in South Africa, the rise in regional and domestic disputes, and the proliferation of Private armies (PMCs). The reappearance of private armies or mercenaries after the Cold War and apartheid is perhaps the most intriguing of these three changes because it implies a major shift in how states view and implement security. This research examines the links between South Africa's military-industrial complex, regional and domestic crises, and corporate mercenaries in sub-Saharan Africa over a 30-year period. The industry has expanded across Africa in countries such as South Africa, Libya, Sudan, the Central African Republic, Mali, the Democratic Republic of Congo, Madagascar, and Mozambique. Although outside PMCs are one of the region's biggest national security threats, this research focuses on regional PMCs and their ties to South Africa's military-industrial complex. This project establishes the foundation for a conceptual theory explaining the reemergence of private armed forces worldwide, focusing on South African PMCs within sub-Saharan Africa's conflict hotspots. Guided by a "market-oriented" strategy, a case study, and a Grounded theory methodology, the research collects and analyzes primary and secondary data using qualitative and quantitative approaches. The study assesses mercenary demand and supply using descriptive statistics and regression analysis. It is unknown what drives the private military sector—demand, supply, or a combination—or whether the market creates a stable equilibrium. If so, at what point do demand and supply equilibrate?

Does The Increase Of Female In The Labor Market Boost Economic Growth?

Presenter's Name: Hanadi Alabaad
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Coauthors:

The purpose of this paper is to investigate the macro-economic gains generated from increasing the participation rate of female workers in the labor market. Female labor force participation rate, broadly, lagged behind the male participation rate. However, gender inclusion and female labor force participation rate have recently received significant attention among scholars as a fundamental mechanism to spur economic growth for both emerging and developed economies. The preliminary analysis of the data for selected countries in the last three decades indicates that the effect of female labor force participation rate on economic growth varies among different age-groups and labor skills. Thus, the prime-age of female labor with high educational attainment would significantly boost economic growth. The data was collected from the World Development Indicators (WDI) of the World Bank.

Perceptions of circumstances vs. effort in Jordan

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Coauthors:

Chapter 1: Perceptions of circumstances vs. effort in Jordan. This chapter proposes a method to quantify the inequalities of opportunities in monthly wages in the Jordanian Labor market drawing on ((jsfRoemer 1993) considerations of circumstances and effort. Using a nationally representative surveys: The JLMPS 2010 and JLMPS 2016, for the whole sample and subgroups based on gender and the geographical region of birth and borrowing the parametric approach which was developed by (Ferreira and Gignoux 2008) and (Bourguignon, Ferreira, and Menéndez 2007) I calculated the shares of the unfair inequality which is morally unjustifiable, and obtained the partials for each group through the parametric decomposition to find out the main drivers for the inequality of opportunity. The contribution of the applied circumstances to the shares of inequality of opportunity remains minor with women and south-born subgroups being the most unfortunate. Gender and area of birth were found to play small role in all groups, the Main drivers of inequality of opportunity for the whole sample were parental education, father's sector of employment and occupation.

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Africana Studies: Limitations and Possibilities

Presenter's Name: Samuel Anthony
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Scholars have written about the connections between the political rise and fall of Kwame Nkrumah, first Prime Minister of Ghana, Father of Pan-Africanism, and cultural icon in the Decolonization movement of Africa, and the western plan to under-develop Africa. This research project seeks to interrogate the Western Intelligence Agencies impact on the legacy of Kwame Nkrumah. Through an in-depth analysis of the U.S's Central Intelligence Agency (CIA) and Britain's Secret Intelligence Service (MI6) documents detailing tactics of hyper surveillance, infiltration, economic subversion, and propaganda of the Nkrumah's cabinet, the goal of this research project is to provide a means of contributing to discourse establishing legal accountability and economical restitution and redevelopment of Ghana. With one hundred and sixty five declassified CIA documents from 1957 to 1966, the research sample provides the necessary space for exploring the United States of America's motives, actions, and interests in the subverting Kwame Nkrumah and the underdevelopment of Ghana. Preliminary findings provide substantial evidence that points to the economic subversion, political agitation, and hyper surveillance; all of which greatly exacerbated civil dissatisfaction in Ghana. Ultimately further understanding of the significance of Western hyper surveillance on Nkrumah's political revolution, I argue, may also point to potential impacts on the legacy of other African leaders in the 20th century such as Lumumba, Nyerere, Sekou Toure, and Cabral.

"What Can We Imagine": Abolitionist Social Work Utilizing the Black Perspective

Presenter's Name: Ahmari Anthony
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Coauthors: Olivia Strickland

Background: Modern Social workers must uphold six ethical principles outlined by the National Association of Social Workers. The Howard University School of Social Work is known for the development of the Black Perspective, which outlines six additional principles: social justice, diversity, internalization, vivification, affirmation, and strengths. Objective: This review outlines how abolitionist social work is supported not only by the Black Perspective but by the ethical

underpinnings of the profession itself. Additionally, it seeks to explore a question posed by Mariama Kaba, a renowned abolitionist scholar. "Let's begin our abolitionist journey not with the question 'what do we have now and how can we make it better?' Instead... 'what can we imagine for ourselves and the world?'" (Kaba, 2020). Methods: The presenters collected the most relevant literature on the topic of emerging abolitionist social work and the utilization of the Black Perspective. Results and Implications: Many social systems within the United States function as carceral systems whether directly or indirectly due to their historical discrimination against marginalized groups. Abolition is the only way to truly eliminate these oppressive systems, as no reforms have had a long-lasting positive impact on the groups most affected by the oppression. This review demonstrates how the social work profession is in desperate need of true alignment with the ethical principles of the National Association of Social Workers and the visionary principles of the Black Perspective; the profession, marginalized communities, and society would benefit from a shift toward anti-carceral systems and alignment with the theories of abolition.

Africa Under Western Eyes: Western Media's Perception of African Culture and its Effects on their Identity Development

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African culture is a prominent feature of Western media today, as it has been since its earliest forms (Hawk,1992). However, the depiction of Africa, its people, its beliefs, and its practices, as depicted in Western media, is often regarded as negative, flawed, and erratic, serving to taint the perception of the culture within the worldview, and plays a big role in compounding the plight of the continent and its people, even within the diaspora, including the critical element of how it affects their identity development and how they go on to view themselves (Wa'Njogu, 2009; Steinbock-Pratt, 2009). This research seeks to analyze Western media's portrayal of African cultures and how these portrayals affect the development of a subjective self-view within Africans on the continent, including those belonging to the children, adolescent, and adult age classes, as well as those classified as indigenes of African countries in the West, East, South, and Northern regions of the continent.

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The Effects Police Brutality in News Media on Health Outcomes: Exploring Black Identity and Rumination

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In the past decade, public awareness of police killings of unarmed Black Americans has been electrified by the high-profile deaths of George Floyd, Michael Brown, and Freddie Gray, among others. Research examining the relationship between the vicarious experience of this videography and psychological outcomes often do not assess the modality of exposure. Therefore, the goal of this study is to understand the influence of racial identity development and rumination on the relationship between police brutality in news media via social networking sites and psychological outcomes in the lives of Black Americans. Participants. 282 emerging adults aged 18-30 who identify as Black Americans will be recruited for this study. Method. Participants will be asked to complete an online experimental survey that includes video clips of police interactions (i.e., positive, negative, or neutral). They will also be asked to respond to questionnaires regarding perceived discrimination, internalizing and trauma-related symptoms, rumination, black identity ideologies, and demographics. Planned Data Analysis. A MANCOVA will be conducted to determine if there is a significant difference between the experimental groups on the endorsement of internalizing and trauma-related symptoms. Lastly, a moderate Moderation multiple linear regression will be conducted to examine the moderating effect of Black identity ideologies and rumination. Implications. This study may contribute a comprehensive, culturally appropriate conceptual model of the effects of race-based news media that can serve as a foundation for psychosocial/behavioral interventions. Also, this study may provide a better understanding of the exacerbating and mitigating factors that affect clients presenting with race-based stress.

A Content Analysis of Black Newspapers and Community Development Before and After the 1898 Wilmington Massacre

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Following the end of the Civil War, African Americans, galvanized by their newfound freedom, quickly worked to build

prosperous communities. Their social, economic, and political advancements directly challenged the notion of white supremacy that permeated the country, especially the South. Given its place within a southern city, Wilmington, North Carolina's Black community was unique. By 1897 the Black population made up more than half of the total population, which led to their substantial contributions to Wilmington's overall development. My thesis seeks to explore the development of the Black community in Wilmington before and after the massacre of 1898. While the focus of previous research on the Wilmington Massacre, and others, has been the White supremacist rhetoric used in newspapers, my research takes a different approach by centering Black perspectives. Using qualitative content analysis, I examine how political activities, economic endeavors, social organizations, institutions, and other facets of the Wilmington community are discussed in local Black newspapers. To better understand how the community was impacted by the 1898 massacre, I compare these community perspectives from before and after the massacre. Thus far, initial findings have indicated church, education, and voting as staples of community interest and activity.

Money, Power, Fanfic: Fan Authors on Patreon

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As derivative work, fanfiction is traditionally circulated through a gift economy that typically prevents its predominantly female writers from receiving compensation for their labor. Some fanfiction writers use crowd-funding platform Patreon to earn income from their writing. Using a feminist cultural materialist perspective, this paper conducts a mixed-methods examination of 150 Patreon profiles and finds that more profiles could be identified as belonging to men than women. Further, systems of economic and social inequality are reproduced within the space. Patreon's policy of suppressing erotic content in its search function results in the incentivization of not tagging erotic content as such. This research complicates the widely held understanding of fanfic writers' gender and provides insight into the economy of fan labor.

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Developmental Implications of Firearm Victimization on Impoverished Communities

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Firearm victimization (FV) includes direct and indirect exposure to gun violence. Unfortunately, overt exposure to firearm victimization has become an integral part of impoverished community members' lives. Extant literature considers the clinical implications of normalized firearm victimization, including the onset of Posttraumatic Stress Disorder, Anxiety, and Depression (Shulman et al., 2021). Upon investigation, researchers have concluded that little research has been conducted with respect to the interests of this proposal. Researchers acknowledge the importance of conducting clinical research focusing on the potentially detrimental effects of firearm victimization on psychopathology. However, this proposal seeks to understand the developmental implications of FV on community members, specifically pertaining to the self-concept, self-perception, and labeling trends of the population of interest. To understand the relationship between FV and development of self, this research proposes to assess self-concept. Self-concept (SC) refers to the description and evaluation of oneself, including psychological and physical characteristics, qualities, skills, and roles; SC contributes to the individual's sense of identity over time and influences judgement, mood, and behavioral patterns (American Psychological Association, 2022). Researchers hypothesize that overt exposure to firearm victimization hinders developmental growth, in relation to self-concept, thus deterring impoverished community members from recognizing their appropriate victim statuses. The reluctance to label oneself as a FV victim may contribute to the lack of impoverished community members who seek therapeutic treatment, specially for environmental trauma.

Perceptions of Cultural Identity and Gender Norm Conformity in Diverse School Contexts

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The purpose of this project is to determine how perceptions of cultural identity and feminine norm conformity differ as a function of school type (HBCU vs. PWI), race (Black vs. White),

and gender (Women vs. Men). Gender norm conformity is the extent to which men and women believe and behave in ways that are traditionally seen as masculine or feminine (Fleming & Agnew-Brune, 2015). Cultural identity refers to a person's identification and participation in certain practices, values, and beliefs aligned with a particular cultural group (Hsueh-Hua Chen, 2014). Researchers collected survey responses from 483 students across a PWI and an HBCU. Surveys included Conformity to Feminine Norms, Cultural Identity, and Demographic variables. Results revealed HBCU students were more likely to believe in the importance of investing in romantic relationships, the importance of taking care of children, and they were more likely to espouse Afrocultural orientations than their PWI counterparts. Black students were less likely than White students to conform to the norms of being sweet and nice, investing in relationships and romantic relationships, and desiring a thin body ideal. However, they were more likely to adhere to the ideal that sex should be confined to one committed relationship. Lastly, women were more likely than men to adhere to traditional feminine norms in most subscales except investing in romantic relationships. They were also more likely to espouse more Afrocultural orientations than their male counterparts. Implications of modern gender norms and their potential outcomes will be discussed.

Balancing Trust and Research Fidelity: Ethical and Methodological Challenges and Recommendations for Conducting Community-Based Research with Socio-Politically Vulnerable Groups

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Background: Individuals who resist oppression are motivated differently and navigate unique challenges based on their identities and circumstances. Researchers face methodological and ethical challenges when examining these relationships – especially when they work with communities with histories of oppression and resistance who are understandably skeptical about engaging with researchers outside their trusted circles. Objective: To identify methodological and ethical barriers in recruiting and interviewing Latinx immigrants who participated in a mixed-methods study which examined motivation and barriers to resisting anti-immigration oppression in the United States and how such resistance is understood and practiced. Methods: Content analysis of researcher field notes and a select literature review of studies on working with socio-politically vulnerable populations. Specific focus will be on research ethics, instrument development, interviewing, and data analysis and interpretation. Results: Ethical and

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methodological challenges included defining participant inclusion criteria, promoting recruitment sensitively through trusted community partners, conducting field interviews in less-than-ideal conditions, working with translators, and developing interview protocols that balance fidelity to the research aim and assuring participants' sense of safety. Recommendations underscore the importance of partnering with trusted community organizations through all stages of a project, and flexibly adapting the methodology while maintaining alignment with the research aim. Conclusions: "Best-practice" for research on experiences of Latinx immigrants and other socio-politically vulnerable groups should balance methodological rigor and ethics to ensure that participants do not re-experience marginalization during the research process.

A Critical Analysis of "The Racial Contract" by Charles W. Mills

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"The Racial Contract" is a 1997 book by Charles W. Mills that explores the racial contract that Western societies are built upon in order to uphold systems of white supremacy. "The Racial Contract" acts as an analysis of the ways in which race functions in Western societies. Throughout the book Mills discusses how the contract operates at both the individual and institution levels. Modern societies are built upon the racial agreement in order for dominant groups to maintain a position of privilege. In examination of "The Racial Contract" I am able to define racism as an intricate political system rather than simply a belief. The impact of the racial contract in political, economic, and social systems have remained prevalent in present day America and continue to disadvantage Black Americans. My critique of "The Racial Contract" by Charles Mills evaluates the key arguments within the texts while providing present day examples of the way this system continues to negatively impact Black people within America.

