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HOWARD UNIVERSITY RESEARCH SYMPOSIUM

April 27-29, 2022

ABSTRACT BOOK

HOWARD UNIVERSITY

RESEARCH SYMPOSIUM

Abstract Book

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Bological & Biomedical Sciences:

Auranofin Inhibits Ebola Virus Replication By Targeting NP-VP35 Interaction

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Ebola virus (EBOV) is negative-sense RNA virus that causes a severe hemorrhagic fever with high case fatality rates in human. EBOV nucleocapsid protein NP interacts with VP35 to facilitate capsid formation. Thus, targeting NP/VP35 interaction may help in development of EBOV inhibitors. We recently observed inefficient EBOV capsid formation in the cells treated by protein phosphatase-1- targeting small molecule 1E7-03. Here, we analyzed the effect of approved rheumatoid arthritis drug, auranofin, on EBOV replication and NP-VP35 interaction.

Methods: EBOV proteins were expressed in 293T cells using EBOV WT-NP tagged with mCherry and VP35 tagged with Flag. Immunoprecipitations (IP) were used to analyze NP/VP35 interaction, followed by Western blot analysis. Split NanoBiT assay was used to investigate the effect of auranofin compound in NP-VP35 interaction. Minigenome and high throughput screens (HTS) assays were used to measure the effect of auranofin in viral RNA replication.

Result: Auronafin potently inhibited NP binding to VP35 (IC50=) in split NanoBiT assay compared to less efficient Gold 1 (IC50=) and 1E7-03 (IC50=) compounds. Auronfin also showed strong inhibition of EBOV transcription in minigenome assay (IC50=). Finally, EBOV replication was strongly inhibited by Auronfin but not Gold 1 compound.

Conclusion: Our study suggests that auranofin may serve as EBOV inhibitor by targeting EBOV NP-VP35 interaction. While it is offered for us in human, it may be prudent to test its effect in animals. We currently investigate whether the effect of auronfin relates to host protein phosphatase-1 which our lab shown to affect EBOV.

Adaptation of the Ebola Virus to the PP1-targeting 1E7-03 Compound Enhances PP1 Binding to NP but Impairs Capsid Formation

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Background: Ebola virus (EBOV) is a non-segmented negative-sense RNA virus that causes a life-threatening human disease primarily in the Democratic Republic of the Congo. Previous studies showed that host protein phosphatases, PP1 and PP2A, facilitate EBOV transcription by dephosphorylating the EBOV VP30 protein. Here we analyzed the effect of continuous treatment of EBOV-infected cells with PP1-targeting 1E7-03 molecule.

Methods: Viral RNA deep sequencing was used to determine mutations in EBOV genome. Transmission electron microscopy (TEM) was utilized for EBOV capsid formation analysis. Split NanoBiT system was developed to analyze NP dimerization and NP binding to PP1, PP2A and VP30. Results: Treatment of EBOV-infected cells with 1E7-03 led to E619K mutation in the nuclear protein (NP). This mutation has no strong effect on EBOV transcription but prevented formation of EBOV capsid in the cells expressing NP E619K, VP24 and VP35. However, in 1E7-03 treated cells, capsid was formed in NP E619K, but not wild type NP co-expressed with VP24 and VP35. In a split NanoBiT assay, dimerization of the NP E619K mutant was considerably reduced (15-fold) relative to WT NP. Binding of the NP E619K mutant to PP1 was significantly increased (~3-fold).

Conclusion: Our findings indicate that increased PP1 binding to NP reduces NP polymerization and compromises capsid formation in the absence of 1E7-03 treatment 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 switching EBOV from capsid formation to transcription.

Comparing rates of change in SARS-CoV-2 wastewater load and clinical cases across major metropolitan areas in the United States

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Public health interpretation of data collected through SARS-CoV-2 wastewater surveillance efforts is challenging because there is no standardized method for the recovery of SARS-CoV-2 from wastewater. There are also site-specific differences (e.g., sewershed size) that may impact the SARS-CoV-2 wastewater signal. The rate of change (ROC) of SARS-CoV-2 was calculated in both influent wastewater samples (28-101 days sampled per sewershed) and of the lab-confirmed case counts between May 2020 to October 2021 in 19 sewersheds (population range: 58,000- 4 million) across four major US metropolitan areas, with varying windows of time (21- and 28-days). SARS-CoV-2 quantification methods and wastewater sampling frequency varied across the four metropolitan areas. The goal was to inform the development of a standard approach in the public health interpretation of SARS-CoV-2 wastewater surveillance data that leverages the simplicity of ROC reporting. The ROC of wastewater load was calculated after applying different approaches for managing signal variability and missing data. Imputing missing viral load data on a 28-day window with significant ($p \leq 0.05$) ROCs for both viral load and clinical cases produced the strongest correlation between ROCs of wastewater and cases (Spearman's rho= 0.78). Furthermore, we observed an average sensitivity threshold of 2.5 new cases per day to result in a significant ROC in wastewater, but sensitivity varied with different laboratory methods. Our retrospective analysis using ROC highlighted certain methodological insights, reduced site-specific impacts, and estimated a wastewater sensitivity threshold, supporting the use of relative, rather than absolute, measures of SARS-CoV-2 wastewater data for more interoperable datasets.

Role of Ferroportin Q248H in Iron Overload and Inflammation in African Americans

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Background: Iron homeostasis is dependent on the regulatory axis between the iron regulatory hormone hepcidin and its receptor, iron export protein, ferroportin (FPN). Dysfunctional hepcidin/ferroportin pathway is linked to elevated intracellular iron and inflammation. FPN Q248H mutation is the most common among African Americans, with an allele frequency range of 2.2% to 13.4%. FPN Q248H was linked to elevated iron levels in Zimbabwean children and increased inflammation in patients with Sickle Cell Disease. Thus, understanding the mechanism of iron metabolism regulation by FPN Q248H mutation is important for the better treatment of iron metabolism disorders in African Americans.

Aim: we developed and characterized a mouse model with the FPN Q248H mutation that allows in-vivo determination of the effect of this mutation on iron accumulation.

Method: We compared expression levels of iron regulatory proteins including FPN, transferrin receptor (TFR), ferritin heavy chain (FHC), hepcidin, and cytokines in mouse organs including spleen, liver, kidney, and duodenum.

Result: Comparison of WT to homozygous and heterozygous FPN Q248H mice pointed to a dramatic increase of FPN levels in kidney and duodenal enterocytes. FPN Q248H mutant mice exhibited increased splenic TFR, lower hepatic TFR, and higher hepatic FHC.

Conclusion: Our data show for the first time that FPN Q248H mutant mice exhibit iron accumulation in different organs. This accumulation is likely due to the reduced FPN Q248H sensitivity to hepcidin. Further analysis of this model will provide additional molecular details of FPN Q248H-mediated iron overload and inflammation among African Americans

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The Data Mining of A Breast Cancer Dataset Using Random Forest and Convolutional Neural Network Amirah Alqahtani, Xiang Simon Wang College of Pharmacy, Howard university, Washington DC 20059

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Machine Learning (ML), especially the Deep Learning (DL), started to play a significant role in the biomedical field during recent years. It could improves the accuracy of diagnosis for diseases such as breast cancer, one of the most common types of cancer among women. It is also considered the leading cause of cancer death in women in many countries of the world. We launched our data mining efforts on a common dataset of breast cancer in women, consisting of

268 instances and relevant attributes such as age of patient at the time of diagnosis, menopause state [pre or post], tumor size [in mm], inv_nodes [range 0-39], node caps, degree of malignancy, breast [left, right], breast quadrant, irradiation, and class [recurrence events and no recurrence events]. For classification modeling we chose a Random Forest (RF) as well as Convolutional Neural Network (CNN) within Weka 3.8.6 software. In RF, the correctly classified instances is 70.0% with TP rate of 0.871, FP rate of 0.718, Precision of 0.742, Recall of 0.871 and F Measure of 0. 801.The calculation of CNN is still ongoing as we will report its results by the time of symposium.

Role of Nef in Macrophages Infiltration in Lungs of HIV Tg Mice

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Background: Antiretroviral therapy significantly improved the longevity of people living with HIV-1. However, chronic long-term HIV-1 infection is complicated by the increased rates of age-associated chronic diseases such as non-infectious respiratory disease. The mechanism of lung deaseses is not well understood. We used HIV-transgenic (HIV-Tg) mice as a model and demonstrated reduced macrophages migration in the lung after LPS injection.

Hypothesis: We hypothesize: 1. expression of pro-inflammatory cytokines is reduced in the lung of HIV-Tg mice compared to wild type (WT); 2. HIV-1 Nef protein is expressed in the macrophages and reduces macrophages lung infiltration through activation of cell Src kinase.

Methods: HIV-Tg and WT mice (3 mice per group) were injected with LPS (3 µg/g body weight), lungs were harvested 24 h after injection and RNA was isolated. Src inhibitor PPi (1 µg/g body weight) was injected 15 min after LPS administration. Levels of pro-inflammatory cytokines (IL-1β IL-6 and IL-18) and Nef were examined by RT-PCR. Immunohistochemistry was performed for characterization of lung macrophages accumulation.

Results: Levels of pro-inflammatory cytokines were similar in the lungs of WT and HIV-Tg mice and administration of PPi did not affect cytokine levels. HIV-Tg lung macrophages expressed Nef and had higher levels of phosphorylated Src. Administration of Src kinase inhibitor reduced lung injury and increased macrophages migration in the lung of HIV-Tg mice.

Conclusion: Nef expression rather than lung-specific environment reduces migration of macrophages into lungs of HIV-Tg mice. Inhibition of Src improves lung macrophages migration and reduced LPS-induced lung injury.