Age, State, and Trait Anxiety in an Adult Black Community

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Anxiety trends among African Americans have had limited empirical examination. This study focused on the measurement of the state (moment-to-moment) and trait (relatively stable) anxiety of African Americans. It tested the linear and curvilinear relationship between age and anxiety within the Black populace. It was hypothesized that as age increased, so would anxiety. The Spielberger State and Trait Anxiety Inventory (STAI) was administered in an urban hospital in the southeastern United States to assess levels of trait and state anxiety among people of African descent in the United States. Two hundred and thirteen African Americans, 110 women and 103 men, ranging from 20 to 70 years of age, completed the tests. The results showed a significant curvilinear relationship ($R^2 = 0.077$) and a significant linear relationship ($R^2 = 0.063$) between state anxiety and age. A somewhat weaker but significant curvilinear relationship ($R^2 = 0.040$) and a nonsignificant linear relationship ($R^2 = 0.020$) was present between trait anxiety and age. The state anxiety data suggest that any positive association between age and anxiety peaks in midlife. From that point, increases with age are associated with lower anxiety. In conclusion, there is a robust curvilinear relationship between state anxiety and age in African Americans, with a positive peak in the early 40's. This research provides insight into trends of anxiety levels among people of African descent.

Keywords: state anxiety, trait anxiety, curvilinear relationship, linear relationship

Jazzing Up the Curriculum: On the History of Jazz at Howard University

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In 1968, the Jazz Institute at Howard University was officially established by trumpeter and pioneer, Donald Byrd Jr. Prior to jazz's formal recognition from Howard University in the late 1960s, classical music took precedence over other musical genres, yet students were feverishly dedicated to interjecting normative musical modes of expression on campus. This paper examines the impact of the "African American oriented curriculum" that Howard University students demanded through the formal instruction of jazz. To conduct this research, a qualitative approach, examining primary artifacts, documents, magazines, posters, flyers, brochures, news items, programs, and annual reports from repositories of the Moorland-Spingarn Research Center, Digital Howard, and the Hilltop Newspaper. The findings suggest that the enactment of the Jazz Institute on Howard University's campus contributed to the rise of black consciousness and the global exchange of Howard's cultural recognition of jazz.

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Black Women’s Internationalism and the Publications of the National Council of Negro Women

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When describing the motives of Sue Bailey Thurman in founding the Aframerican Women’s Journal, Dorothy Height said that Thurman desired “to make black women aware of their heritage and the need to preserve it.” The Aframerican Women’s Journal was the first publication of the National Council of Negro Women (NCNW) and Thurman became its first editor when the inaugural issue was published in 1940. The Aframerican Women’s Journal was dedicated to showcasing the activities of the organization and its members, as well as exposing its readers to topics of interest to Black women, such as peace efforts following World War II. A browse through the articles contained in this publication makes it clear that the NCNW intended for its audience to be informed on not only a local and national level, but also on an international level. The Aframerican Women’s Journal contained content about issues around the globe including India, Cuba, Haiti, Liberia, Europe, and more. Under Thurman’s editorship, the Aframerican was able to merge the NCNW’s role as the conservators of Black women’s history and its efforts towards international outreach. As such, they were able to inform both national and international readers about each other’s history and struggles, thereby strengthening connections between them. Towards the end of World War II, the focus of the journal shifted towards informing its audience on more current events happening on the international stage.

Mental Health Services Utilization Rates among African American Adolescents

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Mental Health, as a subcategory of healthcare, reflects disparities worldwide. Barriers such as insurance status, costs of receiving care, and pervasive societal attitudes inhibit people with a perceived need for mental health intervention from receiving the adequate care they need. In the United States there are discrepancies in utilization rates across communities based on race, age, and economic status. Our understanding of mental health needs is impeded by the lack

of research in diverse communities. In particular, African American youth are significantly underrepresented as mental health-based research participants. Therefore, a gap in the literature exists, limiting our understanding of important factors that contribute to the utilization of mental health services by African American adolescents. In order to fill this gap in the literature, through highlighting these discrepancies, a systemic review on service utilization rates was conducted. Included in this review are available peer review articles, studies, journals and world health data to examine the utilization of mental health services among African American adolescents. To increase awareness about the utilization of mental health services among this group, more studies focusing on African American youth should be conducted. We conclude with a discussion of methods of increasing our awareness on this topic.

Born Naked and the Rest is Truly Drag: Impression Management and the Intersection of Identity and Performance on Social Media

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Drag is an art form that empowers individuals to exaggerate, interpret, and juxtapose concepts of gender, identity, and societal norms. Although drag is its own medium of expression, it shares concepts of identity performance and impression management that are ingrained in human society. Humans perform and present aspects of themselves to adapt to different situations and people. Whether it being fitting in with a new friend group, impressing a date, or even interviewing for a job, humans navigate performing and modifying identities at different points in their lives. The advent of social media have now gives humans more control than ever on how they chose to present themselves. With various social media sites serving the different sectors of a person’s social life, user have the ability to build a different online presentation for these sides of themselves. Drag and digital presence online allows individuals to experiment with identity and how they want the world to see them. Although not always at the same extreme, the ability to emphasize one’s more palatable features and traits, subvert societal expectations, or bring out a hidden self are all available through both mediums. Conducting this study on drag and impression management on social media can lead to a greater understanding of how digital media can impact individual’s ideas of self and how they socialize with one another. As young people serve as the frontline of the digital frontier, there will be a large focus on how their social media presences impact their developing identities.

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“Needs Assessment for early infiltration, exposure and inclusion of diversity within the occupational therapy profession”

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This study aims to examine qualitative differences among minority Occupational Therapists across the OT professional continuum pipeline to improve diversity within the OT profession. Conducting a needs assessment will identify underlying factors that contribute to the underrepresentation of diversity in OT and the courses of action needed to promote change and the generational inclusion of minority occupational therapy professionals. These factors will examine the trajectory of why there is a lack of diversity in the OT profession and the need for early exposure to lower socioeconomic classes to enhance the production of future OTs. Analysis of the production and employment trends of minority occupational therapists among various socioeconomic programs by acknowledging 1. Are the differences in the rate of minority occupational therapist clinicians due to less exposure to lower socioeconomic status among future minority occupational therapists? The lack of exposure and promotion of occupational therapy as a healthcare profession limits equality and diversity within the growing profession of OT. Early exposure and infiltration of the occupational therapy profession specifically to minorities prior to and during college experiences can help assist AOTA’s diversity initiative to drive steady momentum toward inclusive outcomes. Additionally, some studies reveal that improved diversity in health professions is associated with better care for clients, particularly for those in underserved groups. Therefore, changing the face of healthcare specifically, occupational therapy is important to close the racial representation gap so that minorities will have healthcare providers that not only look like them but are culturally relatable.

The Effectiveness of Early Intervention Academy for Children with Autism

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Early intervention is a term used to describe services and supports offered to assists children from birth to 5 years

old who have disabilities or developmental delays. Early intervention is extremely important for children who are not typically developing, acting early can help a child improve their communication skills, play skills, and learn from the world. The purpose of this research study is to show the effectiveness of an early intervention program within the school system in hopes to increase the prevalence of these programs across Texas and then eventually across the U.S. Early Intervention Academy (EIA) is a program in Texas intended for children ages 3-5 years old with a diagnosis of Autism, or suspected Autism and intellectual disability. The goals of the Early Intervention Academy program are to: increase access to a blend of educational and therapy services within the context of a developmentally appropriate curriculum; provide family-centered and wrap-around services designed to meet the individualized needs of the children and build capacity within the family unit; prepare students with the skills necessary to integrate into an inclusive environment when they complete the program and attend their neighborhood elementary school. The research method that will be utilized in the study will include a mixed method. Both quantitative and qualitative data will be collected. Within the mixed methods, case-studies and surveys will be conducted and then data will be analyzed to measure the effectiveness of the program.

Voicing Concerns: Counter Stories of African Americans Lived Experiences of Eminent Domain and the Resulting Impact on Generational Wealth

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It has been documented throughout the U.S millions of acres of privately owned African American land has been seized. A policy that gives the government power to take privately owned property for “public good” or commercial use in exchange for “just” (fair) compensation, was used to obliterate self-sustaining African American communities as early as the 19th century. The literature shows that compensation was one of the serious problems faced by African American families affected by the earliest urban renewal projects guided by eminent domain. This research takes a critical historical approach to interrogate the African American wealth gap and examine the cycle of land erasure and its financial impact. The purpose of this study is to give further context to the taking of property through eminent domain and other housing policies that stripped African Americans of prosperity which have led to the present-day wealth gap and to provide a platform for victims of this atrocity to share their lived experiences. This qualitative study aims to raise awareness and identify descendants of those who were victims of land theft. To

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shed light on their personal experiences and to amplify their calls for restitution, interviews with African Americans who were victims and heirs of victims of eminent domain, were conducted. The preliminary finding is that the desecration of their communities is congruent to the negative impact on generational wealth. As one former landowner exclaimed: "I do not have the money to get a good lawyer to fight for what is rightfully mine."

The Impact of Gendered Racism and Racist Sexism on the Identity Development and Mental Health of Black Women

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The impact of racial and gendered trauma can affect Black women's identity development and mental health. This trauma may have a chronic and cumulative symptomatic presentation not limited to internalized negative beliefs, suicidal ideation, anxiety, and social isolation. Black women's intersectional oppressions place them at a greater risk for many mental health concerns, such as post-traumatic stress disorder and major depressive disorder than Black men and White women (Lewis et al., 2016). Black women are expected to conform and negotiate salient aspects of their identities that have historically been categorized by subordination and marginalization. A concern regarding the study of Black women's experiences is the omission of their simultaneous and intersecting oppressions, which include racism and sexism. An intersectional approach can address the differentiation and distribution of systems of power and thus may allow further intentionality to be placed on the identities that culminate Black women's experiences. To capture the racial identity of being Black and the gendered identity of being a woman simultaneously and inseparably, unique attention to diversity is needed. My research will use an intersectional approach to examine the coexisting identities of Black women and the impact of the intersectional consequences of gendered racism and racist sexism on Black women's identities. The aim of this research is to help clinicians, researchers, and scholars gain a more complete understanding of Black women's experiences, thus improving treatment, mental health outcomes, and protective factors against racism and sexism.

The Overturn of Roe v. Wade: A Woman's Body is Not Her Own

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Amidst a society where unplanned pregnancy is very common, especially among minority women, Roe v. Wade has been overturned. Roe v. Wade, decided in 1973, is a landmark decision in which the United States Supreme Court declared that a pregnant woman's right to choose to have an abortion is typically protected by the U.S. Constitution. After nearly 5 decades, that landmark decision has been overturned. As a result, every state has the power to control a crucial part of a woman's life and body, which is her motherhood and her reproductive system. Even more puzzling than the overturn of this case is how much of a negative impact it has on women, especially Black women. This thesis aims to explore how misogynoir presents itself within the decision to overturn Roe v. Wade. "Misogynoir" is a new term coined by Moya Bailey and is used to identify the ingrained prejudice and dislike of Black women. Further, it will provide historical and cultural context which laid the foundation for how Black women are treated in America.

Identifying the Barriers to the Implementation of the Six Core Element of Healthcare Transition in SCD Transition Program: A Conceptual Framework

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Background: Sickle cell disease (SCD) is an inherited blood disorder most common among African American. Although healthcare transition is a regular event in the lives of adolescents and young adults (AYA) with SCD, the lack of a comprehensive transition to adult care remains a challenge. Disparities in receiving quality health care among African Americans in the United States are known and directly related to poor outcomes. The Center for Health Care Transition Improvement developed the Six Core Elements of Health Care Transition (SCEOHCT), which defines the fundamental components of a comprehensive transition process and can be beneficial for multiple types of health conditions such as SCD, cancer, cystic fibrosis, diabetes, and other chronic diseases. To date, no transition to an adult care program for SCD has been reported utilizing all the SCEOHCT in the District of

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Columbia (DC). The purpose of this paper is to design a conceptual framework that can be used to identify barriers to implementing the SCEOHT in SCD transition programs in the DC. Methods/Result: This study uses a qualitative data collection method through interviews and is analyzed with a thematic analysis method. The study samples are 12 transition care team personnel, 30 AYA with SCD, and 30 parents or caregivers of a young adult with SCD from 3 preselected hospitals in DC. Implication: This study is critical because identifying and addressing the barriers to implementing the SCEOHT will prevent morbidity and mortality amongst AYA and contribute to improved health-related quality of life for people with SCD.

Using Human Center Design (HCD) to identify challenges Expectant and Parenting Teens (EPTs) in Washington DC, face in finishing High School

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Background: The teen birth rate in the United States has fallen each year since 2009 to 17.4 births per 1,000, but remains higher than most developed countries. Teen parents are less likely to finish high school compared to their peers. Objective: To identify challenges encountered during high school by engaging key stakeholders and EPTs in human-centered design (HCD) sessions to guide development of solutions to increase high school graduation. Methods: HCD is a methodology that is used to solve complex problems with the engagement of end-users. We recruited (a) EPTs, (b) Experts, composed of social workers and nurses who provide services to EPTs in schools. We conducted separate meetings for the providers and EPTs. Results: There were 10 EPTs, 6 Experts enrolled in the study. Themes emerged around (a) Resource Development (create an app for EPTs to provide 24 hour phone support for child care services, childcare vouchers, housing); (b) Transportation (Ride share contract for EPTs to take child to childcare and get to and from school; Uber services) (c) Create day care services in the schools, work places and community or close to home; (d) Education (co-parenting, financial literacy, training on work habits, stress management) (e) Policy and monitoring (virtual learning as an option for EPTs). Discussion and Conclusion. Identified themes were used to create insights that informed the underlying concept of creating HU-DCNEXT!-GEN ALPHA childcare. This tailored tool, will help EPTs to go to school or work, while maintaining the health and wellbeing of their families.

Telling Our Stories

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The purpose of this research is to uncover the factors that influence people of African descent to donate personal artifacts to the National Museum of African American History and Culture. For centuries, African Americans have promoted the idea of valuing and claiming their own identities. This has resulted in a plethora of symbolisms that represent what people identify as the Black experience. Since 2016, the National Museum of African American History and Culture (NMAAHC) has become a powerful community resource for displaying and showcasing the Black experience through artifacts, most of which were donated by individuals of African descent. In the past and still today, the history and culture of African American individuals has rarely been told from their point of view. The NMAAHC is a major force on the spectrum of re-interpreting the lives of people of African descent by articulating the story of the Black experience told by the individuals who experience it. The NMAAHC is inclusive in its curatorial practice through its formality of cultural representations induced by individuals who donate personal artifacts to the museum. This study focuses on the African American individuals who contributed artifacts to the National Museum of African American History and Culture. I am attempting to assess the underlying characteristics surrounding individuals' personal motives in donating artifacts to the NMAAHC.

Warriors From A Distant Shore: Afro-Jamaicans in Union Blue

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This essay responds to scholars' increased efforts to highlight the contributions of Black foreigners in the US Military during the American Civil War. This work argues, through the usage of regimental books, census records, and pension files, that Afro-Jamaican immigrants, as refugees from poverty, used the Civil War as an opportunity to build a stable financial future for themselves and their families in the post-war years. This piece builds on nearly a decade of research that starts in 2014 with Dr. Richard M. Reid's publishing of African Canadians in Union Blue: Volunteering for the Cause in the Civil War. Following Reid's work, Dr. Barbara Josiah published her 2017 article; African Diaspora Sailors from Latin America and the

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Caribbean in the Union Civil War Navy: Another Migration, which continued the narrative by finally addressing the Caribbean and Latin American perspective. However, the stories of Caribbean men who served specifically in the US Army remains under-addressed. This essay contributes to scholarly discourse on the subject of foreign-born US Colored Troops by highlighting the role played by Afro-Jamaican immigrants in particular, as well as their motivations. This study seeks to promote a new layer of complexity to the narrative of foreign-born Black veterans, their impact on and off the battlefield, and the families that carried them through to the end of their lives.

Estrangement: Are Black Students Progressively Disconnecting from the Classroom? And If So, Why?

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Research has shown that the cultural practices, values, and beliefs of minoritized students do not match those of the mainstream, majority, and Euro-American cultural realms of America. Additionally, minoritized students' cultural practices, values, and beliefs are not reflected in the public school system. According to the Triple Quandary Theory, this means that African American students are required to adopt values and beliefs that are incongruent with their existing cultural styles acquired from home. This study suggests that the navigation of this incongruence can contribute towards a unique experience that Black students face when they disconnect from the classroom. The author proposes a novel model that describes and measures the unique process of Black students withdrawing emotionally, cognitively, and behaviorally from the classroom. This describes a novel construct, coined estrangement. This research intends to provide proof of concept for the proposed novel construct and model by using Generalizability Theory to analyze a tool the researcher has developed. This tool includes questions that address each dimension of estrangement which speak to the emotional, cognitive, and behavioral withdrawal of Black students in the classroom. This instrument has been created to capture the convergence of three dimensions into the broader sense of estrangement according to the researcher's suggested definitions. Results pending data analysis.

The Black Rural Population: A Forgotten People From American Consciousness

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The environment, education, and access to opportunities can all affect the experiences of Black individuals differently. People in the United States naturally look to the media to tell us these narratives, thus shaping our opinions and thoughts about these groups. However, for some, the media portrays negative stereotypes about their ethnic group and can determine whether they have access to opportunities, education, and other necessities that impact their quality of life. The Black rural population is a group of people affected by the negative stereotypes about them in the media. Since Black people in rural areas are rarely seen on television, their presence in society seems nonexistent. (Lawrence, 2015). The lack of representation of Black Americans outside of urban areas is prominently displayed on tv shows, movies, national news coverage, and social media. The problem is that many people in rural areas do not see themselves represented positively in the media. The larger issue arises when these communities are suffering in silence due to systemic problems because of the lack of media coverage. This research focuses on the media portrayal and lives of Black people at Howard University in rural areas (cities with a population of less than 500,000). This research has three main goals. The first is to highlight negative issues within these communities. Secondly, it is to investigate if/how these issues are communicated to a national audience through movies, TV shows, and news coverage. Lastly, this research aims to offer solutions to this issue.

Things I Imagined: "Paradise" and the Political

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Published in 1998, Paradise was Toni Morrison's first novel after winning the Nobel Prize in Literature in 1993. Morrison's first work following global recognition provides a vision of an all-Black autonomous town in Oklahoma intended to serve as a space for Black prosperity and uninterrupted continuity. Tackling controversial questions about separatism, coalition politics, patriarchy, colorism, geography, and social movements among other topics, Morrison uses fiction to converse with

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prevalent ideas within Black sociopolitical thought and offers commentary about how we can envision our path to liberation. This paper explores to what extent Toni Morrison poses questions about the existing ideological traditions within Black thought and whether the characterization of Morrison as a political thinker disrupting normative Black political thought is appropriate. Thus, it grapples with the constraints of Black political pedagogy and practice as well as the functionality of the novel within the tradition of the Black Radical Imagination.

You are What You See: African American Sitcoms and Their Impact on Generation Z and Millennials' Perception of African American Self and Group Identity

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Sitcoms have been around for over 70 years and have brought not only smiles to audience faces but have brought families and communities together over subtle, lighthearted and relatable comedy. Although there has been nearly a century of material provided for further research within this area of media there is an overwhelming gap in research when it comes to the specific impact that sitcom television shows may have on their targeted audiences. This study serves the purpose of finding the similarities or differences between millennials and Generation Zs' perceptions of the African American family based on popular sitcoms from their generations. This study also intends to shed light on the specific effect of network television sitcoms on African American youth and the future implications of how self and group identity is affected by the impact of sitcoms on African American Gen Z and millennials. To explore the possible variance of perception between the two chosen generations, a quantitative approach of surveys and comparative analysis was conducted amongst the Howard University community.

National Unity and Ethnic Diversity in Ethiopian Secondary Educational Curricula: A Study on Political Ideology in Education

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Since its 1995 Constitution, Ethiopia has implemented a system of ethnic-based federalism. Although this was done to combat the ethnic inequities of past regimes, paradoxically, there has been more ethnic identity-based conflict since the implementation of ethnic federalism than ever before in the country's history. The national Ethiopian civics educational curriculum aims to promote national unity while simultaneously celebrating the country's vast ethnic diversity. This study aims to assess the effectiveness of this curriculum and understand its political implications and compatibility within the realities of the existing ethnic-federalist state structure. Considering both the regional ethnic inequities and the extreme polarization of political behavior along ethnic lines, the study finds that the model used to promote national unity is ultimately incompatible with the state structure. While the motive of promoting national unity is a critical component of the state-building process, it is failing to address the current issues that are contributing to ethnic inequality. The new framework of the Ethiopian Ministry of Education aims to respect cultural diversity, provide equal opportunities, and promote the active participation of its students within its new curriculum framework, and poses these principles as methods of propelling the future of Ethiopia's sustainable development. Ultimately, this cannot be realistically achieved through education without the curriculum addressing the factors and significance of ethnic identity-based conflicts and outlining peace and reconciliation methods in the existing civics curriculum.

"No one's mad sis. Chile.": Social Media and the use of African American Vernacular English

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In 2020, Covid-19 put a halt to billions of lives across the globe. Stay-at-home orders were issued from country to country enhancing the importance of social media for communication. Popular apps such as Tik Tok emerged, and cultural exchange increased as various cultures became more accessible. Black culture and its language, African American Vernacular English (AAVE), became particularly prominent on TikTok where non-black creators began to mimic it. Reactions to this practice have been mixed. Many Black Tik-Tok users see the mimicry as disrespectful and unfair. Black Americans have traditionally used AAVE, an old and complex dialect learned at an early age, to communicate inside jokes and experiences, and to escape from the dominant culture. AAVE, often dismissed as "improper" speech by those in power because of who spoke it, is an important component of the Black identity. Non-black creators, however, simply, see AAVE as "Tik Tok language"

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and fail to understand their use of it as harmful. This research explores how the use of AAVE on TikTok by non-blacks affects the relations between the two groups by asking whether or not appropriated language can be distinguished from proper AAVE without a visual cue. A survey of a mixed Tik-Tok user group asked them about transcripts of similar AAVE language used in videos posted by Black and non-Black creators. Early results suggest most Black participants were able to pinpoint the misuses of AAVE. They also resented the fact that non-black creators were benefiting from its use.

Factors Influencing the Impostor Phenomenon in Black Social Work Ph.D. Students Attending Historically Black Colleges and Universities

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In recent years, the examination of the impostor phenomenon (IP) has expanded to Black doctoral student populations. This study examined IP in Black social work Ph.D. students; explored IP in Black social work Ph.D. students attending HBCUs; and, attempted to determine factors that predict IP in social work Ph.D. students. The study found statistically significant relationships between organizational support ($r = -.306, p < .01$), minority student stress ($r = -.223, p < .01$), depression levels ($r = -.585, p < .01$), and impostor phenomenon scores. The results of the stepwise multiple regression analysis revealed five factors as significant predictors of impostorism ($F(df = 5, 194) = 36.91, p < .001$), with depression identified as the most significant predictor of impostor scores ($\beta = -.501, p < .001$), followed by race (white) ($\beta = -.35, p < .001$), minority stress scores ($\beta = -.21, p < .001$), perceived organizational support ($\beta = -.13, p < .05$), and age (35 to 44 years) ($\beta = .10, p < .05$). These factors accounted for a total of 49 percent of the variance in the in impostor scores.

Hidden Agenda: Analyzing News Framing On Police Brutality and Race in 2020

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The purpose of this research is to determine if Black people feel as if mainstream media helps solve issues that affect

black people disproportionately. This research will analyze how mainstream media framed these problems surrounding Black people in 2020, how mainstream media affected the presidential race of Trump and Biden, and how Black people feel about news coverage and campaigns targeted towards them and their issues. The research will also examine if any of the problems Black communities face have improved since 2020. The research seeks to get a better understanding of the impact mainstream media has on public opinion, politics, and Black people. Secondly, it's designed to shed light on how Black people feel about their representation in news and to determine if there is any trauma linked to the consumption of these stories discussed in national news. Through this study, the researcher seeks to spark conversations on how to better represent black issues through mainstream media and look into alternative media to consume.

Development of Culturally-Relevant Scenarios to Examine Gender-Based Attitudes of Black College Students toward Substance Users

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Since the inception of the War on Drugs, addiction stigma - negative attitudes towards substance users - have prevailed as the dominant discourse surrounding substance misuse in America. Sociocultural factors such as high rates of drug abuse, mass incarceration rates, poverty, and mental health issues disproportionately affect Black people. Therefore, Black people with substance use disorders (SUDs) are particularly susceptible to the effects of addiction stigma. There is a lack of research on how this stigma and other perceptions of substance users manifest in HBCU students. In addition, while the literature does give insight into the barriers, negative outcomes, and perceived discrimination that female drug users face, there is little research on Black people's perceptions of substance users as it relates to gender. The purpose of the proposed study is to examine HBCU students' perceptions of substance users and how these perceptions differ based on the gender of the individual being perceived. The researcher has constructed a survey of culturally relevant, age-appropriate scenarios to assess general attitudes toward people with SUDs and the potential presence of gender-based differences in these attitudes. Via this instrument, the researcher seeks to measure affective attitudes, implicit associations, and general attitudes as they relate to gender and attitudes toward people with SUDs. This poster will describe the development of these scenarios and the overall survey. Once the proposed study is approved by Howard University's Institutional Review Board, the researcher will pursue recruitment and data collection.

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Speaking Volumes: Analysis of Figurative Language in Discourse Samples of Culturally and Linguistically Diverse Adolescents

Presenter's Name: Shaleeta Jones
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Language sample analysis (LSA) is a highly recommended assessment tool for examining linguistic features of culturally diverse populations (Horton-Ikard, 2010; Stockman, 1996). LSA provides an unique approach for developing and analyzing linguistic profiles of a child's language development. During the transition from childhood to adolescence, the language skills required for pragmatic language, understanding abstract concepts, inferential thinking, social interactions, and conveying figurative expressions increases (Farnia, 2018; Nippold, 2007). There are social and cultural influences on figurative and indirect language that emphasize expressions where decontextualized language use is utilized for an intended purpose (Colston, 2005 pg. 99). Documentation of these distinct features of figurative language use can be observed when conducting LSA. While research is heavily saturated with examining the comprehension aspects of figurative language in social contexts, there is little research exploring how these figurative language forms are verbally expressed, especially under the condition of analyzing language development. The purpose of the presentation aims to review ways to enhance LSA for increased diagnostic accuracy through measuring pragmatic language, with particular emphasis on figurative language. Participants will learn about variations in pragmatic language skills that are unique to African American children, as well as techniques for improving outcomes with eliciting ideal language samples and analyzing data.

Return Migration and Political Identification in Atlanta Metropolitan Area

Presenter's Name: Makayla Jones
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This paper focuses on examining the Great Migration and the political struggle of black people during the civil rights movement in the Atlanta Metropolitan area. This has currently influenced black northern migrants and their

children who left during the Great Migration to return to the south to pursue the new black economic and political opportunities occurring in this area. The research findings concluded that people who moved to northern and midwestern regions of the United States gained political power and understand how to consistently exercise their black voting power. In the South, the southerners who stayed behind formed advocacy campaigns and became skilled in strategic political mobilization as a result of the civil rights and black power movement. This resulted in an increase in black voting power in Atlanta, more southern black elected officials, and a rise in economic opportunity for black people in the South. While black migrants moving to northern cities were granted political rights they were not given substantial economic opportunities. This motivated previous migrants to move back South after the civil rights and black power movement due to the new opportunities in the region. With the return migration and the newly politically mobilized black residents of the Atlanta metro area in collaboration, they have increasingly influenced national elections in Georgia to lean more towards being majority democratic. As a result in Georgia, Republicans have been winning by fewer votes each election cycle and this research uncovers that return migration that may be influencing this trend.

Understanding the Effects of Data Pollution on Marginalized Communities in the South

Presenter's Name: Mikah Jones
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As waters begin to rise and temperatures continue to increase, the fight against pollution and climate change has been heavily examined to find sustainable solutions. Yet, while many see the environmental protection movement as having a positive impact on our futures, those who have been historically and systematically marginalized are suffering at the hand of environmental justice bias. To address this gap, this project investigates the depth of data bias in air pollution in southern communities. In conjunction with the National Center for Atmospheric Research (NCAR), I employ the use of census, EPA Air and NEXRAD data, and geographic information system (GIS) mapping to locate air radar quality inequality close to Mossville, Louisiana. Data gathered shows that the EPA regulated air quality meters that identify particulate matter that is of concern for people's health are located miles away from these communities and meters within proximity are often noted to be broken or damaged. Additionally, many of the harmful toxins released are not heavily monitored or tracked, while safety guidelines for large companies are heavily ignored. This has resulted in inaccurate readings that

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allow for the continuance of petrol-chemical companies to be approved for placement in these areas. Due to the effects of racial and ethnic bias on environmental justice as it pertains to disenfranchised and marginalized populations such as Black, Brown, and Tribal communities, extensive research into the data gaps is necessary to provide equity in pollution response initiatives.