Key: HIV-1, Nef, Src, macrophages, lung

AlphaFold 2 Based Structural Analysis of Protein-Protein Interaction Interface for Anticancer Drug Development

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Proteins are crucial for life, and their structures can be used to gain insight into invaluable information about their functions. These structures can also facilitate interventions such as structure-based drug design and targeting mutagenesis. P53 is one of essential proteins responsible for cellular processes that include growth arrest, DNA repair, and apoptosis. Mutation of p53 leads to replication of cells with abnormal DNA, an uncontrolled progression of cell cycle, and continuous proliferation. It has been reported that about half of cancerous cells in most cancer types contain mutation in their p53 proteins. For this reason, it is considered as an important target and its structure have been used for developing of various anticancer therapies. In addition to p53, another proteins family named Bcl2 is also responsible for the apoptosis regulation. Overexpression of this protein contributes to downregulation of the apoptosis process resulting in cancer. AlphaFold 2 is a computational method based on deep learning (DL) approach for protein structures prediction with high precision. This technique is able to predict protein structure even in case of no similar structure available. AlphaFold 2 has been listed as the Science's 2021 Breakthrough, i.e. AI-powered Protein Prediction at the end of last year. In this work, we used alphaFold 2 to build six Bcl2 related proteins' structures and compare them to p53/ Bcl2 structures in the protein-protein interaction (PPI) interface for anticancer drug development purpose. Particularly, their a-helix regions were studied in detail to assess the degrees of geometric and chemical complementarities.

Persistence of disparity in thyroid cancer survival after adjustments for socioeconomic status and access

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Introduction: Thyroid cancer incidence has increased by 3% annually in the past 4 decades. This increase has been driven mainly by the papillary subtype. Incidence is highest in White patients, yet Black patients have the highest mortality rate. Majority of thyroid cancer literature attributes survival disparities solely to earlier detection in White patients, though there is scarce data regarding detection in other racial/ethnic groups. We aimed to explore the association of thyroid cancer early detection with racial/ethnic disparities in survival.

Methods: The Surveillance, Epidemiology, and End Results (SEER) database was queried from 2007-2011 for patients with a first primary thyroid cancer diagnosis and up to 5 years of follow-up. Composite scores were generated from county-level variables to capture socioeconomic status and screening habits. Kaplan Meier analysis and Cox proportional hazards models were utilized for survival analysis.

Results: We identified 46,970 patients with differing median ages at diagnosis by race/ethnicity. Most of the cohort presented with the papillary subtype. Compared to White patients, all other patients were more likely to present with distant disease. Black patients had the worst 5-year survival compared to all other races/ethnicities. After adjusting for sex, age, stage, subtype, tumor size, surgery, radiation, socioeconomics, and screening habits, Black patients were the only race/ethnicity with increased odds of 5-year mortality compared to White patients.

Conclusion: Thyroid cancer survival is worst for Black patients regardless of socioeconomic status or screening habits. Racial/ethnic disparities in survival are not attributable to early detection alone.

Molecular Characterization of Endosymbionts in Phlebotomine Sandflies

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The major causative agent of cutaneous leishmaniasis in Ethiopia is Leishmania aethiopica. A known vector of L. aethiopica is the sandfly Phlebotomus longipes. Microbiome manipulation in insect vectors of disease has been proffered as a disease control strategy. Our previous work investigating sandfly microbiomes unveiled the presence of bacteria often found as endosymbionts in insects - Cardinium, Spiroplasma, and Wolbachia. All three bacteria manipulate reproduction, fitness, and disease resistance in their hosts. In this study, we examined the diversity and distribution of endosymbionts in sandfly specimens collected in 2014 from Ethiopia. Wolbachia was detected in 100% of insects via PCR using Wolbachia-specific primers. More than 80% of the total endosymbiont sequences in nearly half of the specimens affiliated with Wolbachia. Analysis of 16S rRNA gene sequences resulted in nine operational taxonomic units (OTUs) binned at 97% similarity. Analysis of predicted amino acid sequences of Wolbachia surface protein gene sequences revealed that only 46% of the sequences shared the same hypervariable region profile. Together, these analyses indicated diversity within sandfly-associated Wolbachia populations. Spiroplasma and Cardinium were detected in 91.3% and 72.5% of sandflies, respectively. 16S rRNA gene sequence analyses resulted in four similar OTUs for each endosymbiont. Future experimentation includes further genetic characterization of endosymbionts in our sample collection, including insects sampled during two additional years. Furthermore, we will determine whether there are differences in the diversity of endosymbionts and community structure in P. longipes and P. ashfordi, a suspected vector of L. aethiopica.

African American Women and Triple Negative Breast Cancer: Widened Disparities Associated with Covid-19 Pandemic

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Breast cancer accounts for approximately one third of all cancers in women and it is the second most common cancer deaths among women. However, triple negative breast cancer (TNBC) is the aggressive, polymorphic sub-type of breast cancer. It accounts for 10-20% of all breast cancers in the United States, affecting African American (AA) women disproportionately. The lifetime probability of developing breast cancer in African American Women is 1 in 8 versus 1 in 9 for white American Women, yet AA women experience greater mortality rates than their female counterparts. AA women are diagnosed younger with more advanced tumors. Literature is indecisive to the extent of the impact of disadvantage neighborhood, yet research suggest that segregated disadvantaged poverty neighborhoods are associated with the highest diagnosis TNBC and decreased standard of care during Covid-19 pandemic. This review study focuses on the possible contributing factors associated with the development of TNBC and the effect of delayed treatment during Covid-19 pandemic. Forty articles were extracted from PubMed and Google Scholar, but only articles that met the inclusion and exclusion criteria were selected for this

review. The inclusions were TNBC, African American women, disparities, Covid-19, socioeconomic and disadvantaged neighborhoods. Exclusions were other subtypes of cancer, ethnic groups and men. The study indicated a strong link between disadvantaged neighborhoods and lower socioeconomic status and high mortality rate associated with TNBC in AA women population. Additionally, Covid-19 was associated with the widened disparities in treatment delays and high mortality rates among the AA women with TNBC.

The Relationship Between Proximity to Fast Food Restaurants and Obesity in Older Adults

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Abstract
Introduction: Over the past several decades, the United States has seen a dramatic increase in the prevalence of obesity, which has become a public health crisis.. A common culprit for this is the high density of fast food restaurants and the scarcity of healthier food outlets within low income neighborhoods, which facilitates the consumption of high calorie foods that lack nutrients, thus resulting in obesity. Research suggests that there is a causal relationship between proximity to fast food restaurants and obesity in older adults. Therefore, the goal of this research is to study the relationship between obesity in older adults and proximity to fast food restaurants.

Methodology: This project analyzes articles outlining the causal relationship between proximity to fast food restaurants and obesity. Focusing on the effects it has in communities with older adults and any strategies and/or treatments that could be implemented to possibly rectify this health crisis. Preliminary Results: There is a positive association between fast food establishments and store fronts and obesity, supermarkets were not associated with obesity.

Investigating barriers to antidiabetic medication adherence among individuals with type 2 diabetes

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Diabetes is a chronic disease that requires strict management. The unmanaged diabetes sequalae are cardiovascular disorders, limb amputation, disability, and death to a mention few. Adhering to prescribed antidiabetic medication can mitigate the consequences of diabetes. The medication adherence to antidiabetic medication by type 2 diabetes mellitus is in decline. Peer reviewed articles retrieved from PubMed, Google Scholar, Research Gate and other search engines included subjects from different countries with different cultural and socioeconomic backgrounds. The articles were selected to better understanding why some type 2 diabetic individuals do not adhere to their prescribed antidiabetic medications. Common barriers to medication adherence reported by individuals with type 2 diabetes from different countries were fulfilling their religious obligations, not seeing immediate result from the medication, economic constraints, not having access to medication, not understanding the illness well, and not having access to healthcare. The results showed that having access to medication did not improve the adherence of antidiabetic medication among some diabetics. In addition, COVID-19 affected the underserved and underprivileged because of their vulnerability to poverty and discrimination. In the United States majority of blacks live in dense households which is unfavorable for chronic disease management in times of infectious disease outbreaks. Hence, cultural education about the disease process and tailoring the intervention of the management according to the resources available to this population would improve medication adherence in individuals with type 2 diabetes. Also, an effective national policy on health disparities would help mitigate mortality rates during pandemic lockdown.

HIV-1 Restriction Factors Expression in Sickle Cell Disease Spleen Mice

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Background: Sickle cell disease (SCD) is a hereditary disease in which a mutation in the position 6 of hemoglobin b-chain occurs changing glutamic acid for valine, which leads to polymerization of this so-called hemoglobin S (HbS) when deoxygenated. Previous reports indicated that SCD patients are less susceptible to HIV-1 infection and, when occurs, have slower progression toward AIDS. No evidence is yet presented in vivo to explain this effect. Thus, the aim of this study is to evaluate HIV-1 infection and underlying molecular restriction mechanism in mouse model of SCD.

Methods: Townes mice, expressing either human wild type (WT) and SCD hemoglobin, were injected intraperitonially with mouse-adapted Eco-HIV-1 that has murine leukemia virus envelope instead of HIV-1 envelope. After one week, spleen samples collected and processed for protein extraction from cells homogenate or mRNA isolation.

Results: we performed immunoblotting and qPCR analysis of ferroportin (FPN1), heme oxygenase 1 (HO-1), cholesterol 25- hydroxylase (CH25H), cyclin-dependent kinase inhibitor 1A (p21), transferrin receptor (TfR) and SAM Domain and HD Domain-Containing Protein 1 (SAMHD1). Our results show SCD mice having increased mRNA and protein expressions levels of FPN1, HO-1, p21 and TfR in both male and female animals, with an increase in male and no change in female expression of CH25H and SAMHD1 at mRNA and protein levels, respectively.

Conclusion: our data shows for the first time that genes known to be involved in HIV-1 restriction and iron metabolism might be key regulators of HIV-1 restriction in SCD mice.

Neuromodulation of Output Neuron Activity Patterns in Olfactory Bulb Circuits

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Research on neurodegenerative and depressive disorders indicates a role of olfactory bulb neurons for propagating nerve impulses to limbic structures. The pathology of the frontal cortex in patients suffering from neurodegenerative conditions resembles closely the brains of rodent models after removal of the olfactory bulb. The olfactory bulb is a precise model to analyze cellular, molecular and neurological alterations that relate to specific patterns of behavioral modulation. Here, we determine olfactory bulb neuronal firing patterns relevant for the propagation of nerve impulses to limbic structures.

Long-lasting depolarizing activity in mitral/tufted cells (M/TCs) of the olfactory bulb is accompanied by bursts of action potentials and helps to analyze synchronization of M/TCs. Our experimental approach involves whole-cell patch-clamp recordings from M/TCs in mouse brain slices.

M/TCs receive input from olfactory sensory neurons and transmit signals to limbic and higher order olfactory structures. M/TCs also signal to neurons in the input layer of the olfactory bulb, specifically to GABAergic periglomerular neurons. These neurons express high levels of G-protein coupled receptors such as glutamate, dopamine, GABA-B and GABA-A receptors. Our results indicate enhanced amplitude and longer duration of long-lasting currents in M/TCs when applying a dopamine receptor antagonist and a GABA-A receptor antagonist. Both antagonists block synaptic transmission and relieve inhibition in M/TCs, thus leading to more action potentials in M/TCs.

Blockade of inhibitory transmission in the olfactory bulb enhances signal output from olfactory bulb to limbic and higher order olfactory structures with potential effects for neurodegenerative pathologies.

Funding: NSF (IOS-1355034), NIH (P30AI117970), HUCM

To Examine the Impact of Folic Acid & Vitamin B12 in Pregnant Women: A Systematic Review

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Introduction: Approximately 3,000 pregnancies are affected by neural tube defects each year in the United States. Worldwide 300,000 babies are born with neural tube defects each year. Babies born with neural tube defects often times end up having spina bifida. This is due to lack of folic acid and vitamin B12 intake in pregnant women. Folic acid is used to prevent and treat low blood levels of folate. Increasing the intake of folic acid and vitamin B12 can help prevent approximately over 150,000 neural tube defects that occur each year. This purpose of this study will examine the impact of folic acid and vitamin B12 in pregnant women.

Methods: A systematic review will be conducted to examine the impact of folic acid and vitamin B12 in pregnant women; articles from 2010-2020 will be utilized to develop an intervention that addresses the lack of folic acid and vitamin B12 and the effects it has on pregnant women.

Expected Outcome: Neural tube defects can be avoided with the proper recommended intake of folic acid and vitamin B12 for women during their pregnancy. Due to the mandate of the FDA of adding folic acid to all grain products that are labeled as enriched. This mandate is known as folic acid fortification. Approximately 1,300 babies in the United States did not develop neural tube defects due to folic acid fortification. Future research will look further into increasing the number babies that are not born with neural tube defects with the use of folic acid vitamin B12.

Effect of polystyrene nanoparticles on commercial mucin

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Mucins are a group of glycoprotein polymers that constitute the mucus gel which forms a protective barrier across the lumen. The ubiquity of mucin in the lumen exposes it to environmental factors, however, the changes in viscoelastic properties of mucin to those environmental factors is still unclear. Among high contact plastics used in food and drink packaging is polystyrene. To understand the effect of polystyrene on mucin properties, dynamic light scattering, rheology, and atomic force microscopy (AFM) is used to observe the changes that unmodified polystyrene nanoparticles (NPs) have on the flow properties of three types of commercially available mucins. Dynamic light scattering suggests that the hydrodynamic diameter of all 3 mucins decrease with the presence of NPs. Further rheology studies show that the elastic character of the mucins diminishes when NPs are introduced. While previously it was noted that polystyrene NPs aggregate commercially available synthetic mucin, we observed fluidization – a decrease in viscosity – of filtered mucin solutions. Fluidization compromises the protective barrier that mucin forms across surfaces and could facilitate transport of viruses, dust, and bacteria. The Interactions between the mucin network, protein core with carbohydrate side chains, and polystyrene NPs are unknown. Future efforts will focus on the mechanistic basis of fluidization. However, we demonstrate that the mechanics of free mucin is changing upon contact with polystyrene, a crucial step to understanding mucin-pathogen interactions.

Characterization of cells isolated from the urine of sickle cell disease patient

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Characterization of cells isolated from the urine of sickle cell disease patient

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Background: Sickle cell disease is the most common hereditary disease associated with a single mutation in the beta-globin gene. Following the multitude of health concerns facing patients of SCD, is kidney failure. Two types of renal epithelial cells (podocytes and proximal tubular epithelial cells) are found in the urine of renal disease patients. Harvesting these cells from urine are easy and non-invasive, allowing for characterization, a necessary step in the study, discovery, and development of novel therapeutics.

Objectives: To characterize epithelial cells collected from the urine of SCD patient.

Methods: Harvested and immortalized epithelial cells from the urine of SCD patients were grown in culture. Their total RNA was isolated, and its concentration was measured. 2 µg of total RNA was used for the production of cDNA. Human embryonic kidney cells (HEK293) and human renal glomerular endothelial cells (HGEC) acted as controls. The PCR reaction was performed using vWF, WT-1, podocyte, nestin, GAPDH, and - actin human gene primers. The PCR products were separated on 2% agarose gel.

Results: Cells shown cobblestone-like morphology by phase-contrast microscopy. Cells were negative for vWF, WT-1, and podocin. Cells were positive for nestin, and GAPDH and -actin.

Conclusion: Cells harvested from urine of SCD express marker for de-differentiated epithelial cells (nestin). Further characterization of cells using specific primers for tubular cells (aquaporin 1 and megalin) is required.

Characteristics and Academic Career Outcomes of Godina Fellowship Recipients

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Introduction: The American Society for Reconstructive Microsurgery (ASRM) sponsors the Godina Fellowship to expand the careers of microsurgeons. This study characterizes the scholarly impact and academic career outcomes of Godina Fellows to create a benchmark for aspiring microsurgeons.

Methods: The ASRM provided a list of Godina Fellows (1993 – 2020). An Internet based search obtained demographic, academic pedigree, and scholarly impact metrics. Curriculum vitae were reviewed to characterize future career outcomes, including chair designations.

Results: 28 Godina Fellows were included in this study. Most were men (96.4%) and American (60.7%). The average age of selection was 44.1 ± 4.5. Training pedigrees consisted primarily of plastic surgery residency training (92.9%) followed by orthopedic surgery (3.6%) and otolaryngology (3.6%). 32.1% completed formal reconstructive microsurgery fellowship training, 25.0% completed hand fellowship training, and 10.7% completed craniofacial fellowship training. A minority of Fellows had a PhD (32.1%) or Masters Degree (14.3%). The average h-index was 32.5 ± 10.9 resulting from 159.8 ± 90.1 peer-reviewed manuscripts cited 3997.7 ± 2515.9 times. Most held academic careers at time of selection (96.4%), including 42.9% serving as chief (25%) or chair (17.9%) of a division or department at the time of appointment.

Conclusion: Godina Fellowship recipients make important contributions to the field of reconstructive microsurgery through research and leadership at academic surgery programs. Analysis of this unique cohort allows for identification of key characteristics for aspiring reconstructive microsurgeons.

The Identification of Genetic Triggers that Contribute to the Risk and Onset of Type 2 Diabetes Mellitus to Create a Comprehensive Nutritional Prevention and Treatment Plans

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Type 2 diabetes mellitus (T2DM) is a disease where there is insulin resistance, meaning the cells do not normally respond to insulin and this leads to the rise in blood sugar levels. High blood sugar can be detrimental to the organs in the body and lead to heart related complications.To compile genes that are attributed to the cause of T2DM and the demographic factors that are related to these genes. The question being answered is: What are the genetic triggers connected to Type 2 diabetes mellitus and how can the research be used to create a comprehensive prevention through nutrition and treatment plan? A comprehensive search was done through PubMed.gov from the National Library of Medicine that was limited to studies published within the last ten years and included clinical trials, randomized controlled trials, cohort studies, case control studies, and cross sectional studies. Ten studies involving several cases and controls were chosen based on the criteria focusing on individuals from China, Europe, Africa, and India. Multiple genetic triggers were confirmed to have a direct correlation and cause to the risk and development of T2DM. In conclusion, this systematic review revealed the different genetic triggers that are linked to the cause of type 2 diabetes mellitus and this information can develop a comprehensive nutritional plan that involves the importance of genes in regards to T2DM.

Incidence, Characteristics, and Cost of Eyelid Lacerations in the United States from 2006 to 2014

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Background: To report incidence, demographics, and cost of eyelid lacerations (ELs) in the United States (US).

Methods: The Nationwide Emergency Department Sample is the largest publicly available emergency department database in the US. We conducted a retrospective longitudinal analysis to identify all emergency department visits in the sample from 2006 to 2014 with a primary or secondary diagnosis of EL. Descriptive statistics were calculated for hospital characteristics, patient demographics, and inflation-adjusted patient emergency department (ED)/in-patient (IP) charges.

Results: The incidence of primary and total EL from 2006 to 2014 decreased by 50 per million and 7.1 per million, respectively. In the same period, the total ED and average ED charge, corrected for inflation, increased by almost $37 million and $1,600 per person, respectively. Over 90% of ELs were classified as periocular. Children had the highest overall incidence for every calendar year between 2006 to 2014 and represented over 40% of all primary EL cases. Object-related (42.2%) and fall-related (28.8%) were the most reported mechanisms of injury (MOI). Patients admitted to the hospital were mostly male (68.6%), had private insurance (33.1%), from the lowest income quartile (33.8%), lived in southern states (31.2%), and presented to metropolitan teaching hospitals (76.5%).