African American Reparation Policy Proposals

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My senior thesis encompasses recommended policy proposals for African American reparations. I specifically focus on housing and undergraduate education policy as these areas are foundational steps to attaining generational wealth. There are many barriers surrounding obtaining or retaining a home such as gentrification, displacement, redlining, and many more as well as a lack of resources and funding disparities in education to name a few. I tackle these topics in my proposal in more detail as I intend to create solutions which leave no black individual incapable of utilizing the reparation proposals. Whether black American citizens are young adults, middle age, or senior citizens, they will be able to take advantage of the reparation program which will be fully funded by the federal government. The policies do not only include monetary direct payments which are distinctly for black senior citizens but programs aimed to make accessing homeownership easier, attending fairly funded education programs, etc. We must acquire generational wealth paid in forms of federally funded programs that make renting or owning a home and obtaining a bachelor's degree easier. The overarching focus in developing my proposed legislation is closing the racial wealth gap. Additionally, I explain through qualitative research that the United States's capitalistic economy will not survive if reparations are sufficiently implemented.

Peace Conversation Circles: Promoting Agonistic Historical Dialogue in Post-Genocide Rwanda

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Background: Following the 1994 genocide against the Tutsi in Rwanda, local conversations are minimized, despite national reconciliation programming. Silence or misinformation about the genocide dampen the prevention of conflict from re-escalating. Objective: We examined the effects of intergenerational dialogue about the genocide. We hypothesized that participation would increase shared understanding of genocide-related events, willingness to discuss the genocide, positive attitudes towards outgroup, engagement with outgroup, and perspective-taking. Methods: Peace Conversation Circles (PCC), conducted in partnership with a local organization, Christian Action for Reconciliation and Social Assistance, fostered dialogue between older adults who experienced the genocide (i.e., survivors, perpetrators, rescuers) and youth, to promote local conversations about genocide-related events. Residents from Muhanga and Kamonyi were trained to co-facilitate three dialogue sessions. Quantitative measures were used to interview community facilitators (CFs) pre-training (T1), post-training (T2), and post-intervention (T3); community participants were interviewed pre-and post-intervention. Results. The mean age of CFs (N=72) and community participants (N=213) was 43 and 52% were female. Results from one-way ANOVA tests indicated that willingness to discuss the genocide and positive attitudes towards outgroup significantly increased for PCC participants and CFs. Perspective taking significantly increased for CFs from T1 to T3; no significant changes in perspective taking for community participants. Knowledge about the genocide or willingness to interact with outgroup members did not differ between CFs and community participants. Conclusions: Community engagement is key to implementing local peacebuilding interventions. While PCC benefited community participants, the positive effects of select variables (i.e., perspective-taking) merit greater focus and attention.

The Atypical Mermaid: Reading The Little Mermaid Against the Grain to Contextualize My Experience as an Autistic Black Girl

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Autism diagnoses are on the rise, changing the ways we understand what autism looks like and what it means for an autistic person's opportunities in life (Silberman, 2016). Movies and television almost exclusively depict autism through the use of white male characters (Pomerance, 2022), erasing the existence of autistic women and people of color and therefore making it more challenging to perceive autism in these demographics. Medical professionals

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routinely misdiagnose and underdiagnose autistic Black women and girls, leaving them with unhelpful “treatment” and inconsistent accommodations that lag behind their white male counterparts (Aylward et al., 2021; Liptak et al., 2008). These problems can devastate any autistic person, but those effects compound upon autistic Black women and girls (Crenshaw, 1991; Hill Collins, 2000). This research will analyze how filmmakers represent autism and focus on the lack of representation of autistic Black women and girls. The research will use mixed methods of content analysis to dissect entertainment media (particularly Disney’s 1989 *The Little Mermaid*) and use autoethnography to tie in my experiences as a Black autistic woman. The research will approach this analysis through the frameworks of intersectionality and Black feminism. The research intends to uncover more insight into the ways that filmmakers represent autism in film and television, how these depictions may relate to autistic Black women, and how we can improve representations of autistic Black women in film and TV.

College Students Perceptions of Culture, Gender and Coping

Presenter’s Name: Aminata Kone
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The purpose of this project is to understand how gender role conflict and cultural identity relate to gender norm conformity and coping. Researchers collected survey responses from 483 students across a PWI and an HBCU. Surveys included Conformity to Feminine Norms, Cultural Identity, Coping, Gender Role Conflict, and Demographic variables. Results indicate that individuals who experienced higher levels of Gender Role Conflict are more likely to use more unproductive coping mechanisms. These mechanisms include self distraction, denial, substance abuse, behavioral disengagement, venting, humor, and self blame. Participants who experienced higher levels of Gender Role Conflict were more inclined to conform to traditional feminine norms such as investing in close relationships (relational), being kind to others (sweet and nice), committing to improving one’s outward appearance (appearance), and wanting to achieve a thinner body ideal (thinness). However, these same participants were less likely to see the importance of taking care of, and being with, children. Participants who embody more Afrocultural practices and values were more likely to use productive than unproductive coping strategies. These include active coping, emotional support, instrumental support, positive reframe, planning, humor, acceptance, and religion. Also, those who espoused more Afrocultural practices and values conform to traditional feminine norms such as relational, sweet and nice, domestic (maintain home),

and care for children, but were less likely to conform to beliefs around modesty (refrain from calling attention to one’s talents or abilities). Implications culture and gender role conflict as they relate to psychological well being will be discussed.

The Academic Implications of Childhood Trauma Among Students of Afro-Descent: A Subjective Analysis

Presenter’s Name: Darian Lasenby
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Childhood trauma is a current epidemic influencing adverse outcomes, including mental health challenges, deficits in cognitive abilities, lower academic achievement, and student conflict at school (Eklund et al., 2018). The effects of trauma are severe. These effects are far more extensive and detrimental for some children and students. The impact of childhood trauma is either buffered or exacerbated by a child’s environment (Blaustein, 2013). The educational context is a psychosocial factor significantly vulnerable to the effects of childhood trauma. The increase in children who have or will experience trauma is alarming, resulting in adverse experiences in the educational domain. In most classrooms, at least one student has experienced trauma and traumatic stress (Blaustein, 2013). Childhood trauma profoundly affects the appropriate trajectory for learning across an individual’s developmental lifespan (Lasenby, 2019). In communities comprised of poverty, violence, racism, homelessness, and other forms of social vulnerability, the majority of students will have experienced trauma due to their proximity (Blaustein, 2013). The rates of Black students exposed to trauma, second-hand trauma, and traumatic stress continue to increase (Opara et al., 2020). This study will examine the impact of childhood trauma on the three domains of academic engagement: behavioral, cognitive, and affective. Additionally, the investigation will include insight into understanding participants’ perceptions of their experienced traumatic event(s). This insight will better inform the understanding of psychological and educational processes impacted by childhood trauma.

Keywords: Childhood trauma, academic engagement, subjective experience

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Assessing the relationship between Financial Deepening and Economic Growth

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Using World Bank Deconomic evelopment indicators data, this research assesses the causal relationship between financial deepening and economic growth in Oil rich countries. The research utilizes world bank's M2(Monetary Base) and IMF's financial development indicators to assess the relationship. Does financial deepening lead to economic development or economic development lead to financial deepening? The paper also investigates the mechanism through which the dynamic relationship between financial deepening and economic growth occurs.

Preparing Your Seat at the Table: An Intricate Examination of the Professional Ambitions of Post Professional Minority Occupational Therapy Students and Practitioners

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The OT profession is predominantly white (82.5%) and does not reflect the national demographics in terms of diversity” (Banks, 2022). The purpose of this study is to investigate the ambitions of minority occupational therapy practitioners who have returned to school in order to obtain a post professional degree. “The results from this study can help to identify gaps in current literature, increase the body of knowledge from a research perspective, further investigate the need for diversity across all aspects of the profession, as well as determine the goals and aspirations of minority (African American, Black, and Latino) occupational therapy students who have returned to obtain their post professional degree. A hypothesis will be tested in the form of a mixed methods survey design. Participants will complete a qualitative survey in which will assess their personal reasons for returning to school. The results from this study will help determine the primary reason minority occupational therapy students are returning school. Furthermore, outcomes from this study can potentially identify the need for currently policy changes and commitments to further diversifying the occupational therapy profession.

Black Developmental Continuum: A New Theory of Racial Identity

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Most racial identity models were developed during the last part of the 20th century and may not represent the current experiences of African Americans. The Black Developmental Continuum (BDC) provides a model in which Black Americans can conceptualize and visualize their life experiences related to ethnicity and racism. Several continua were chosen over a stage model because of the complicated and sometimes cyclical nature of the Black experience. The initial continuum of BDC begins with an experiential state similar to William Cross's Racial Identity Scale “pre-encounter stage.” The BDC then emphasizes an “awakening moment,” defined as Black Americans becoming aware of their Blackness and what it signifies in America. This can entail the awareness of positive (proactive) as well as negative (defensive) aspects of the Black experience. Initially, it was hypothesized that individuals would immediately take one of four routes as a function of this dawning of awareness: oblivion, serenity, constructive nationalism, and refutation/resistance. The model holds that individuals may vacillate or fluctuate between the paths throughout their lifetime. As individuals age, they are able to have emotions and experiences of more than one path without internal conflict. It is essential that revised models of racial identity reflect the fluid nature of the Black experience. Additionally, it is important that they are explicit with respect to value judgments placed on the life paths individuals follow. The BDC aids in diversifying the psychological sciences, specifically for African Americans, and understanding different general Black racial identities.

Increasing Access to Safe Active Transportation in a Small Mid-Atlantic Minority City: An Evaluation Plan for the Petersburg Healthy Options Partnerships' Mural Project

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Background: The health benefits of physical activity include obesity prevention and treatment. Petersburg, Virginia, a majority African American city, has an adult obesity prevalence of 42%. The Petersburg Healthy Options

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Partnerships (PHOPs) planned the Petersburg Street Mural Project to promote physical activity through active transportation to address this public health issue. The mural project involved painting a mural on a significant intersection in Petersburg with a goal of creating community awareness of and participation in active transportation advocacy and projects in Petersburg. The mural project was a pilot for future projects aiming to improve safe active transportation across Petersburg. Study Purpose: This capstone project aimed to develop an evaluation plan and tools to determine if the PHOPs team met its objective of increasing the number of visitors to the Petersburg Public Library/POP! Market who feel safe crossing W. Washington and/or N. Market Streets by 25%. Methods: The evaluation plan was developed using practice-based measures and through collaboration with the PHOPs evaluator. The evaluation plan's components included: participant description, data map, selected and adapted instrumentation, data analysis, communication plan, and recommendations. Evaluation tools developed included road user observation forms and a community member survey. Implications: Nationally, the adult obesity prevalence is like Petersburg, Virginia, with over 40% of adults in the United States with obesity. Thus, there is a great need for physical activity as a preventative measure and treatment option for obesity. Evaluations of interventions addressing physical activity and safe active transportation are needed to understand interventions' effectiveness.

Economic Wealth in Black Students with Loans

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The Higher Education Act of 1965 and its reauthorizations were designed to provide financial assistance to post-secondary students and strengthen the educational resources of colleges and universities in the United States. Under this Act, programs such as Federal Work Study, the Federal Supplemental Education Opportunity Grant, Pell Grants, the Federal Perkins Loan program, and Parent Loans for Undergraduate Students have provided college students with financial assistance. However, research still shows that Black students are more likely to be burdened with student loans than their white counterparts. For example, research shows that Black students owed 113% (i.e., more than what they had borrowed) 12 years after their initial enrollment, while White students only owed 65% (Carlson, 2020). Such significant reliance on student loans has a consequential negative impact on Black students' well-being. First, large loans consume future income that otherwise could be saved or invested. Second, loans do not always lead to degree completion, nor do degrees provide access to highly compensated employment

opportunities. Third, such debt discourages students from continuing their education in graduate programs. Under the pressure of such debts, students may also be more likely to choose a high-salary job over a lower-salary (public interest) job (Henager & Wilmarth, 2018). In this study, we examine the impact of student loans on Black students' well-being. We will then make suggestions on policies and programs that can best provide financial assistance to support Black students' post-secondary education.

Race and Gender Inequalities in the Colombian Labor Market

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Inequality is one of the main characteristics and challenges of developing countries' labor markets. More than half of Colombia's workforce participates as informal workers. In particular, Afrocolombians and women face additional barriers to entering and staying in the market. This paper uses microdata from the Great Household Survey in Colombia to analyze urban sector disadvantages from racial and gendered perspectives. This article aims to test, identify, and characterize inequalities pertaining to wages, access, and opportunity in the labor market through data analysis comparison and the Linear Probability Model regression method. This paper finds that unemployment among Afro-descendant females is almost double that of non-Afro-descendant men, even when controlling for educational attainment and regional differences. Additionally, the participation of Afrodescendants in the Colombian labor market is determined by the overrepresentation of this community at the lowest levels of education and the underrepresentation at the highest.

The Economic Impacts of Hurricane Katrina

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Presentation Type: Oral Presentation
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Coauthors:

My paper discusses the numerous negative economic consequences of Hurricane Katrina on the city of New Orleans, Louisiana. In addition the physical damage caused by the storm itself, my research discusses how inadequate government aid, biased media coverage, and selfish political

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agendas by local government contributed to the preventable suffering of millions. Additionally, my paper analyzes the vast difference in response and aid to the victims of the storm based on race, specifically between black and residents. Factors such as discriminatory housing practices, wage gaps, and others resulted in black residents facing a much harder recovery relative to their white counterparts. We can see the effects of these unfair disparities even today, almost more than two decades after the storm's strike in 2005.

Cinematherapy: a Study on the Framework of Human Connection

Presenter's Name: Morgan Phillips
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The world is more disconnected than ever. Further understanding human connection and human development can help bridge the understanding of how to be more connected. One tool that can be utilized to foster human connection is cinematherapy. Films are methods used to trigger human emotion, which can be used to aid in building human connection. This study is a phenomenological approach based on grounded theory research conducted by Brené Brown. The research design was constructed in order to further investigate how cinematherapy further develops human connection specifically in younger adolescents. Additionally, this particular research design seeks to understand how positive development can begin in younger adolescents as a result of these conversations. The research and conversation is significant as it goes beyond and adds to the literature regarding the realm of cinematherapy, human connection, human development, and the use of films in a therapeutic and educational lens.