Conclusions: The incidence of ELs declined from 2006 to 2014. ELs occur most frequently in children and young adults. The high proportion of object and fall-related injuries in this population highlights an area to develop strategies to reduce the frequency of preventable eye injuries.

Aggregation Stability of Galactose Coated DNA Particles in Various Media

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Transfection is the introduction of DNA into a cell, and it is being implemented to increase the production of the protein of interest. Transfection exhibits versatility in the ability to incorporate various DNA and polymers into the nanoparticle's composition. DNA nanoparticles formed with galactosylated polyethylenimine (PEI-gal) have galactose sugars on the surface that are signals for cells with sugar receptors. This research aims to understand the stability of galactose-covered nanoparticles in various solutions over time. This data will be helpful in determining optimal conditions for transfection. Dynamic light scattering (DLS) was used to observe the changes in the solution's stability in terms of aggregation and the disappearance of particles of a size. Standard transfection agents, PEI and Lipofectamine, will be used for controls. The preliminary data of the study shows Lipofectamine micelles as a stable nanoparticle in the different solutions; however, in culture media with serum proteins (5% FBS in DMEM), the DLS curve at 1 hour had a dissimilar result leading scientists to hypothesize that the micelles are rearranging at this time. Future studies will look at the stability of nanoparticles with proteins incorporated and their uptake in cells.

Cross-adhesion behaviors between the sugars of N-glycans

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The surface of all animal and plant cells are enriched with glycans. Glycans are also found on the surface of all bacteria and viruses. An N-linked glycan (N-glycan) constitutes 70% of glycans on cells. Dissecting the rules of sugar-sugar adhesion can help us understand the rules governing the biodistribution of pathogens and cells. A previous study in our lab observed a consistent portrayal of self-adhesion of mannose and sialic acid (SA). The research aims at understanding the cross-adhesion behaviors between sugars of N-glycan, in which different terminal sugar will be exposed after glycosidase treatment. We used a pseudo-typed HIV virus as a study platform. This virus has a shield of complex type N-glycans and an envelope of Vesicular Stomatitis Virus G protein. Five glycosidases are used to expose different sugar, and the cleavage will be confirmed via lectin-sugar aggregation. Dynamic light scattering (DLS), and atomic force microscopy are applied to validate the adhesion and aggregation behaviors. Preliminary results suggest no cross-adhesion between four sugars: SA, galactose, N-acetyl glucosamine, and mannose. We also observe a very defined signature DLS correlation curve of each exposed sugar. The research helps the understanding of how the composition of N-glycan determines virus-virus aggregation and virus-host adhesion. Future studies will be the robustness check with other viruses or mucin, which is an O-glycan and the principal components of mucus. If there is a robust rule between the sugar interaction, that will help the prediction of the vulnerability of each person and manage the spread of pathogens.

Synthesis of Compounds for Treatment of Sickle Cell Anemia

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Sickle cell disease, a commonly inherited blood disorder, is caused by a point mutation in hemoglobin that exchanges a hydrophilic amino acid for a hydrophobic amino acid. The mutation causes deoxygenated sickle cell hemoglobin (HbS), under hypoxic conditions, to misfold and polymerize into fibers. This results in blood flow blockage and can lead to intense pain and hospitalization. Therapeutic strategies to combat sickling include stabilizing the non-polymerizing, oxygenated state of hemoglobin. By stabilizing the oxygenated state, sickling is reduced and oxygen uptake is increased. The drug 5-hydroxymethylfurfural (5-HMF), an aromatic aldehyde, has been shown to increase hemoglobin's oxygen affinity by binding to the N-terminal β-valine residues. However, it is degraded quickly by enzymes in the blood; this reduces its pharmacological efficacy. In the present work, the pharmacophore of 5-(hydroxymethyl)furfural was used in a structure-activity relationship study to find structurally similar compounds that have improved biological properties. Derivatives of 5HMF with substitution at the hydroxyl group by aryl ethers were synthesized and characterized using NMR, GC, and FT-IR. Further studies will investigate the biological properties of the synthesized candidates to determine if they have improved anti-sickling properties compared to 5HMF.

Nutritional Intervention for Type II Diabetes Prevention in Minority Youth: Pre-Diabetes

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Introduction: The prevalence of youth with prediabetes in the United States has increased alarmingly within the past decade. Prediabetes is classified by blood sugar levels higher than normal that are not high enough to be diagnosed as type II diabetes. This health disparity falls disproportionately on African American and Hispanic youth. In 2016, the CDC found that 18% of US adolescents ages 12-18 had prediabetes, roughly 1 in 5. The widespread prevalence of prediabetes among African American (22.8%) and Hispanic (22.5%) adolescents was higher than among their white counterparts (15.8%). Prediabetes presents an increased risk of many chronic diseases. Metabolic and cardiovascular complications are heavily linked to obesity and concomitant insulin resistance, hyperinsulinemia. However in this intermediate stage, nutritional intervention tools can be used to prevent the progression to type II diabetes; thus, the proposed study is to examine the relationship between prediabetes and type II diabetes mellitus prevention in minority youth through nutritional/lifestyle intervention.

Methodology: A systematic review will be conducted to examine dietary habits and risk factors relative to hyperinsulinemia. Pertinent articles will be utilized to examine a nutrition education intervention strategy to mitigate the progression of prediabetes to type II diabetes.

Expected Outcome: Based on limited data there is a need for further research to examine health inequity for patients seeking adequate healthcare. This research will investigate socioeconomic factors and examine the effectiveness of culturally tailored programs in African American and Hispanic youth.

Keywords: diet, insulin resistance, minority, prevention, prediabetes cluster, type II diabetes, youth

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AMPK signaling stimulates mitochondrial mitophagy and ATP production in human trophoblast cells

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The role of placental mitophagy in the development of major pregnancy related disorders remains unclear. We hypothesized that AMPK signaling stimulates mitochondrial mitophagy and ATP production in human trophoblast cells. In Study One, BeWo cells were treated with AICAR, chloroquine (CLQ) and their combination. The abundance of LC3II, SQSTM1, PRKN, BNIP3 and BNIP3L in mitochondrial fractions was analyzed by Western blotting. In Study Two, we knocked down PRKAA1/2 expression (AKD) using Lenti-virus shRNA and investigated the effects of AKD on mitophagy pathways as described above, mitochondrial membrane potentials by TMRM staining and ATP production by Seahorse cell mito stress assay. The effects of AICAR or AKD, CLQ and/or their combination on numerical parameters were analyzed by two way ANOVA (n=3).

The main findings include: 1) In mitochondrial fractions, the abundance of LC3II, SQSTM1, PRKN, and FUNDC1 was increased by 1.92, 1.96-, 1.24-,1.58- fold, respectively, by AICAR, while the abundance of BNIP3 and BNIP3L was reduced by 1.66- and 1.29-fold by AICAR, respectively; 2) The changes of proteins in AKD cells were opposite to those in response to AICAR; 3) TMRM intensity in AKD cells was increased by 1.094-fold; 5) Mitochondrial ATP production was lower in basal levels and in presence of oligomycin, FCCP, and rotenone/antimycin in AKD compared to CT cells. This study indicates that major mitophagy pathways mediated by PRKN, FUNDC1, BNIP3/BNIP3L are present in human trophoblast cells and AMPK signaling regulates mitophagy via PRKN and FUNDC1 mediated mitophagy pathways, which may affect mitochondrial membrane potential and ATP production.

Cardiac pre-ejection period and blood pressure in African American college students

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A body of research points to cardiac sympathetic nervous system involvement in forms of early hypertension that are sometimes designated "hyperkinetic." The cardiac pre-ejection period (PEP), from the ECG "Q" wave to the aortic valve opening , reflects changes in cardiac sympathetic input. Presently, we examined the relationship between changes in PEP during psychological challenges and resting blood pressure levels and variability. We measured blood pressure at resting and task-involved time points in 145 African American college students. An impedance cardiograph assessed cardiac activity continuously throughout the session. Principal components analysis (PCA) revealed that PEP reactivity scores for the reaction time tasks (three) and the racist imagery challenge (two) loaded on a single

component, providing a composite PEP reactivity score. PCA revealed both systolic (SBP) and diastolic (DBP) readings loaded convincingly on one component; we retained a composite score for each. Blood pressure variability was estimated as the variance of five blood pressure readings. PEP reactivity showed a significant, negative correlation with the SBP and DBP composite scores ($r = -247$, $p = .006$; $r = -.200$, $p = .026$ respectively). SBP and DBP variability correlated positively with blood pressure levels ($r = .227$, $p = .006$, SBP; $r = .290$, $p < .001$, DBP). Hierarchical multiple regression analysis revealed that PEP reactivity predicted SBP levels after controlling for body mass index and the variability of blood pressure measures. The findings support evidence associating sympathetic activity with early blood pressure elevations.

Association between Aflatoxins and Liver Disease in Developing Countries: A Systematic Review

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In underdeveloped nations, aflatoxin is one of the leading causes of hepatocellular cancer. Aflatoxins are a family of toxins produced by certain fungi found on agricultural crops. More than 5 billion individuals in underdeveloped nations are at danger of chronic aflatoxins exposure from contaminated foods. A lot of studies have been done about Diabetes, Cirrhosis, HBV, HCV, alcohol consumption etc. in regards to hepatocellular carcinoma, but the gap in research about liver cancer is aflatoxins. Therefore, this study aims to provide that missing link by showing how certain crops in developing, tropical countries such as the Caribbean are susceptible to liver cancer caused by Aspergillus flavus and Aspergillus parasiticus.

A systematic review was conducted to analyze the relationship between aflatoxins and liver cancer. The databases utilized for this study were PubMed, Mayoclinic, NCBI, MDPI and Google Scholar databases. Based on all the results from the searches, articles were limited to be around the time period of 2010 to present. In total, 4 scientific based studies were used in this research and about 5 other articles for supporting ideas.

The main fungi that produce aflatoxins are Aspergillus flavus and Aspergillus parasiticus, which are abundant in warm and humid regions of the world, hence why countries in Africa or the Caribbean region are more susceptible to being affected. This then becomes a problem and leads to cancer because of long term and excessive exposure to aflatoxins.

Factors associated with Attempted Suicide and Self-Inflicted Injury among Women aged 18-65years in the United States: a Retrospective Analysis of the NIS (2003-2015)

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Background: Attempted Suicides and Self-Inflicted Injuries are a significant cause of mortality in the United States, accounting for 14.5 deaths/100,000 population.

Aim: To determine factors associated with attempted suicide/self-inflicted injuries among women aged 18 – 65 years in the United States.

Methods: We queried the National Inpatient Sample (NIS 2003-2015) database to identify all hospitalizations on account of attempted suicide or self-inflicted injury. Independent predictors of attempted suicide/self-inflicted injuries were identified using multivariable regression models. We determine the interaction between race/ethnicity and increasing median income on attempted suicide/self-inflicted injury's risk in a sub-analysis and utilize sample weights to generate national estimates.

Results: There were 1,031,693 adults' hospitalizations in the NIS with a primary diagnosis of attempted suicide/self-inflicted injury in the study period. The highest attempted suicide/self-inflicted injury risk was among women aged 31-45years. Whites women have a higher attempted suicide/self-inflicted injury risk than any other race/ethnicity; Blacks or Hispanics. Intimate partner violence increased attempted suicide/self-inflicted injury risk 6-fold. Black women in the highest income strata had a 20% increase in the odds of attempted suicide/self-inflicted injury compared to Black women in the lowest socioeconomic strata.

Conclusion: attempted suicide/self-inflicted injury risk is highest among women aged 31-45 years in the U.S. Other determinants include intimate partner violence, Black women in the highest socioeconomic group, and uninsured patients.

Do biofilm infection and microbial communities cause breast implant complications? A case study analysis

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Breast augmentation is one of the most popular surgical cosmetic procedures in the United States, with over $1.1 billion spent on silicone gel implants in 2018. However, the longer patients have breast implants, the higher the risk of complications such as capsular contracture, infections, and anaplastic large cell lymphoma (ALCL). Recent studies show that biofilms, microbial communities that grow on breast implant surfaces are associated with these complications. We conducted a case study analysis with the aim of comparing the microbial community on healthy patients with breast implants and patients with breast implant complications. We focus on papers that investigated the microbial communities associated with breast implants complications as well as capsules from healthy patients published between 2011 and 2021. An extensive search was conducted using different databases.9 papers were selected for the case study analysis. The included papers provide information on the microbiome associated with three breast implant complications: capsular contracture (n=6), ALCL (n=2), and breast tissue expander infections (n=1). In those 9 papers, a total of 45 different taxa are identified. Staphylococcus spp. (n = 16) and Propionibacterium acnes (n = 7) are the most frequently identified taxa across the three complications. While Staphylococcus spp., Propionibacterium acnes, and Bacillus are notably related to capsular contracture, Ralstonia spp., occur mostly in ALCL. Most studies show no significant difference between the microbial diversity or taxa present on breast implant complicated and non-tumor capsules, and there is no sufficient evidence of a causative link between microbial growth and breast implant complications.

Impact of Covid-19 on African Americans with Type II Diabetes: A Retrospective Study (January-November, 2020)

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Coronavirus disease, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-COV-2), was declared a pandemic by the World Health Organization (WHO) on March 11, 2020, after it had spread across six WHO regions. First discovered in Wuhan, China in December 2019, Covid-19 affected over 63.1 million people with 1.47 million deaths Worldwide in November, 2020. The first case of Covid-19 was reported in the United States on January 21, 2020, in Washington State and over 13.5million confirmed cases with 267,792 deaths in November 2020. The writer has attempted to synthesize findings from articles that report on the impact of Covid -19 in the United States with data on African Americans who also have type II diabetes in 2020. Many articles were retrieved using keywords search on PubMed and Google scholar. Out of the forty articles, only eighteen articles met the inclusion and exclusion criteria for this review. The articles were further grouped in tabular form and sixteen articles were analyzed according to their critical levels of evidence. The result confirmed that patients with diabetes have poor outcomes with Covid-19 than patients with no diabetes. Also, health disparities, racial and socio-economic factors contributed to the poor outcomes of Covid-19 among African Americans with co-morbidities than other races in the United States. It is imperative that this disease must be mitigated through awareness, socio-economic interventions, pharmacological and non-pharmacological remedies couple with the recent placement of the Affordable Care Act in bridging the gap in economic and health disparities among affected population.

High Fat Diet and High Fructose Diet-fed Male and Female Liv-ARKO Mice Displayed Exacerbated Glucose-Stimulated Insulin Secretion

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In this study, female and male Liv-ARKO mice were placed on three distinct diets: Control (Research Diets Inc), High Fat (HFD), and High Fructose (HFrD). After one and two months, Glucose-Stimulated Insulin Secretion tests were performed: each group was injected with a 20% glucose solution at 2g of glucose/kg body mass and blood samples were taken via tail milking at 0 minutes, 15 minutes, and 30 minutes. Blood samples were immediately centrifuged and serum supernatant was extracted for further analysis via Sigma Insulin Assay.

Our results showed that LivARKO female mice fed a HFD but not a HFrD displayed significantly increased fasting insulin levels compared to LivARKO female mice on a control diet. Glucose-stimulated insulin secretion was increased significantly in HFD LivARKO female mice after 15-minutes and stayed similarly elevated at 30-min. Control diet LivARKO female mice did not have a significantly elevated GSIS until 30-min. HFrD LivARKO mice did not display any increase in GSIS at 15-min or 30-min.

It was hypothesized that HFD and HFrD-fed Liv-ARKO mice would impair GSIS. From our data, we can conclude that female LivARKO mice displayed an exacerbated increase in GSIS in HFD but not HFrD. These data suggest that diets

high in fat may lead to a dysfunction in insulin signaling that ultimately plays a role in the development of insulin resistance. More research is necessary in order to further investigate the effects of high fat diets on glucose-stimulated insulin secretion and consequent development of insulin resistance.

The Head, Blood Vessels, and Nerves of Orangutans and Comparison with Humans

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Based on the evolutionary similarities between our species and apes, there has been much exploration and comparisons of the musculature and bone structure of these primates. However, the blood vessels and nerves have been less studied. Through the Visible Ape Project, bones, muscles, vasculature and innervation of various ape species are being studied. In our study, we are dissecting an Orangutan specimen. The face and cranium has shown some similarities to humans, with some marked differences. Within the cranium, cranial nerves I-XII have been documented and analyzed. There has also been blunt dissection of the left and right sides of the face. Discovery of innervation and vasculature under the zygomatic arch of the Orangutan has been compared and noted and compared to that of humans. The superficial dissection of the right side of the face has led to the discovery of innervation and vasculature that mostly mirrors the facial innervation and vasculature of humans. With the progression of blunt dissection, there are continuous discoveries being made about the similarities and differences within the Orangutan head.

Identification of New Ant Species on Howard University's Campus

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Formicidae are one of the most abundant animals worldwide. While there are many ant species worldwide, the focus of the study was Howard University in Washington, DC. The purpose of this study was to determine the species of ants on campus; also, to examine their biodiversity level. This was done by using the DNA Barcoding technique. Samples were collected from different areas on campus and analyzed. The ant population on this campus has never been studied. DNA barcoding is a scientific technique used to identify and distinguish organisms and categorize them into different species or taxonomic groups by using a short genetic marker. For animals, the short genetic marker used was the Cytochrome Oxidase 1 (CO1). CO1 helps amplify segments of DNA in animals, keeping it broad enough to know that the species is ant but making it specific enough to see the differences between species within. DNA was extracted from each ant. PCR reaction was conducted using CO1 primers. Samples with successful amplicons were sent to GeneWiz, LLC for sequencing. Sequences were uploaded to DNA Subway, a system used to analyze genetic relationships between species. Using the basic local alignment search tool (BLAST), ant sequences were aligned with sequences in the DNA Subway database. From this analysis, we identified five different species of ants that belong to one large subfamily based on sequence relationships. This work is ongoing as students continue to increase the field of collection to include species found in the entire Washington DC area.

Angiogenic Gene Characterization and Vessel Permeability of Dermal Microvascular Endothelial Cells Isolated from Burn Hypertrophic Scar

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Hypertrophic scar (HTS) formation is a common challenge that impacts patients after a burn injury. Dermal microvascular endothelial cells (DMVECs) are an understudied cell type in HTS. An increase in angiogenesis and microvessel density can be observed in HTS. Endothelial dysfunction may play a potential role in scar development. This study aims to generate a functional and expression profile of HTS DMVECs. We hypothesize that transcript and protein-level responses in DMVECs from HTS differ from those in NS.

HTS had an increased area density of dermal microvasculature compared to NS. HTS DMVECs were 17.59% less permeable than normal DMVECs ($p<0.05$) to 40kDa FITC-dextran. After injury, normal DMVECs were 28.4% and HTS DMVECs were 18.8% more permeable than uninjured controls (28.4±4.8 vs 18.8±2.8; $p=0.11$). PCR array identified 31 differentially expressed genes between scar and skin DMVECs, of which 10 were upregulated and 20 were downregulated. qRT-PCR and ELISA studies were in accordance with the array.

DMVECs expressed a mixed profile of factors that can contribute to and inhibit scar formation. Functional data supports that DMVECs play a role in scar pathology because HTS DMVECs have both a discordant response to cellular insults and baseline differences in function. Further investigation of DMVECs is warranted to elucidate their contribution to HTS pathogenesis.