Political conservatism and moral model of addiction: Pre-registered reanalysis

Presenter's Name: Sahvanah Prescott
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Attitudes toward drug addicts have implications for public policy, yet there is inconsistent evidence of the relationship between public demographics and attitudes. A publicly available data set (Earp et al., 2019) included demographics

and judgments of addicted people, but did not report relationships between them. So, we undertook a reanalysis. Study participants indicated whether the person who started taking drugs had changed or remained the same person. They also endorsed either a medical model for addiction, emphasizing biological origins outside the individual's control, or a moral model, emphasizing individual choice and moral failings. We publicly pre-registered the following predictions prior to analysis: conservatives will say the addicted person is changed and endorse the moral model of addiction due to beliefs in personal responsibility, older people, who have seen individuals through good and bad times, will see the addicted person more the same person, and women will see the person starting a bad drug as more the same person and endorse the medical model because they are more empathetic. Results confirmed that conservatives viewed the addict as a changed person and endorsed the moral model. Age was not associated with judgments of being the same person. Results showed no relationship between gender and model of addiction. Going against predictions, women reported the addicted person as more changed. Political ideology showed predicted effects on views of drug addicts. Open science facilitated access to data otherwise unavailable for an honors thesis, and pre-registered analyses increased scientific transparency and integrity.

A look into Black Political Leadership in the 20th and 21st Century

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Shirley Chisholm. Jesse Jackson. Barack Obama. When considering Black Leaders from the 20th and 21st centuries these three names alone, arguably define the state of black politics in the US. Certainly, these three figures made an impact on black politics that will never be forgotten. Through the study of these three black political figures, we will learn two main lessons about the black community including what these three figures represent to the black community at the height of popularity. Along with this, we will clarify the general political positions of these figures and subsequently a large swath of black America's position on a variety of topics. Through these two perspectives, we will not only be provided with a precise history of Black American Politics over integral eras but will access an invaluable playbook for the next generation of Black Political leaders. From this set of lessons, one will then be able to cast predictions on the future of black politics in the US. We will consider the current set of Black leadership while also looking back to the state of the community to explicate trends.

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Belonging in Science: Exploring the Experiences of Notable Black Scientists in S.T.E.M.

Presenter's Name: Ashley Riley
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Presentation Type: Poster Presentation
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There is a dearth of research examining the experiences of Black scientists in Science, Technology, Engineering, and Math (S.T.E.M.) fields. The present investigation seeks to contribute to research on Black scientists through qualitative research exploring the performance, persistence, and experiences of notable Black scientists in the S.T.E.M. field. The researchers analyzed archival transcripts from individual interviews with Black scientists in the field of physics discussing progression through their careers, significant accomplishments, and cultural and environmental factors contributing to their professional experiences. In accordance with Saldana's (2021) qualitative research methodologies, the researchers explored the phenomena of belonging through line-by-line descriptive coding followed by focused coding analyses. Microsoft Word and IN VIVO software were utilized for first and second cycle coding, respectively. Interdisciplinary research from science education and social science literature were employed to bolster our understanding of Black scientist's experiences in S.T.E.M. Findings highlight the importance of belonging as it relates to affiliations, family, work, academic achievement, professional affiliations, work and work environment, research, affirmative action, Black scientists, and lack of belonging. Analyses reveal that affiliation played a central role in Black scientists' sense of belonging. Further, the significance and impact of affirmative action policies influenced Black scientists' experiences in the workplace. Potential implications for Black S.T.E.M. students and professions are explored.

Mass Incarceration and the Theory of Punishment

Presenter's Name: Jamelia Robinson
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This paper uses an exploration on the philosophical theories of punishment to answer the question as in to why the United States' incarceration rates are the highest amongst most developed countries. The paper relies on the argument that the mass incarceration present in the U.S is unjust. It will use the theories on punishment to provide possible solutions

to the issue. In support of Vincent Chiao's stance within his writing, it will be contended that a strictly deontological theory of punishment would not answer the question as to why the United States' mass incarceration system is unjust as it fails to consider the social impact of incarcerating wrongdoers. The paper will then go forth in exploring other theories of punishment and examining what are the possible solutions to be brought forth in their practice. It will then be concluded that in order to remedy the mass incarceration rates the United States must adopt a stronger reliance on rehabilitation rather than incarceration as a form of punishment.

Expressive Arts and its Effects on Adverse Childhood Experiences (ACE)

Presenter's Name: Sahara Sampson
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Presentation Type: Oral Presentation
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Coauthors: Rayna Richardson

The expressive arts have long served as protective and healing mechanisms against the psychological and physical effects of trauma (Schouten, de Niet, Knipscheer, Klber, & Hutschemaekers, 2014). The purpose of this study is to examine differences in individuals' mental health due to adverse childhood experiences (ACE) with and without expressive art intervention. According to the Centers for Disease Control and Prevention, ACEs are defined as "types of abuse, neglect, and other potentially traumatic experiences that occur to people under the age of 18". ACE traumatic results can impact an individual's psychological and physical well-being (Centers for Disease Control and Prevention, 2019). Unaddressed trauma can often be stuck within an individual's body, which can be challenging to express verbally in traditional therapy settings. In this two-part study, we first conducted an extensive literature review to examine how dance and movement have been used to treat individuals affected by adverse childhood experiences. We also conducted a study to understand how engagement with visual arts is related to adverse childhood experiences. The research described here is part of a larger research plan about expressive arts participation and ACE. Further research will be conducted to discuss how expressive arts are effective for Black children who have been affected by adverse childhood experiences.

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The Relationship of Fall Prevention Service Delivery of African American/Black Older Adults; Race and Ethnicity

Presenter's Name: Ashley Sheehy
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Presentation Type: Oral Presentation
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Coauthors:

The objective of this study is to find a correlation in service delivery for fall prevention with African American/black older adults when receiving treatment from healthcare professionals of various ethnic backgrounds. African American/black older adults have a higher profile for falls and experience 2 or more falls per year. In the current climate of improving healthcare for minority groups, the findings of this study may help to provide quality healthcare for fall reduction to minority older adults that will allow for better carryover of fall prevention techniques. This research will be implemented by conducting a quantitative correlation study using a survey data with a 10 questions Likert scale survey via Qualtrics that will be dispersed to current and past certified occupational therapists, certified occupational therapy assistants, certified physical therapists, and certified physical therapy assistants via social media platforms and forums and word of mouth. The quantitative data will be examined and analyzed with Howard University using SPSS software and stored using Refworks.

The Impact of Race-Related Stressors on the Psychological Well-Being of African American Women

Presenter's Name: Tiara Smith
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Presentation Type: Poster Presentation
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This study investigates the relationship between race-related stressors and the psychological well-being of Black women in the United States. It was initially hypothesized that higher indicators of race related stressors would result in lower psychological well-being among Black women. Participants were 326 college students at Howard University who were given two sets of questions: the Racism and Life Experiences (REL) questionnaire assessing racist life events and Ryff's Psychological Well-Being scale, measuring specific aspects of psychological adjustment and mental health. The REL scale was scored in terms of the frequency and the impact of a set of common racist occurrences. In addition to correlational analyses, a moderated regression analysis determined the effects of the impact of reported racism on the relationship

between the frequency of racist events and well-being. Contrary to the initial hypothesis, results showed that there was significant correlation (.237) between experienced racist events and well-being. Preliminary results from the regression analysis revealed that experiencing more frequent racist events was associated with higher well-being scores in individuals who report that events have a weak to moderate impact. The findings suggest that racist life experiences are not extremely disruptive and may strengthen one's sense of well-being. This is consistent with a colloquial notion that "what doesn't kill you makes you stronger." (Supported by NSF Grant # 1823965)

The Influence of Post World War II Media on American Social Structure and the Social Positions of American Women

Presenter's Name: Jasmine Smith
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The purpose of this research is to analyze the role that Post WWII media played in the evolution of American social structure following the war (up to 10 years after the end of the war). This research seeks to establish a timeline of WWII mass communications rhetoric in order to fully conceptualize the changes American society was subjected to. In doing so, it encourages readers to consider how prominent media from that era connects to the upbringing of the Baby Boomers and the influence their upbringing has on today's society. This study will investigate the narratives surrounding American social structure that were popularized during the Great Depression (Pre-WWII), World War II, and Post-WWII (up to 10 years following the war) via several mediums of communication: radio, television/film, and print media.

Examining accommodations policy and addressing barriers to access in post-secondary institutions

Presenter's Name: Malika Smoot
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Every semester, students with disabilities must request accommodations (i.e. extended time on exams and assignments, note taking assistance, the ability to record lectures, or guaranteed access to specific classroom seating). Disability spans invisible and visible ailments and can be

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temporary (acute) or ongoing (chronic), which includes social emotional issues such as anxiety and depression, as well as short term injuries such as a broken arm or a concussion. Accommodations allow for students with disabilities to participate in their education at a level consistent with their peers, however, the lengthy and redundant process serves as a barrier. Studies have shown the earlier students with disabilities receive accommodations, the better they perform. However, students with disabilities have reported unawareness of services, difficulty in process, and stigma from professors as reasons they have delayed or have not used these services. This presentation will comprehensively examine the perceived barriers, as well as related policies and procedures for students who need to seek accommodations, especially in Historical Black Colleges and Universities. This study will address the gaps in the current literature on students' needs in seeking for accommodations, increase the awareness of faculty, university staff, and students on this issue, and provide suggestions on culturally competent practice, such as Universal Design Learning Techniques, to best meet the needs of students with disabilities while supporting their learning process and outcome.

Going to Church: Examining the trends of church attendance in light of Covid-19 on religious beliefs, practices, and affiliation among U.S. Christians.

Presenter's Name: Tess Starman
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The state of religion in the United States has notably changed over the past decades, with decreased affiliation, strength of belief, and attendance. These changes were exacerbated by the Covid-19 pandemic, which prevented formal gatherings of large groups of people, such as weekend religious services. Few scholars are currently exploring the role of gathering on religious life, and thus how decreasing attendance is impacting religious change, both during and prior to Covid-19. Through secondary data analysis of the General Social Survey, this study examines religious trends from 2012-2021 with attention on the period effect of Covid-19 on religion. Specifically, this research analyzes how the decline in church attendance due to Covid-19 has impacted the already declining religious practices, beliefs, and demographics. Analyzing church attendance trends is important because of the way in which religion, or lack of religion, impacts decision-making processes, especially pertaining to lifestyle, political ideology, and interpersonal relations.

The Intersectional Relationship between Internalized Antiracism, Phenotypic Privilege, and Belonging in Black/White Biracial People in the United States

Presenter's Name: Hannah Stevenson
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This presentation will focus on the research I plan to conduct that aims to contribute to the growing field of mixed race studies through exploration of Black/White biracial individuals' experiences of racial group belonging. Black/White biracial individuals, in particular, have struggled differently than their monoracial counterparts in developing their racial identities and social belonging. Much of the literature has emphasized their psychological experiences from a deficit-based lens, which overlooks important aspects of a biracial individual's life experiences. Biracial identity has often been discussed as a source of low self-esteem, double rejection, and poor peer relations, among other challenges (Shih & Sanchez, 2005). Though the development of a racialized identity can be an inherently complex process for any individual, it may be unique for Black/White biracial people due to their parentage. Understanding that racial self-definition is a social mandate, the research will use intersectionality theory to discuss the complexity of biracial identity, situated in the context of the United States' racial history and racial oppressions. Though race, as a concept, is a social construction, its implications create social realities and inequities that require all people to think of themselves as racial beings (Helms, 1994; Shih, et. al, 2007). Racial group membership and belonging are salient aspects to the ways in which people define social identification. This research will explore the role of internalized antiracism and phenotypic privilege in Black/White biracial individuals' racial self-identification, conceptualization of their own identity, and experiences of racial group belonging.

The application of the Face Negotiation Theory to the social and political conflict of the African American community

Presenter's Name: Jordyn Taylor
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This study has two purposes: (a) to examine the application of Stella Ting-Toomey's Face Negotiation Theory to American ethnic groups in the time of cross-cultural conflict and (b) to

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compare and analyze the effects of race on pre-established variables stated in the theory like cultural variability. There will be a comparative analysis using race as a grouping factor instead of nationality, differentiating this study from those done previously. Once examined, the goal is to see how race, as an independent variable, produces results that deviate from the assumptions of the original study conducted in 1991. The aim of this study is to determine if racial differences play a role in face management and how this conflict in itself garners a facial response from individuals of that culture. This combined could help explain major conflict behavior that is displayed by these groups in respect to the Black Lives Matter, Stop Asian Hate, and White Lives Matter movements from 2013 to 2022.

Covid 19, Missed Milestones, Social Interactions, and Mental Health in Black Emerging Adults

Presenter's Name: Moiya Toliver
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Covid 19 pandemic had a tremendous impact on the mental health of all. From the initial waves of the pandemic which were marked by virtual settings, social distancing, and isolation, many are still dealing with its psychological effects. Specifically, for older adolescents emerging into adulthood, the pandemic hit during a period often filled with major milestones. Thus, when considering milestones missed due to the pandemic, this population seems to have been particularly impacted concerning connectedness and race-related stress. Social interactions were altered and milestones such as graduations, proms, and the first year of college were cancelled or delayed. Furthermore, Black emerging adults were at the center of two pandemics, that of COVID-19 and the heightened racial unrest following the murders of Ahmaud Aubrey, Breonna Taylor, and George Floyd. This qualitative study focuses on Black emerging adults, ages 18-21, attending a historically Black institution. Focus groups were conducted to better understand how Black emerging adults' connections and coping have been affected. The aim of this research is to examine the following for Black emerging adults during the COVID-19 pandemic: how have social interactions changed; and how have missed milestones during this time impacted their mental health? Results from the study will provide insight into the impact that missed milestone events and changes in social interaction due to the COVID-19 pandemic have had on the mental health and wellbeing of Black emerging adults. Results will inform interventions that can

support while they navigate the effects of COVID-19 on their mental health.

The Effects of Acts of Terrorism on Mental Health Within a College Campus

Presenter's Name: Mauryah Turner
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In the past, the U.S has defined terrorism as various types of criminal activity that involve the unlawful use of force and the use of force by revolutionary organizations over the years (Teichman, 1989). The U.S Army's definition of an act of terrorism is the calculated use of unlawful violence or threat of unlawful violence in order to incite fear among populations. When researching ways to describe terrorism, or an act of terrorism, there are many varying definitions, but one common factor remains between them- the threat of violence. Howard University, one of the largest Historically Black Universities in the United States among several other HBCU's in the country, was the target of bomb threats in early 2022 and 2023. Fear of safety or security can lead to unwanted mental health challenges that can affect academic performance, daily satisfaction with life, and other basic psychological functions. The study's aim is to review and determine the effects that the awareness and seriousness of acts of terrorism such as mass shootings and bomb threats can have on the students and faculty on college campuses. The preliminary results of the research showed a positive relationship between the awareness and seriousness of acts of terrorism and post- incident psychological symptoms of stress and other mental health challenges. In future studies, the information collected from this study could be used to support other bodies of literature involving psychological reactions to threats of violence on targeted groups of young and older adults.