Direct and Indirect Effects of Endocannabinoids on Interneurons and Output Neurons in Central Olfactory Circuits

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Our aim is to determine the role of the endogenous cannabinoid (endocannabinoid) system in regulating neural activity of interneurons and output neurons in the olfactory bulb, the first central relay station in the brain for olfactory information coming from the nose. We use a combination of anatomical and physiological techniques as our experimental approach. Endocannabinoids mediate retrograde signaling at synapses in several brain regions where they are released from depolarized output neurons and rapidly diffuse to presynaptic inhibitory interneurons to transiently reduce presynaptic firing and neurotransmitter (GABA) release.

The main olfactory bulb is a cortical structure with distinct layers that house different types of GABAergic interneurons and glutamatergic output neurons. In the glomerular layer (input layer), periglomerular cells mediate dendrodendritic interactions with output neurons such as mitral cells and tufted cells. In the external plexiform layer and mitral cell layer (output layer), granule cells form synapses with mitral cells. We find that both periglomerular and granule cells prominently express cannabinoid receptors, CB1R, and are directly inhibited when cannabinoid receptors are activated. In contrast, mitral and tufted cells show weak or no expression of cannabinoid receptors. Nevertheless, they are activated by CB1R agonists. However, the endocannabinoid system affects mitral and tufted cells only indirectly through direct activation of CB1R on interneurons. The data indicate that the endocannabinoid system can have direct and indirect cellular and network effects and modulates the excitability and synaptic responsiveness of both interneurons and output neurons in the main olfactory bulb.

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Analyzing the Effect of Human Behavior on Ant Species.

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This research project analyzed the effects of human behaviors on the pavement ant species. The research question was "What are the effects of human behavior on the abundance of ant species in the DC area?". The hypothesis formulated for this experiment is that there will be some positive effects on the pavement ant species, however the negative impact humans have on ants as a whole will overwhelm the good. The methods used to collect these different ant species were fieldwork. Baits were used in order to be able to collect and identify the species. Ant DNA barcoding was also used to identify an ant species and use that information to track humans effects on the species. The results have confirmed the hypothesis even though through actions, like urbanization, humans are able to provide new food sources to the ants. However for most ant species, besides pavement ants, the effects of pollution, climate change, and temperature far outweigh the good. This topic is relevant because the impact of humans on the ant species, especially the pavement ant, can be identified. This information can then be used to evaluate human behavior and make more conscious decisions to benefit and protect the ant species. A research project such as this one can facilitate a better understanding of how humans affect the world leading to positive change.

The STIM1 regulator-SARAF, Ca2+ influx and Acute Pancreatitis in vivo

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SARAF is an important regulator of Ca2+ influx & Ca2+ signaling in vivo. Our findings suggest SARAF regulate SOC- and receptor-mediated Ca2+ influx. SARAF seems to be an integral membrane protein that modulates Ca2+ homeostasis. Increasing the expression of SARAF, we can see a decrease in severity of acute pancreatitis.

Increased SARAF function should be considered as a potential therapy for disease associated with Ca2+ signaling.

Isolation and Characterization of Phages Briakila, Soile and Toni Isolated from the Howard University campus

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Bacteriophages, or phages, may be utilized to study viral ecology, epidemiology, and enhance the development of therapeutics. In the current study, enrichment, and direct culturing methods, using the host Mycobacterium smegmatis mc2155, were used to elucidate phage diversity in soil samples collected from the campus of Howard University. Over 15 phages were purified using standard isolation protocols during the 2021-2022 academic year. Here we will address three of them: Briakila, Soile and Toni. Following isolation of the phages, lysates were generated, and DNA was extracted. The genomes were sequenced at the Pittsburgh Bacteriophage Institute, on the MiSeq platform (Illumina Sequencing). This revealed that the phages belonged to cluster B, with two belonging to subcluster B1 (Soile and Toni), and one belonging to B3 (Briakila). Soile is longer than ~60% of other sequenced members of B1 with a length of 69097, while Toni is closer to average length (68,581bp) with a length of 68,784 bp.. The G+C content for both genomes was consistent with the average for the subcluster. With 69,166 bp, Briaklia's genome is slightly longer than the average B3 genome (68,787bp), and G+C content was consistent with the average for the B3. Annotation of the genomes is currently underway. Additionally, all other phages that were not sequenced phages in the 2021-2022 collection are undergoing assays to determine patterns of phage sensitivity/insensitivity–immunity using wildtype M. smegmatis mc2155 and lysogens generated from the HU-PHAGES collection.

HIV-1 Tat interaction with ELL1 and KAP1

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Background: HIV-1 latency is mediated in part by KAP1 binding which is reversed by HIV-1 Tat protein. Tat recruits host Super Elongation Complex (SEC) and activates transcription. While ELL1 protein was identified as part of SEC, its role in HIV-1 latency was not clarified. Here we utilized proximity mass spectrometry and biochemistry approaches and identified ELL1 as potential player in HIV-1 transcription.

Methods: HIV-1 Tat fused with APEX was used for proximity labelling followed by MS-MS analysis. HIV-1 transcription assay was used to determine the role of ELL1 protein. Immunoprecipitations (IP) were used to confirm protein-protein interactions. Split NanoBiT system was used to study protein-protein interaction.

Results: global HIV-1 Tat interactome analysis was conducted by APEX proximal labelling followed by MS-MS analysis. Several Tat-binding proteins were identified including KAP1 and ELL1. We confirmed HIV-1 Tat interaction with KAP1 and ELL1 by IP. ELL1 is a protein phosphatase-1 (PP1) binding subunit and ELL1 expression inhibited HIV-1 transcription in PP1-depndent manner. We also showed that KAP1 interacted with PP1 in split Nano-BiT assay.

Discussion: latency of Adeno-associated virus 2 is reversed by KAP1 Ser 824 dephosphorylation by PP1/NIPP1 holoenzyme. Our previous studies showed that NIPP1 expression blocks HIV-1. Here, we showed that HIV-1 Tat binds PP1/ELL1 holoenzyme and also interacts with KAP1. We are currently extending this study to analyze KAP1 dephosphorylation by PP1/ELL1 complex and its role in HIV-1 latency.

Understanding Pathogenesis of Alzheimer's Disease Type II Diabetes Mellitus Patients using Pathway Profiler Array (qRT-PCR): A Case Study

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Abstract: Type 2 Diabetes Mellitus (TD2M) is a serious health concern impacting the public health and heath care system worldwide. Chronic T2DM is now thought to be linked with substantial impairments of cognitive performance and increase the risk of developing Alzheimer's Disease (AD). Our previous findings have linked these diseases through cognitive impairments and genetic pathways. The current study examined the βamyloid precursor protein (APP) pathways with clinically identified T2DM patients (male/female) of Pakistan using profiler array gene expression (qRT-PCR) coupled with Ingenuity Pathway Analysis (IPA) to reveal the pathobiology (pathways) towards the disease development in each unique case of T2DM patients (participants). The most important canonical pathways identified were Amyloid Processing, Neuroinflammation Signaling, ERB4 signaling, Interleukins (IL6, IL-17, IL1B) signaling, and nNos signaling.

A universal model for the biomechanical response of spider silk filaments

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Spider silk is a versatile and resilient material. When compared at similar dimensions, spider silk is stronger and lighter than steel. There is increasing interest in harnessing the biomechanical properties of spider silk for biomedical applications such as wound dressings and tissue repair. Predictive modeling of the biomechanics of biomaterials from spider filaments requires accurately capturing the force response of a single filament. Since spider silk is proteinaceous, it exhibits several force response regimes, which can be mapped to different levels of protein deformation. A micromechanism-centric model is needed to universally capture and predict the force response of different spider silks. The different levels of protein deformation were captured by mechanical analogs such as springs and dashpots, linked in series or parallel based on the nature of the damping character of the mechanisms. Model validation consisted of mining literature for experimental studies on spider filament mechanics and fitting various types of filaments using a single model with optimized parameters. A universal fit was obtained in most cases, and the variations in model parameters were linked to published variations in the filamentous protein interactions and structure. Moreover, the complex geometry of spiderwebs was parametrized into a simulation mesh using MATLAB software. In future work, the precise design advantages offered by the filament mechanics in the context of web geometry and ecological conditions will be studied using simulations. These design principles and the validated predictive power of the model will aid in innovating biomaterial design using proteinaceous filaments for biomedical applications.

Bacterial hemolysins: inhibition of host cell membrane lysis by maternal milk proteins

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Lactoferrin, lysozyme and lactalbumin are maternal milk proteins with multifunctional innate immune activities. They respectively play a role in the chelation of iron, lysis of bacterial cell wall and inhibiting the proliferation of cancer cells. E. coli, Staphylococcus aureus and Pseudomonas aeruginosa are bacterial pathogens that produce hemolysins in the causation of serious diseases as sepsis, pneumonia and neonatal meningitis. Our preliminary studies have shown that some hemolysins are inhibited by human milk and lactoferrin. We were therefore interested in determining if the three maternal milk proteins could inhibit pore formations by bacterial hemolysins and elucidate the mechanisms of inhibition. We used isoelectric focusing to isolate individual hemolytic fractions from culture supernatants of the bacterial organisms, purified and pooled the active fractions for each organism. Hemolysis was determined with sheep red blood cells and by absorbance measurements at 540nm. Polyethylene glycols (400, 3,500 and 8,000 kDa) were used to estimate pore sizes. Overall, the three milk proteins inhibited lysis of the sheep rbc membrane in a concentration and pH dependent manner, with lactoferrin showing the highest inhibition against E. coli and S. aureus hemolysins. Pores created by the hemolysins ranged from 0.7 to 3.05nm in diameter, but the largest number of pores came from the pooled E. coli hemolysin. Inhibition was also obtained with EDTA and EGTA. The results demonstrate in vitro hemolysin inhibition by maternal milk proteins and indirectly give credence to the protective advantage of breast feeding against childhood bacterial infections.