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Factors Influencing the Women for Birth Decision in Bangladesh: Applying Health Belief Model and Theory of Planned Behavior

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The Cesarean section (CS) rate in Bangladesh is over 80% in hospital-based deliveries, which should not be more than 15%, as recommended by the World Health Organization due to the long-term health effects on women. However, studies in the Bangladeshi context pay little attention to understanding the reasons for this alarming CS trend from health belief and behavioral perspectives. To address the research gap, this study investigated the social factors influencing Bangladeshi women's birth decisions using the health belief model and the theory of planned behavior. A total of 503 Bangladeshi women who gave birth within two years during the data collection participated in the study by completing an online survey. The study findings from structural equation modeling show that subjective norms significantly influence CS delivery. Not only physicians have a direct influence, but family members such as pregnant women's mothers and husbands, who traditionally hold high social positions, also have a huge impact on pregnant women's birth decisions. The study found a positive relationship between health beliefs and attitudes toward the specific birth modality. However, no positive relationship was found between attitude and intention for CS or VD. The study also indicates that knowledge has a significant correlation with birth delivery, as women who are more aware of the consequences of birth modalities choose VD over CS. To reduce the CS rate, this study suggests addressing the lack of health content sources in the local language, creating awareness and arranging motivational programs for first-time pregnant women, and implementing policies strictly for service providers.

The Impact Of Having Children In The Home On Psychological Distress Among US Cancer Survivors from 2017-2020: Results From The US Health Information National Trends Survey

Presenter's Name: Naomi Vinod
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Background: Literature has long emphasized the presence of psychological distress (PD) in cancer survivors as significant. Many survivors struggle with the emotional and psychological impact of cancer, even after completing treatment. Despite the extensive research on PD, there seems to be little understanding on the pressures of parenting as a cancer survivor. Having children in the home can be a wonderful and fulfilling experience, but it also comes with its own set of challenges including childrens' need for constant support and financial demands. Methods: The following study sampled data from The US Health Information National Trends Survey from years 2017-2020. This analysis aimed to examine the impact of having children in the home on PD among cancer survivors. To measure self-reported distress the Patient Health Questionnaire-4 (PHQ-4), a four-point Likert-type scale that assesses the presence of anxiety and depression symptoms, was used. Results: Descriptive statistics on 2369 HINTS respondents was performed and included men (N=1023) and women (N=1346), children in the home (N=284), no children in the home (N=2085), and age (M=62.22). Chi-Square analysis showed significant differences in the reporting of PD in cancer survivors with children when compared to cancer survivors without children in the home, $\chi^2(30, N=2369)=756.380, p<.001$. Conclusions: Results from this investigation suggest disparities in PD amongst cancer survivors with children compared to those without children. Further investigation of these disparities is necessary as we take steps towards mitigating these differences and better understand what needs are not being met.

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The Association of Ethnic Group Membership, Perceived Health, and Psychological Distress Among Female Cancer Survivors: Results from the 2017-2020 US Health Information National Trends Surveys

Presenter's Name: Jenna Warren
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Coauthors: Jules Harrell

Purpose: This secondary analysis aimed to examine the effect of ethnic group membership on psychological distress among female cancer survivors representing variable cancer types and determine the mediating effect of perceived health on the aforementioned relationship. Methods: Preexisting data found in the Health Information National Trends Survey Fifth Edition, Cycles 1-4 (2017-2020) was analyzed using Hayes PROCESS Macro. Ethnicity was categorized as Non-Hispanic White, Non-Hispanic Black, Hispanic, Non-Hispanic Asian, and Non-Hispanic Other. Psychological distress was measured via the patient health questionnaire-4 (PHQ-4) and perceived health with a Likert scale single item. Results: Responses from 803 female cancer survivors were included. The vast majority of the sample was Non-Hispanic White (75.1%) followed by Non-Hispanic Black (11.6%) and Hispanic (8.71%). Results demonstrate that Non-Hispanic Black ($M = 2.04, p = .002$) and Hispanic ($M = 2.25, p = .007$) women report significantly higher levels of psychological distress compared to Non-Hispanic White women ($M = 1.96$). Hispanic women also report significantly lower self-rated health compared to Non-Hispanic White women ($p < .001$). Mediated analysis confirms that the difference in psychological distress between Hispanic and Non-Hispanic White women is mediated through self-rated health (Effect = 0.36, SE = .11, 95% CI [.14, .59]). Conclusion: Findings from this study reveal higher levels of psychological distress in multiple ethnic minority groups of female cancer survivors when compared to their White counterparts. For Hispanic women, a portion of the differences in that relationship can be attributed to differences in self-rated health.

The Fight for Equality and Justice within New York City's Bail-Bond System

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Throughout history, the bail bond system utilized within New York City has unjustly targeted minority communities. These already marginalized groups face harsher consequences than others when they are arrested, detained and forced to post bail to regain their freedom. Many cannot afford the excessive bail prices and must decide if their freedom is worth sacrificing the financial stability of their families, along with the mental and societal anguish that comes with such a heavy decision. Therefore, it is imperative that the issues present within New York City's bail bond system be addressed and the overall system be reformed to ensure that its policies, procedures and processes are fairly applied to all New Yorkers.

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TRANSLATIONAL & CLINICAL SCIENCES

A Scoping Review: Defining the Effects of Sensory-Based Intervention and Activity-Based Intervention for Older Adults with Dementia

Presenter's Name: Barbara Addo
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Coauthors:

Dementia is increasingly recognized as a significant public health issue for aging populations. Dementia is a neurological disease that causes behavioral and cognitive symptoms progressively impairing an individual's ability to engage in meaningful occupations. Progressive decline associated with dementia impacts a person's occupational performance, independence, and quality of life. Currently, a plethora of research literature addresses therapeutic intervention programs as an essential treatment for supporting people with dementia and facilitating their participation in occupational performance. Sensory-based interventions, such as drumming, have been hypothesized to be non-pharmacological interventions for individuals with dementia. Activity-based interventions targeting participation and engagement in meaningful activities have also been hypothesized to benefit older adults' emotional and physical well-being. Without something to do, agitation, irritability, wandering, self-stimulation, yelling, and aggressive behaviors arise. The inability to participate and engage in meaningful activities can place older adults at higher risk of loss of identity and well-being. This scoping review aims to analyze the effects of sensory-based and activity-based intervention programs on active engagement for individuals with dementia. The results of this study will improve the performance range of older adults with dementia by equipping occupational therapists with an extensive inventory of evidence-based interventions to decrease maladaptive behaviors and increase participation in occupational engagement, such as ADLs, leisure, rest/sleep, and social involvement.

Development of PSMA-Targeted Drug Loaded Nanoparticles for Combination Therapy of Advanced Prostate Cancer

Presenter's Name: Simeon Adesina
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Objective: To develop PSMA-targeted, drug-loaded nanoparticles for the treatment of advanced prostate cancer. Combination therapy in a nanoparticle platform and targeted to prostate specific membrane antigen (PSMA) overexpressed on prostate cancer cells will enhance therapeutic efficacy and reverse chemoresistance. Methods: The PSMA targeting ligand was synthesized and characterized. The PSMA targeting ligand was coupled to heterobifunctional polyethylene glycol (PEG) using HATU as a coupling agent followed by conjugation to polylactide-co-glycolide (MW: ~30kDa) to form PSMA-linked, PEG-terminated PLGA copolymer (PSMA-PEG-PLGA). Fluorescent dye (rhodamine-123)-loaded nanoparticles with various surface densities of the targeting ligand were prepared by varying the proportion of PSMA-PEG-PLGA and PEG-PLGA in the formulation. Flow cytometry studies was done to select the formulation with optimum surface density of targeting ligand using LNCaP prostate cancer cells. Drug loaded nanoparticles were prepared and characterized (particle size, drug loading and release profile) using the selected formulation. Results: Mass spectrometry of the targeting ligand coupled to PEG gave the expected molecular weight. Proton Nuclear Magnetic Resonance data confirm the synthesis of PSMA-PEG-PLGA. Uptake studies of dye-loaded nanoparticles by flow cytometry show that the formulation with 10% surface density of the PSMA targeting ligand gave optimum and consistent accumulation in LNCaP prostate cancer cell line at both 15 minutes and 120 minutes leading to the selection of the formulation for drug loading studies. Drug loading of brusatol and docetaxel and the drug release profile of the selected formulation will be presented. Conclusion: The nanoparticle formulation is suitable for targeting drugs to prostate cancer.

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Applying Knowledge Translation to Prepare Occupational Therapists to Work with Women with UI

Presenter's Name: Jessica Alden
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Urinary incontinence (UI) is considered a major global health problem which affects women of all racial backgrounds. Symptoms may have a profoundly negative impact on quality of life, occupational performance, and incur substantial financial burden on women with UI, particularly Black women. OTs may use biopsychosocial interventions to promote occupational performance and coping with symptoms, but there is a high level of variability in OTs preparedness to treat women with UI. This project applied a knowledge translation model to deliver an in-service training to prepare OTs treat UI symptoms and increase quality of life of women with UI. The training effectively increased OT confidence in clinical skill areas including; screening, evaluation, and treatment.

A Content Analysis of Health Communication Received by Black Males Regarding Cardiovascular Risk

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Background: African Americans have a substantially higher incidence and prevalence of high blood pressure. As such, they are at higher risk of developing chronic health complications like heart failure, kidney problems, stroke, and metabolic syndrome. Furthermore, these conditions are commonly found in black men with low educational attainment, poor lifestyle, and low health literacy. Fifty-eight percent (58%) of African Americans have basic or below basic health literacy, compared to 28% non-Hispanic whites. However, according to the American Academy of Family of Physicians, healthcare materials are written at the 10th-grade level, alienating many African American communities. Media, second to medical professionals, was one of the common sources of health information for African American men 40 years and older. This analysis aims to assess patterns in health communication content regarding cardiovascular risk and complications for black men ages 40 years and older. Method: The proposed study will use a systematic review to conduct a content conceptual analysis of articles from four major black magazines prevalent in the 90s: Essence, Jet,

Ebony, and Black Enterprise, to discern what information black males receive about their health. Expected Outcomes: Black men are at a 1.6 times higher risk of cardiovascular disease than white men. The study results will show that black men are not receiving accurate health information to minimize cardiovascular risk.

Impact of Race and Insurance Type on Outcomes Following Bariatric Surgery

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Bariatric surgery is beneficial in reducing the prevalence of obesity, increasing the likelihood of remission of chronic medical conditions increasing longevity, and improving the overall quality of life. The aim of the present study is to determine the interaction of race and insurance type on the outcome of bariatric surgery among patients in the United States. Data on patients with bariatric surgery-associated hospitalizations between 2010 and 2017 was retrieved from the National Inpatient Sample database. Outcomes of interest were the length of hospitalization (LOS), development of acute pulmonary embolism (PE), and mortality. There were 1,164,717 hospitalizations associated with bariatric surgery in the study period. The mean age was 46.0 ± 13.4, 76.5 % were females, 68.4 % White, 17.5% Blacks and 13.0% Hispanics. Among these patients, 62.5% had private insurance, 30.1% public insurance and 4.3% were uninsured. Private insurance was associated with a lower risk of adverse outcome across all race/ethnicities. Uninsured Black patients had double the risk of adverse outcomes compared to Blacks on public insurance: mortality (OR= 6.63 VS 3.44, p < 0.05), PE (OR=6.71 VS 3.10, p < 0.05), and LOS (OR=14.48 VS 6.63, p < 0.05). White patients with private insurance have the best outcome. Uninsured Blacks patients have higher adverse outcomes (mortality, LOS and PE) compared to Black patients on public or private insurance. There was no significant difference in outcomes between Whites, Blacks or Hispanics on private insurance.

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Synthesis and Characterization of a Targeted Peptide Drug Conjugate for the Treatment of Glioblastoma

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Glioblastoma is the deadliest and most common primary brain tumor with an incidence of approximately 10,000 Americans per year. Challenges to the success of treating such brain tumors include the active efflux of drug from the brain parenchyma, the inability of anticancer agents to cross the blood brain barrier (BBB) and accumulate in the brain tumor cells, adverse effects of the current therapy, and resistance to radiotherapy and chemotherapy. Recent efforts have been made to improve glioma therapy with the use of targeting agents that are able to cross the BBB. Although these targeted drug delivery systems are able to cross the BBB and reach the brain parenchyma, they fail to deliver high concentrations of drug primarily to the brain tumor cells. To overcome these challenges, an effective drug delivery system for glioma therapy should consist of a drug conjugate with a targeting ligand that is able to cross the BBB and selectively deliver the drug to the tumor microenvironment. Herein, we propose to synthesize and characterize a transferrin receptor targeted drug conjugate that is able to cross the BBB and accumulate in the tumor microenvironment for enhanced site-specific drug delivery. Using the T7 peptide (HAIYPRH) as the targeting ligand for the transferrin receptor, 7-ethyl-10-hydroxycamptothecin (SN-38) will be coupled via a protease cleavable peptide linker to form the targeted drug conjugate. The peptide linker will be cleaved by cathepsin B which is overexpressed in glioblastoma. The synthesized conjugate will be characterized and cleavage studies will be presented.

The effect of exercise on the immunological function of erythrocytes in humans

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Red blood cells, or erythrocytes, account for about 80% of all cells in the human body. As of now, their major known function is to carry oxygen to the tissues of the body and take carbon dioxide away from the tissues and back to the lungs. Since red blood cells carry oxygen all over the body, it is well-

known that they impact the immune system; however, until now, it has not been known whether they alter inflammation directly. Recently, at the Perelman School of Medicine at the University of Pennsylvania, research showed that red blood cells work as immune sensors. The aim of this study is to examine the effect of exercise on the immune function of red blood cells. Pubmed and google scholar were used to conduct a literature review search. Of the results, 25 studies were used for the findings of this paper. After an intensive review of the current literature, the researcher concluded that regular acute exercise can enhance the newly found function of red blood cells due to increased red blood cell production, supporting the hypothesis.