The Functional Morphology and Comparisons among the Pinniped Middle Ear Apparatuses

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Mammalian middle ear morphology evolving approximately 200 million years ago was a major innovation for terrestrial animals. During the transition from terrestrial to aquatic environments for the ancestors of modern whales and pinnipeds, specializations of the ear continued to occur in the basicranial auditory apparatus. Modern cetacean hearing is well understood, with a rich fossil record of the transitional auditory morphologies from primitive to derived body forms. Pinniped hearing has not been studied in depth, especially because these animals are defined as semiaquatic and require at least two modes of hearing to thrive. The fossil record of pinnipeds is sparse; as a result the transitional morphologies of the hearing apparatus remain undiagnosed. Previous studies demonstrate lack of clarity regarding osteological and functional morphologies of the auditory system. These earlier studies are limited to the structure of the basicrania and ossicles in pinnipeds, which includes the Families: Phocidae (true seals), Otariidae (sea lions and fur seals), and Odobenidae (walruses). In mammals, these regions are thought to be more evolutionarily conservative and the hypothesis is that this will remain true for pinnipeds. This preliminary study demonstrates anatomical comparisons of pinniped tympanic and ossicle morphology, with special emphasis on phocids. Future analyses will compare modern carnivore basicranial and auditory morphology in relation to hearing and will establish transitional patterns from land to sea in early pinnipeds.

Antiviral Factors Inhibit HIV-1 Infection in Sickle Cell Disease

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We previously showed that HIV-1 replication is inhibited in Sickle Cell Disease (SCD) PBMCs in part because of the expression of ferroportin (FPN) and activation of SAMHD1. We hypothesized that sickle cell hemoglobin (HbS) phagocyted by macrophages leads to upregulation of innate antiviral response. In this study we analyzed and validated antiviral genes expressed in HbS-treated macrophages, SCD PBMCs and splenocytes from SCD mouse model.

Methods: RNA Seq was conducted on total RNA obtained from HbS –treated THP-1 derived macrophages and non-activated and activated PBMCs using IlluminaβNextSeq 500. Townes mouse model of SCD was used in the study and infected with EcoHIV virus that was propagated in 293T cells.

Results: RNA Seq analysis of THP-1- differentiated macrophages treated with HbS showed upregulation of restriction factors IFIT3, LGALS3BP, MX2 and RTF1, in addition to IRF-&. RNA seq analysis of activated SCD PBMCs, showed upregulation of APOBEC3A, CH25H, heme oxygenase-1 (HO-1), and FPN. We confirmed the expression of APOBEC3A, CH25H and HO-1 by q-PCR and Western blot and validated their antiviral role using small molecule inhibitors. Further analysis of Eco-HIV infection in SCD Townes mice showed significant down regulation of HIV-1 gag and nef mRNA levels in the spleen of SCD mice. Interestingly SCD mice had increased FPN and SAMHD1 expression in spleen.

Discussion: Activated SCD PBMCs express many antiviral factors that facilitate robust anti-HIV-1 effect and block viral replication. Suppression of EcoHIV infection in SCD mice further support the idea that HIV-1 infection is suppressed in patients with SCD.

A Machine Learning Approach to Classify Sickled and Healthy Red Blood Cells

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Sickle cell disease (SCD) is an inherited hemoglobinopathy that affects tens of millions of people worldwide. Under low oxygen conditions, mutant HbS forms polymers that lead to the hemolysis of red blood cells (RBCs), vaso-occlusion, and organ damage. In SCD, patient evaluation requires the determination of red blood cell morphology and counts which can be used to measure the efficacy of drugs developed to prevent RBCs sickling. However, existing cell morphology detection tools do not yield accurate counts to be used in the evaluation. Typical microscopy images are noisy and common methods such as thresholding, watershed, and region growing are not suitable for automated analysis. We collected blood from SCD patients using approved HU IRB protocol, then isolated and cultured RBCs in complete RPMI media for 18 hrs at 1% O2. We also cultured control RBCs

at 21% O2 in a regular tissue culture incubator. RBCs were photographed at 400x magnification using an Olympus IX73 microscope. The images were used for machine learning to segment and classify RBC based on their morphology. Deep neural networks (DNNs) were utilized to segment and classify red blood cells in the microscopy images of blood samples. Initially, we created a small training set by labeling individual RBC in images as healthy, sickled, and unknown. Our preliminary results using the small training set are encouraging and, currently, we are increasing the size of the training data set to obtain higher accuracy that will result in a valuable tool for patient evaluation.

Treatment of burn hypertrophic scar with fractional ablative CO2 laser does not decrease levels of hyperpigmentation

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Background and Objective: Laser treatments have been used to treat hyperpigmentation following burn injury; however, quantitative values have not been reported. Mexameters provide quantitative measures of pigmentation. This study examines changes in scar melanin index after laser via Mexameter readings in various Fitzpatrick skin types (FST) with the aim of assessing efficacy of the tool in skin of color.

Methods and Analysis: Patients with scars of various sizes were grouped according to FST and treated with fractional ablative laser (FLSR). A database of 253 patients undergoing treatment was constructed. Individuals who completed at least 1 pre-operative and 3 laser sessions with Mexameter readings were selected. 46 patients met these criteria. For preliminary data analysis, 10 patients were selected. Mexameter readings were compared from the start of treatment to the latest date of treatment.

Results: 80% of patients were female (n = 8) and 20% were male (n = 2). Patients were FST 2 (n=2), FST 4 (n=3), or FST 5 (n=5). Data is represented as fold-change where each laser session reading per patient was normalized to its own pre-operative laser session measurement. After the third laser session, 60% of patients (n = 6) had a 1-fold decrease in melanin index. The largest fold-change present was -1.197. The remainder of the patients maintained similar values as the preoperative session.

Conclusion: Based on Mexameter values, FLSR does not lead to improvements in hyperpigmentation. Future studies will add more patients and compare Mexameter values with clinical photos.

Increased Insulin Resistance in 10-month compared to 5-month Old Male Hepatic Androgen Receptor Knockout Mice

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Insulin resistance is an important component of type 2 diabetes and metabolic syndrome. The liver plays an essential component in the metabolism of insulin and androgen signaling. Sex differences exist in type 2 diabetes with men having a higher prevalence than women. In our study we placed male liver androgen receptor knock-out mice (Liv-ARKO) on chow diets to determine if Liv-ARKO had an effect on insulin resistance on younger age (5 month) compared to older age (10 month).

In this study, male Liv-ARKO mice were kept on chow diets for either 5 months or 10 months and then sacrificed. Some mice were given a dose of 0.5 U/kg insulin before sacrificing to investigate the effects of age on insulin signaling. Western blots were used to determine protein expression in tissue from the liver, skeletal muscle, white adipose tissue. BCA assays were used to standardize the protein concentration in each sample.

It was hypothesized that p-AKT is lowered in both 5- and 10-month-old mice compared to mice not given insulin. Additionally, after 10 months, total AKT was increased. Our results suggest that Liver Androgen Receptor is causing decreased insulin action at the level of p-AKT in both young (5 month) and old (10 month) mice. If insulin is not stimulating p-AKT, the body may try to make more total AKT to try to compensate; hence the increase in total AKT seen in the 10 month mice. Further investigation should also be performed on the gender differences in these results.

Computational prediction of mutation effects on ACE2 receptor protein stability and binding affinity between the spike protein of SARS - CoV - 1 and SARS - CoV - 2.

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The Angiotensin-Converting Enzyme-2 (ACE2) is the primary target of the SARS-CoV-1 /SARS-CoV-2 spike (S) glycoprotein enabling entry into the human body. Certain ACE2 genetic variants have gained attention because of their rapid rise within certain populations and evidence of transmission. Now that multiple projects analyzing human genomic data are completed, an unprecedented wealth of information is available on genetic variations. However, genetic variations closely associated with the rise in mortality rates among American Americans need further investigation. We applied the structure-based computational saturation mutagenesis approaches to determine the folding and binding energy caused by missense mutations on ACE2 regions of ACE2 - SARS-CoV-1 S / ACE2 - SARS-CoV-2 S complexes. We observed ACE2 mutations at glycine residues G561, G486, G268, G399 and G405 causing the most destabilizing effects on protein stability. In terms of the mutations affecting binding affinity between ACE2 - SARS - CoV - 1 /ACE2 - SARS - CoV - 2 complexes, ACE2 mutations in D355 and D38, decreased the binding affinity between both complexes. Y41 displayed mixed results by showing an increase of binding affinity in ACE2 - SARS - CoV - 2, and a decrease in ACE2 - SARS - CoV - 1. We identified multiple ACE2 genetic variations affecting protein stability and binding affinity in these populations which may contribute to infectivity and transmission. It is important to develop personalized treatments for groups at higher risk susceptible to COVID-19 transmission and infectivity.

A Review on the Clinical Significance of Hypoplastic A1 Segment in Relation to Cerebrovascular Events

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The circle of Willis is the ring-like structure of anastomotic blood vessels at the base of the brain. The anterior circulation to the brain is provided through bilateral pre-communicating (A1 segments) anterior cerebral arteries (ACA). Hypoplasia resulting in narrowing of the A1 segment of the ACA is seen in around 2% to 22% of the general population. It has been suggested that A1 segment hypoplasia contributes to stroke incidence. Our purpose is to assess the extent to which a hypoplastic A1 segment accounts for stroke in the ACA territory of the brain. Pubmed was queried using the keywords "A1", "hypoplasia", and "stroke" with the search limited to the period 1990 to 2022. While there has been an established correlation between presence of a hypoplastic A1 segment and an associated anterior communicating artery aneurysm, their risk of rupture and subsequent hemorrhage have, so far, not been significant and further studies have yet to be undertaken. Additionally, there have been conflicting reports in the literature detailing the extent to which hypoplastic A1 segment predisposes patients to ischemic stroke in the ACA territory. Our review of the literature highlights discordance among studies involving the clinical significance of the hypoplastic A1 segment. Proposed areas of future research include the correlation between hypoplastic A1 segment and ischemic and hemorrhagic stroke as well as its possible genetic predisposition.