A novel sulfonylurea compound reduces neuroinflammation in the murine model of vascular dementia

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NOD-like receptor Leucine-rich repeat protein 3 (NLRP3) inflammasome plays a major role in the pathophysiology of inflammation-associated disease states, including vascular dementia (VD). The NLRP3 inflammasome is activated in response to danger-associated molecular patterns and releases the inflammatory cytokines, interleukin-1 β (IL-1 β), and IL-18. Guided by computational studies, we reported on a rationally designed, natural product-inspired sulfonylurea compound, AMS-17, that inhibited the LPS-induced activation of microglia in vitro. Unlike the previously reported sulfonylurea compounds, AMS-17 is structurally unique and remains neutral at the physiological pH. We predict that the unique structural features will offer distinct advantages in minimizing the off-target activity of AMS-17. In vitro studies on the anti-inflammatory activity of AMS-17 was performed using N9 microglial cells line. AMS-17 lowered the LPS-induced expression and protein levels of IL-1 β , inducible nitric oxide synthase (iNOS), and TNF- α . AMS-17 was well-tolerated by the N9 microglial cells and did not affect the viability at the therapeutic concentration. It prevented the aberrant microglial activation in response to bacterial LPS in vivo. Intraperitoneal administration of AMS-17 lowered the number of Iba-positive microglia upon LPS activation and significantly improved learning and memory in the Morris water maze test. Together, these results provide strong evidence of the beneficial effects of AMS-17 in minimizing microglial activation and its potential for the treatment of neuroinflammation-associated disease states. Our approach on the structural refinement of the lead molecule, AMS-17 to improve its activity and selectivity will be presented.

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Comparing Response in Autonomic Activity and the Perceived Stress Scale across Gender

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There is some controversy over whether gender differences in scores on the PSS are due to a difference in the number and magnitude of stressors across groups or response sets stemming from gender socialization. Additionally, knowledge of the relationship between aspects of perceived stress and cardiac activity is lacking. We conducted a PCA of the perceived stress scale undergraduates and a community-based sample. 2 factors, helplessness (PH) and self-efficacy (SE) were found in each sample. In both groups, women scored higher on PH and total perceived stress, However, in the community cohort, men tended towards higher in SE than women. Next in a subsample of the undergraduates we tested the association between both components with 2 objective measures associated with ANS arousal IBI and RMSSD derived from ECG recordings. These 1-min recordings were made during resting and task epochs. HR analyses were employed to determine if stress measures predicted IBI and RMSSD over and above the effects of gender and BMI. A model containing only gender and BMI was sufficient in predicting mean IBI, with sex, but not BMI being a significant predictor. Including PH to the model didn't significantly increase the predictive value of the model. While a reduced model containing only gender and BMI was not a significant predictor of RMSSD during a racial stressor, including SE in the full model significantly increased the correlation between the model and RMSSD. In this model SE was a significant predictor and gender was trending towards an effect.

Resistin: A novel signaling molecule in the development of inflammation, insulin resistance, and Type 2 Diabetes Mellitus

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Introduction: Type 2 Diabetes Mellitus continues to be a growing health concern in the United States that disproportionately affects minorities including non-Hispanic Black Americans. The underlying pathology leading to the development of Type 2 Diabetes Mellitus is resistance to insulin with factors

such as alterations in inflammation, glucose uptake, and dyslipidemia contributing to its development. The underlying molecular mechanisms for how insulin resistance develops is not fully understood. Adipokines have been known to modulate insulin sensitivity; thus having significance in the study of Type 2 Diabetes Mellitus. Resistin is a unique signaling molecule in the pathogenesis of inflammation, obesity-related insulin resistance and Type 2 Diabetes Mellitus. Outlining a mechanism that takes these processes into account may reveal a pathway to understanding the molecular mechanism of insulin resistance. This mechanism may drive the development of interventions that focus on these molecular pathways. Methods: A systematic review was conducted on papers from 2000 - 2023 focused on the role of Resistin in pathways leading to the development of insulin resistance. Outcome: Resistin's influence on insulin resistance is heavily related to its roles in inflammation, glucose uptake, and dyslipidemia. The suppression of glucose uptake contributes to hyperglycemia. Resistin-induced release of pro-inflammatory cytokines inhibits insulin-receptor signaling through downregulation of insulin receptor expression. Finally, Resistin increases adipogenesis and LDL receptor expression, contributing to dyslipidemia which promotes insulin resistance. Conclusion: Resistin is a unique signaling molecule with unique roles in the pathogenesis of inflammation, obesity-related insulin resistance and Type 2 Diabetes.

Use of Quantum Computing to Assess the Effect of SARS-CoV-2 Mutations on Remdesivir

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Quantum computing (QC) is increasingly being used in drug discovery to take advantage of a quantum computer's ability to analyze a large amount of data at fast speeds with high accuracy. QC can execute complex calculations on data sets with millions of samples, molecular descriptors, and differential parameters with accelerations because quantum bits, or qubits, provide a state space that is exponentially larger than that of classical counterparts. QC has been explored to predict and simulate protein structure, physicochemical properties of drug candidates, and dynamic behavior of biomolecules used for therapeutic development. Recently, QC has been used to assess mutational effects on the SARS-CoV-2 spike protein (S), and on the main SARS-CoV-2 protease 3CLpro, and to further identify potential lead candidates that would bind to 3CLpro and its predicted mutants. Herein, we report on our efforts to adopt quantum computing algorithms to machine learning and free energy

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simulations, to evaluate the effects of natural mutations on the RdRp polymerase of SARS-CoV-2, a known target to which the small molecule drug Remdesivir binds. We are aiming to: (1) identify patterns of variation/mutation on the RdRp polymerase; (2) determine how the known mutation(s) perturbs the target site and the possibility of drug resistance; and (3) predict future mutation maps that may be detrimental to drug efficacy and potential structural modifications to work around. Such Knowledge would be significant in identifying lead compounds for further testing and optimization to develop pharmacological agents for COVID-19 less likely to develop drug resistance.

Expediting the Commissioning Process of a Linear Accelerator

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The commissioning process of external beam treatment machinery plays a crucial role in validating the viable operation and behavior of radiation and radiotherapy treatment planning system (RTPS) and process. It involves examining testing system functions, comparing calculated and measured dose calculations, and characterizing various model algorithms. This process must be done to ensure that radiation machine(s) may be used for clinical treatments. Based on the simulations performed in Raystation, while the reference point for each case received its prescribed dose of 200 cGy, the other measurement points of interest also received dosage on a much smaller scale. We were able to successfully receive the prescribed dose to the isocenters for some of their respective cases. However, due to the limitations of this study, namely the short supply of ion chambers and lack of time, the commissioning process could not be performed at its maximum efficiency. The frequent rearrangement of the ion chambers increased the time needed for this procedure. This is important because a quicker commissioning process could possibly correlate to more patients receiving their radiation treatments as more external beam techniques are being clinically tested.

An occupational therapy sensory based intervention approach in a trauma informed care model with victims of homelessness and trauma

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The purpose of this project is to develop a sensory-based occupational therapy program that can be implemented using a Trauma-Informed Care (TIC) model alongside sensory-based interventions for the vulnerable homeless population. In order to develop the program, a trial intervention module will be completed with the population at So Other Might Eat (SOME) to determine the effectiveness and feasibility of the project. Two instruments will be used as a pre/post-test to assess the effectiveness of these services: The Canadian Occupational Performance Measure (COPM), and the Adolescent/Adult Sensory Profile. The sessions will be conducted onsite with a So Others Might Eat (SOME) affiliated program. The purpose of the project is to increase occupational engagement of the participants who have experienced a traumatic event that has become a barrier to occupational function. The Trauma-Informed Care model, in conjunction with sensory-based interventions, has been an emerging form of practice that has demonstrated positive outcomes among other populations. This type of model can have a positive impact as the data to be collected can be used to improve outcome measures.

Automated Summarization of Clinical Notes from Electronic Health Records with Natural Language Processing

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Natural Language Processing (NLP) has witnessed significant advancements with the rise of large language models (LLMs). LLMs are trained on vast amounts of text data, and their abilities have evolved to surpass traditional NLP systems, allowing for numerous applications. These applications include but are not limited to language translation, sentiment analysis, and question-answering systems. The emergent abilities of LLMs stem from their ability to learn complex patterns and relationships within language and transfer these learned features to downstream tasks. They can produce coherent and contextually relevant text, generating

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responses that are human-like in nature. To demonstrate, we have created an NLP model to automatically summarize clinical notes from electronic health records (EHRs). The model is a GPT-2-like causal language model that was trained on a dataset of clinical notes that were summarized by medical and pharmacy students at Howard University. A live demo of the model is publicly available on the web at bit.ly/gptclinicalnotes. This research highlights the current capabilities of LLMs, their potential applications in healthcare, and the ethical considerations that need to be addressed in their development and deployment.

Comparison of Renal Function Estimators and Their Impact on HIV Pharmacotherapy Eligibility

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Objectives: Traditional methods for estimating GFR are known to overestimate CrCl in black patients, consequently causing kidney damage and potential treatment to be overlooked. With the recent implementation of the 2021 CKD-EPI equation, GFRs in black patients have been found to be lower than when using the older methods to estimate. The purpose of this research is to determine eligibility discordance in HIV pharmacotherapy upon using the 2021 CKD-EPI GFR estimator without the race variable, in comparison to previous renal estimators including 2009 CKD-EPI and MDRD. Methods: Retrospective chart review investigating the implication on clinical decisions and HIV medication management caused by implementation of the 2021 CKD-Epi without race, in Black Americans. This project is approved by the Institutional Review Board at Howard University. Data to be collected includes patient demographics. Patient data will be securely abstracted and input into MedCalc to calculate eGFR using the 2021 CKD-EPI, Cockcroft-Gault, 2009 CKD-EPI, and MDRD calculators. It will then be determined whether the new 2021 CKD-EPI equation limits eligibility for the specified medication, in comparison to previous eGFR estimators, with the CrCl calculated from Cockcroft-Gault being our reference value. Results: The results are preliminary in nature, as we have only collected a small subset of data, out of the total cohort of patients to be collected. Thus far we are able to see the distinct differences in GFR estimates among the various renal estimators.

Pediatric Eating Behavior and Anxiety Following a Mentally Fatiguing Task: Interactions with Mood Symptoms

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According to the cognitive capacity model, mental exhaustion is a situational factor that causes difficulty regulating mood and behavior. We aimed to preliminarily investigate whether this model is relevant for youth by testing 1) the impact of cognitive fatigue on state anxiety and energy intake among youth, and 2) whether anxiety and depressive symptoms moderate these associations. On separate days, youth (8-17y) completed a two-hour cognitive fatigue (Attention Network Task) and control (watching movies) condition, then ate from a laboratory-based meal. State anxiety was assessed immediately before and after conditions. State anxiety, and anxiety and depressive symptoms were assessed via self-report questionnaires. Mixed-model ANCOVAs were conducted with state anxiety or energy intake as a within-subjects factor, and with condition, and trait anxiety or depressive symptoms, as between-subject factors. Models adjusted for age, sex, height, fat mass (%), race/ethnicity, condition order, and days between visits. Participants' (N=90, 12.5±2.5y, BMI% 58.572±29.49, 50% Female, 50% non-Hispanic White) state anxiety increased after the fatigue, but not the control condition (p=.007). Energy intake did not differ between conditions (p=.72). Participants with higher anxiety and depressive symptoms reported greater increases in state anxiety, regardless of condition (ps <.001). However, anxiety and depressive symptoms did not significantly moderate the association between the condition and state anxiety or energy intake (ps>.16). Although a cognitively fatiguing situation caused increases in state anxiety, it did not affect disinhibited eating among youth. Future studies should investigate this pathway for increased state anxiety longitudinally, and among youth with mood and anxiety disorders.

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Combination of AlphaFold2 and Long-timescale Molecular Dynamics Simulations to Understand Viral Packaging Processes

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The parvoviruses are small nonenveloped single-stranded DNA viruses that constitute members that range from apathogenic to pathogenic in humans and animals. They are assembled from viral proteins (VPs) of icosahedral T=1 symmetry and include 60 VPs, from two proteins, VP1 and VP2, which overlap in sequence, with VP1 having additional amino-terminal residues. Post-translational cleavage of assembled particles can modify some proteins' truncation of a few amino-terminal residues of VP2 to generate VP3 and VP4 in full virions. These include multiple different ratios of VPs (VP1:VP2:VP3:VP4) between the three subfamilies. Within the families, the structural motif is common to many other RNA and DNA viruses, which consist of eight-stranded anti-parallel β -barrel and α -helix conserved areas, along with disordered n-terminal unconserved areas throughout the family. However, much is unknown about the interactions between the conserved areas and unconserved n-terminal membrane formations between the subfamilies; thus, with the use of AlphaFold2, the latest breakthrough of artificial intelligence (AI) system to accurately predict a protein's 3D structure, and long-timescale molecular dynamic simulations, advances have been made for atomic-level characterization of conformation transitions during viral packaging processes. This shows promise, to help understand the roles of conserved and unconserved areas and the formation of packaging capsids between the VPs and inner surface in the creation of the n-terminal membrane layer.

Development of Targeted Polymer-Drug Conjugates for Ovarian Cancer Chemotherapy

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Objective: To synthesize and characterize targeted, linear, and hydrophilic polymer-drug conjugates for ovarian cancer treatment using gemcitabine as the model drug. Methods: An α -, ω -bis-azide-terminated, linear hydrophilic ethylenediaminetetraacetic acid derivative (azidePEG-

EDTA) was coupled to glycyphenylalanylleucylglycine (GFLG) tetrapeptide by 9-fluorenyl-methoxycarbonyl solid phase peptide chemistry to obtain an intermediate for the polymer backbone. GFLG is a specific substrate for cathepsin-B, which is overexpressed in ovarian cancer and is widely reported for selective drug release in the tumor microenvironment. A gemcitabine-coupled intermediate was synthesized by reacting gemcitabine hydrochloride with the synthesized polymer building block using hexafluorophosphate azabenzotriazole tetramethyl uronium as the coupling agent. Polymer synthesis using strain-promoted alkyne-azide cycloaddition-mediated polymerization is ongoing. Results: A novel polymer backbone intermediate, azidePEG-EDTA coupled to GFLG, was synthesized and characterized via mass spectrometry (observed m/z: 1616.9800 [calculated: 1616.8410]) and Fourier-transform infrared spectroscopy (azide stretch: 2106cm⁻¹). The gemcitabine-coupled intermediate was confirmed by mass spectrometry (observed m/z: 2108.1936) and nuclear magnetic resonance spectroscopy. Cleavage studies showed drug cleavage within 3 hours of incubation with exogenous cathepsin B. Conclusion: A linear hydrophilic gemcitabine-coupled intermediate was synthesized for the development of polymer-drug conjugates designed to target and treat ovarian cancer. This intermediate can undergo strain-promoted alkyne-azide cycloaddition click chemistry for the synthesis of the polymer-drug conjugates in drug delivery to ovarian cancer by the enhanced permeability and retention effect. Specific cathepsin B cleavage of the polymer-drug conjugates will allow selective drug release in the tumor microenvironment, thereby minimizing adverse side effects and off-target toxicity to healthy cells.

Adverse childhood experiences (ACEs) and associated health outcomes among adults with skin cancer

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Background: Ongoing investigations explore the relationship between adverse childhood experiences (ACEs) and their lasting impact on chronic diseases, especially various forms of cancer. This study aimed to evaluate the relationship of ACEs with health-related quality of life (HRQOL) measures among individuals with a skin cancer diagnosis. Methods: This analysis utilized the 2019 Behavioral Risk Factor Surveillance System (BRFSS) dataset, which was gathered from a nationally representative cross-sectional study of non-institutionalized US adults. Study analyses were conducted using SAS® version 9.4. Bivariate analyses and multivariable logistic regression were used to assess the relationship between ACEs and the

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HRQOL among survivors of skin cancer. Results: In total, there were 416,902 respondents. ACEs were identified in 55% (n=6,724) of skin cancer survivors. After adjusting for covariates such as age, gender, race/ethnicity, BMI, educational status, income level, and insurance status, skin cancer respondents with ACEs have a higher odds of poor physical health (Odds Ratio [OR] = 1.39, 95% Confidence Interval [CI] 1.24-1.56, p<0.0001) and poor mental health (OR=2.13, 95% CI 1.81-2.51, p<0.0001) compared to those without ACEs. Additionally, respondents who reported ACEs were more likely to be uninsured compared to those who did not report ACEs. Conclusions: This study highlights the deleterious role of childhood maltreatment on HRQOL among skin cancer survivors in a nationally representative sample. Additional research is needed to better understand the pathway driving this relationship.

Academic EHR (Simchart) Training and Usability: Students' Perspective

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Background: Recent adoption of Electronic Health Records (EHR) meaningful use has made EHR knowledge and skills, mandatory National curriculum requirements for health sciences at all levels in the United States. However, Historical Black Colleges and Universities (HBCUs) have not fully adopted and infused EHRs across the curriculum due to the cost and lack of equity in resource dissimulation. Method: We infused Sim-Chart software across the undergraduate clinical curriculum through the NIH AIM-AHEAD grant award. Students were trained to increase EHR knowledge, and problem solving skills. Each clinical course coordinator ensured that case studies, clinical simulation were utilized for students learning in the laboratory sessions. Approved HU IRB survey was used for the evaluation during the 2022 Spring and Fall semesters. Results: Out of 81 students who participated and filled out the survey, sixty (80.25%) students reported that the SimChart would enable them initiate, evaluate, and update client plan of care while fifty seven (70.37%) students responded that it would enable them perform focused assessment as in their health assessment and fundamental classes where students used the SimChart to complete documentation on patients' head-to-toe assessment and care in their lab sessions prior to their clinical rotation. Implications: This project has shown that SimChart tool enhanced transfer of learning, allowing students to take on the role behaviors of what will be expected of them as practicing healthcare professionals on graduation. The enhanced curriculum has helped the students develop

critical thinking and problem solving skills in labs prior to clinical orientation.

Synthesis and characterization of targeted SN-38 conjugate for cancer therapy.

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7-ethyl-10-hydroxy-camptothecin (SN-38), it is an active metabolite of the anti-tumor agent, irinotecan hydrochloride. They act by inhibiting DNA topoisomerase 1 (topo 1), an enzyme that is responsible for adjusting and controlling the topology of the DNA. SN-38 binds to topo-1 and DNA, to form a ternary complex in the presence of tyrosine, which prevents DNA religation and replication, and thus causes apoptosis. The goal of this study is to synthesize and characterize a PSMA-targeted SN-38 conjugate for site-specific delivery to prostate cancer. The PSMA-targeted SN-38 conjugate was synthesized in a series of steps. First, the PSMA targeting ligand (Glu-NH-CO-NH-Lys) was synthesized. In a second step, SN-38 was coupled to a linker region. In the final step, the targeting ligand was coupled to the drug via a spacer to produce the actively targeted conjugate. The linker region consists of a spacer, a protease recognition dipeptide sequence recognized by tumor-associated lysosomal cathepsin B and a self-immolative spacer. The synthesized conjugate was characterized by High Performance Liquid Chromatography (HPLC) and Mass Spectrometry (ESI-MS). Enzymatic cleavage studies were done in phosphate buffered saline by adding Cathepsin B activated with 30Mm DTT/15Mm EDTA to the conjugate in solution. The resultant solution was incubated at 37°C for 120 hrs. Aliquots of the solution were taken at predetermined times for up to 120 hours and HPLC analysis of the samples was done. ESI-MS data confirmed the synthesis of the SN-38 conjugate and HPLC data show conjugate cleavage in vitro.

Key words: SN-38, Drug Conjugate, PSMA, Targeted Drug Delivery

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Reshaping Nutrition Care for Transgender and Gender Diverse Individuals (TGGD)

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Transgender and gender diverse (TGGD) describe individuals who identify as a gender different from that assigned at birth or do not identify with the gender binary, respectively. Without published guidelines for nutrition care, TGGD individuals are at increased risk for health disparities. We aimed to identify the nature of current guidance on the Nutrition Care Process (NCP) for TGGD individuals and to determine common health concerns. Using PRISMA guidelines, we searched four databases using “transgender,” “nutrition care process,” and related terms. We included studies involving TGGD individuals, conducted in the United States, between 2003 and 2023, published in English. Reviews and books were excluded. Two reviewers performed a rigorous screening and selection process independently, removed duplicates, and collaborated as needed to settle discrepancies in selection and assessment of quality. Articles were coded by study characteristics and findings. The initial search yielded 746 articles, of which seven observational studies (588 participants) qualified for the review. Most of the participants (93%) were adolescents. All studies confirmed the lack of published nutrition care practice guidelines for the TGGD population. In all studies, hormone replacement therapy received as part of gender-affirming care was associated with up to a 5% higher risk of heart disease, and up to four times higher rates of disordered eating patterns compared to cisgendered individuals. Given the associated risks for chronic diseases and that gender is a significant factor in determining optimal nutritional needs, research is urgently needed to develop nutrition care practice guidelines for TGGD individuals.

Colon Cancer in Older Adults

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Coauthors:

Introduction: Colon cancer is most common in older adults 50 years or older. The predominant effect of colon cancer on this population is attributed to the biological aging process

(mitochondrial and genetic dysfunction). Older patients also statistically have poorer prognoses than younger patients. Colon cancer treatment among younger populations has improved over recent years, but treatment for patients aged 50 to 99 has not progressed. Purpose of the Study: The study aims to assess the increased risk of colon cancer diagnosis and poor prognosis in older populations. Methods: A systematic review was conducted to evaluate the risk of diagnosis and adverse outcomes of older colon cancer patients. The articles used for this review were peer-reviewed, published from 2015-2023, available in full-text format, and focused on colon cancer patients that were considered to be older adults. Results: 15 articles were utilized to review the literature surrounding colon cancer in older adults. The review discussed the reasoning behind the increased risk of colon cancer in this population and what further research needs to be conducted. Conclusion: Older adults are more commonly diagnosed with colon cancer and have poorer prognoses than younger individuals. Further research is necessary to determine at what age the risk of colon cancer diagnosis begins to increase. With this research, medical professionals can evaluate when to begin colon cancer screening for their patients and whether current treatment techniques for older patients need to be reevaluated to improve their prognoses.

Child Nutritional Status in Ethiopia: Challenges and Interventions

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Introduction: Child malnutrition is a persistent problem in Ethiopia, with approximately 30% of children under the age of five experiencing stunted growth due to chronic undernutrition. The causes of child malnutrition in Ethiopia are multifactorial, including poverty, inadequate healthcare, poor access to clean water and sanitation, and food insecurity. This abstract aims to summarize the challenges faced by Ethiopia in improving child nutritional status and the interventions that have been implemented to address this issue. Methods: This abstract is based on a review of three articles from the ScienceDirect database that focus on child malnutrition and interventions in Ethiopia. The articles were selected based on their relevance to the topic and the quality of the research. Results: The review identified several interventions that have been implemented in Ethiopia to improve child nutritional status, including national nutrition programs, community-based nutrition programs, and school feeding programs. While these interventions have shown some success, child malnutrition remains a significant problem in Ethiopia, particularly in rural areas where

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poverty and food insecurity are prevalent. Conclusion: The challenges faced by Ethiopia in addressing child malnutrition are complex, but interventions such as national nutrition programs and community-based nutrition programs have shown some success. A comprehensive approach that addresses the underlying causes of malnutrition is needed to ensure sustained improvement in child nutritional status in Ethiopia.

Factors associated with dental care use, unmet dental care need, and barriers to unmet need among United States women: results from NHANES, 2017 to 2020

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Accessing needed dental care may vary among socioeconomic and demographic groups. This study examined the disparities in dental access and identified the socioeconomic and demographic factors associated with dental care access among United states women. Using data from the 2017-2020 National Health and Nutrition Examination Surveys (NHANES), we conducted a Chi-square to assess the differences in the proportions of women who reported not getting their needed dental care and computed a weighted multivariate logistic regression to examine the factors associated with access to dental care use, unmet dental-care need, and reported reasons for unmet need. Non-Hispanic Blacks and other minority racial-ethnic groups including multi-racial groups were more likely to have never used dental care compared to non-Hispanic Whites. And non-Hispanic Whites less than high school educated were more likely to have never used dental care as compared to more than high school educated . Groups that were more likely to report an unmet need were women with PIR < 1.00 and between 1.00 and 1.99 as compared to PIR ≥2.00 and women without health insurance as compared to those with health insurance. Expanding insurance coverage for dental care and improving access for women with poor health may address racial-ethnic and education-level disparities in unmet dental care need.

The Effect Nutrition has on Frailty Syndrome in the Elderly Population

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Background: Frailty syndrome (FS) is generally defined as a weakness and gradual decrease in physical strength within the body. The acronym FRAIL has been used to define FS as fatigue, resistance, ambulation, illnesses, and loss of weight. Objective: This literature review aimed to review the studies done between 2017-2022 and evaluate the correlation nutrition can have on the elderly population regarding frailty syndrome. Methods: Among the elderly participants aged 60+, dietary intake was monitored and measured, specifically various macronutrients and micronutrients. Such as protein, caloric intake, and vitamin D, to name a few. The participant's frailty was assessed before and after the study based on weight loss, weakness, fatigue, ambulation, and overall physical activity. Results: There is more of a correlation between the total caloric intake, protein intake, physical activity, and relatively healthy diet and lifestyle with frailty than a single macronutrient or micronutrient. Conclusion: Frailty is not solely a dietary issue; it needs to be looked at more holistic, incorporating physical activity as well. A limitation of the review was that a single definition of frail has yet to be agreed upon.

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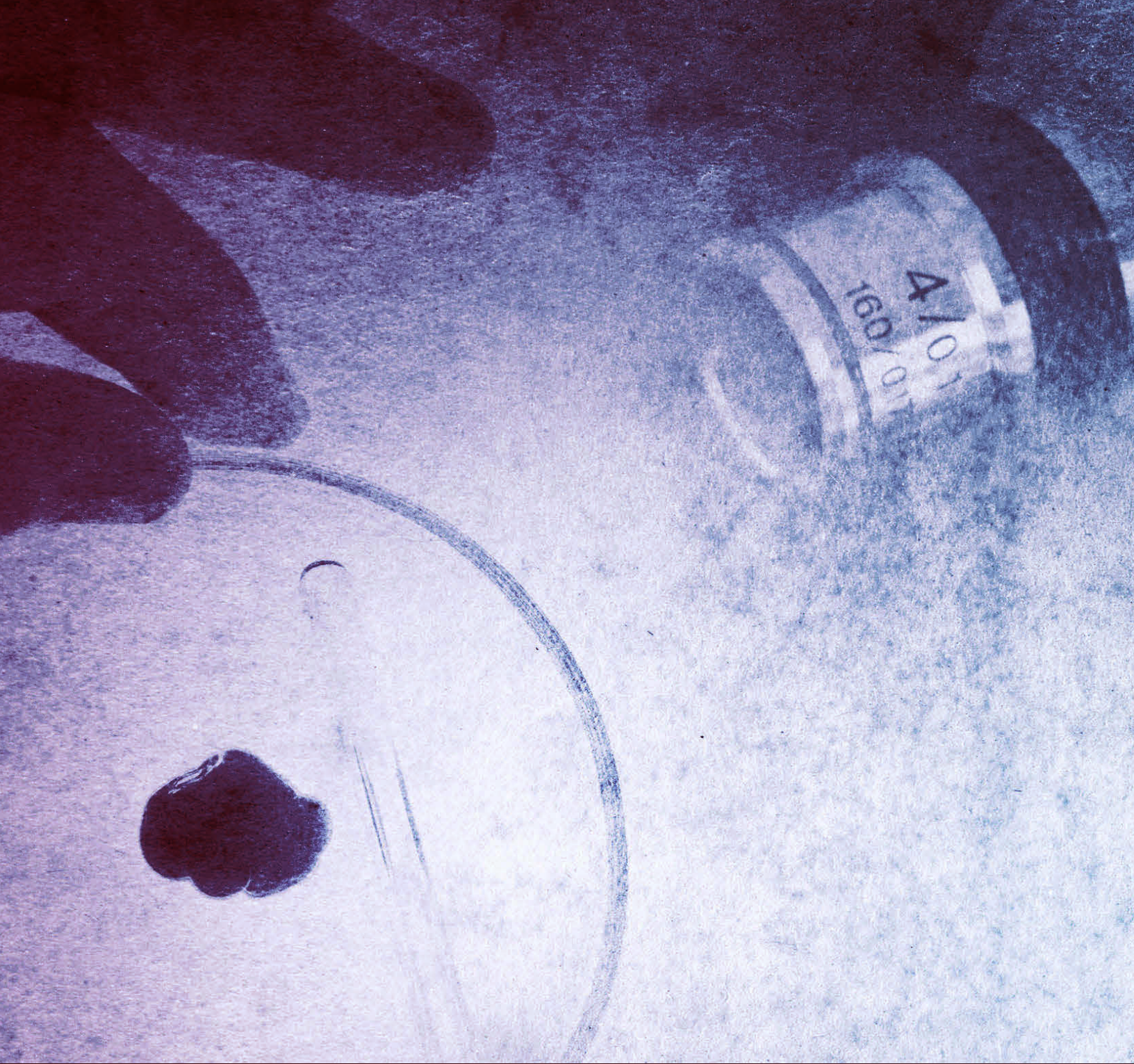
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