Tagging the 19S Lid Proteasomal Subunit rpn-6.1 with the epitope OLLAS results in a significant fertility defect.

Presenter's Name: Destiny Minns
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TITLE: Tagging the 19S Lid Proteasomal Subunit rpn-6.1 with the epitope OLLAS results in a significant fertility defect.

AUTHOR: Destiny Minns, Lourds M. Fernando, Ph.D., and Anna K. Allen, Ph.D.

BACKGROUND: The Caenorhabditis elegans worm is an excellent model organism for scientific fields such as reproduction. In the field of reproductive research, one question remaining unanswered is if the 26S proteasome plays a role in C. elegans reproduction that is not associated with proteolysis. CRISPR/Cas9 endogenous genome editing has made answering this question a bit easier. Through CRISPR/CAS9 researchers are able to quickly generate specific gene mutations in proteasomal subunit genes and tag subunits with fluorescent proteins or small epitope tags, such as OLLAS. This allows researchers to identify the spatiotemporal location of the tagged subunit, understand more about its tissue-specific functions, and even identify any interactions with germline-specific proteins.

METHODS: CRISPR/Cas9 endogenous genome editing, Microinjection, Lifetime Brood Assay, Lifespan Assay

RESULTS: When compared to wild-type hermaphrodite worms, gfp::rpn-8 animals showed no significant difference in brood size. Yet, rpn-6.1::OLLAS animals showed a significant 15% decrease in brood when compared to wild-type. gfp::rpn-8 and rpn-6.1::OLLAS also showed significantly different lifespans from wildtype.

CONCLUSIONS: rpn-6.1::OLLAS has a 15% decrease in brood size. This suggests the epitope, OLLAS, tagged to the C terminus of rpn-6.1 disrupts the normal function of brood size. Tagging subunits, rpn-8 and rpn-6.1, also showed a disruption in the lifespan of the worm.

Classifying Diapause-State of Culex pipiens with Infrared Spectroscopy and PCA-K-means Based Clustering

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BACKGROUND: Marked by a genetically-determined state of low metabolic activity and increased tolerance to extreme conditions, diapause is a dormancy mechanism mosquitoes use to survive unfavorable environments. Changes in photoperiod and temperature can induce diapause by upregulating metabolic genes such as cyclooxygenases and stress tolerance genes such as HSP70. Classifying the presence or absence of diapause in mosquitos can facilitate the management of vector-borne disease transmission. Female mosquitos prepare for the winter by feeding on sugar sources such as floral nectar, consisting of fructose, glucose, and sucrose. Diapausing female Culex pipiens tend to selectively feed on fructose and glucose sources over sucrose. Metabolic differences between diapausing and non-diapausing mosquitos, brought on by selective carbohydrate usage, support the viability of a diapause-state classification system based on mosquito biochemical makeup. METHODS: We aim to further investigate carbohydrate usage in Cx. pipiens and to develop a diapause-state classification system. We used Fourier Transform Infrared Spectroscopy (FTIR) to characterize carbohydrate metabolism in diapausing and non-diapausing Cx. pipiens. FTIR spectra were pre-processed by removing spectral bands without relevant information. Data was analyzed and modeled via Principal Component Analysis (PCA) and K-means clustering. RESULTS/CONCLUSION: PCA retaining two axes explained 80% of the variance within raw data. After discarding spectral ranges below 600 cm-1 and above 2000 cm-1, PCA performed in tandem with K-means clustering explained 96.7% variance. Our analysis is useful to developing a novel, time- and cost-efficient approach to diapause-state classification using portable FTIR technology.

Perceived Racial Discrimination and Hypertension: A Comprehensive Systematic Review

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Introduction:Discrimination is thought to be at the root of racial differences in hypertension. Although conflicting findings have been observed, existing evidence reveals a possible link between racial discrimination and blood pressure. The goal of this systematic review was to quantify the relationship between perceived racial discrimination and hypertension, as well as systolic, diastolic, and ambulatory blood pressure.

Methodology: Electronic database search of PubMed and PsycINFO (keywords: blood pressure/hypertension/diastolic/systolic, racism/discrimination/prejudice/unfair treatment) was combined with discordancy and ascendancy approaches. Forty-four articles (N = 32,651) met inclusion criteria. Demographics, hypertension diagnosis, blood pressure measurement, discrimination measures and conceptualization, study quality, and effect sizes were all coded in the articles.

Preliminary Results: Fisher's Z, the derived common effect size metric, was used to verify random effects meta-analytic models. Overall, hypertension was linked with perceived racial discrimination, Zhypertension = 0.048, 95 percent CI [.013,.087], but not with resting blood pressure, Zsystolic = 0.011, 95 percent CI [.006,.031], Zdiastolic =.016, 95 percent CI [.006,.034]. Sex (male), race (Black), age (older), education (lower), and hypertensive status were all moderators that enhanced the relationship. Nighttime ambulatory blood pressure was most strongly connected with perceived prejudice, especially among Blacks.

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Sickle Cell Hemoglobin Induces Antiviral Response in Sickle Cell Disease

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Patients with Sickle Cell disease (SCD) have lower risk for HIV-1 infection. We accessed changes in antiviral gene expression in SCD peripheral blood mononuclear cells (PBMCs) and analyzed antiviral gene expression in macrophages treated with sickle cell hemoglobin (HbS).

Methods: RNA was isolated from PBMCs collected from SCD patients and matched healthy controls. RNA Seq was conducted on Illumina NextSeq 500 and processed on Illumina Dragen workflow and further analyzed by Ingenuity Pathway analysis (IPA).

Results: we detected 2230 differentially expressed genes in SCD PBMCs compared to controls. In THP-1-differentiated macrophages treated with HbS versus HbA, we detected 322 differentially expressed genes. Gene set enrichment analysis (GSEA) showed upregulation of antiviral gene expression in SCD PBMCs. Four genes had highest upregulation: APOBEC3A, CH25H, HMOX1 and FPN1. GSEA analysis of RNA Seq data from HbS-treated macrophages showed enrichment of interferon response. Unsupervised IPA analysis pointed to the upregulation of IRF-7 signaling pathway and down regulation of viral infection and replication.

Discussion: We propose that HbS released by hemolysis and up taken by macrophages leads to the IRF-7-triggered induction of antiviral state in macrophages. Macrophages will induce antiviral state in circulating SCD PBMCs likely though the cytokines and interferons secretion known to be elevated in SCD patients. We currently validate CH25H, HO-1, APOBEC3A for their anti-HIV-1 effects. Taken together, our study point to novel mechanism of upregulation of antiviral factors mediated by sickle cell hemoglobin that included induction of antiviral, heme- and iron- regulatory pathways.

Characterization of High-Dose Electrospun Therapeutic Peptides for Sustained Release

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Electrospinning can produce nanofibers for chemical drug delivery purposes. However, this method has not been tested in biologics drug delivery. Uni-axial and co-axial electrospinning methods are potential strategies for sustained release of encapsulated of small biologic molecules. However, difficulties persist in formulating drug entities at high doses. The choice of polymer types and its interaction with the drug are critical factors in producing suitable electrospun nanofibers.

We found Poly lactic-co-glycolic acid(PLGA), polycaprolactone(PCL), and Polyethylene glycol(PEG) as suitable polymers for producing capsules for sustained slow release of a biologic polypeptide protease inhibitor. This was achieved by designing different uni-axial high doses inhibitor formulations for electrospinning of small drug-like protease inhibitors. All nanofibers were visualized using a Scanning Electron Microscopy(SEM), and their rheological properties were analyzed by a rheometer.

Research showed a correlation between viscosity and the morphology of fibers. As viscosity of the drug-polymer-solvent solutions increased to its critical value, the nanofiber transformed from round bead-like morphology to a stretched droplet and finally into smooth fibers. Rheometer showed PLGA/PEG had a very low viscosity in comparison to PEG/PCL formulations, confirmed with more beads in the PLGA/PEG images

Literature shows that randomly aligned, bead-free, and very porous electrospun fibers are best for slow drug release. SEM imaging of the study showed formulations with PEG/PCL as more porous with minimum beading, making it a good candidate for low dose release of our encapsulated protease inhibitor. Next, release kinetics studies will be performed using high-performance liquid chromatography(HPLC) to optimize formulations before in vitro studies.

Factors Affecting the Readmission Rates and Health Care Costs of Patients Hospitalized with Schizophrenia: Non-Adherence to Treatment and Increased Relapses

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Non-adherence to medication and outpatient follow-up care are recognizable problems and may be the most challenging aspect of treatment in patients with schizophrenia. Interventions to improve adherence include psychosocial therapy and education, offering and beginning antipsychotic long-acting injections, electronic reminders, service-based interventions, and financial support systems. However, it is difficult to measure the standard of adherence to treatment, as some of the interventions are not applicable to most patients. We conducted a literature review focusing on related topics published from 2014 until 2019 using PubMed and CINAHL searching tools. Other mental health disorders were excluded from our search to avoid confounding the results. The results showed a reduction in hospital readmission in patients who were taking long-acting antipsychotic injections and had supervised outpatient follow-up care as well as participating in psychosocial therapy when compared with the rest of the patients who did not receive long-acting injections or outpatient follow-up clinics.

Structure Matters: Pegylated Monoclonal Antibodies Models Aided Using Predictive Protein Structural and Deep Learning Tool AlphaFold 2

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Resources within the structural biology community have unfolded within the last fifty years with the Protein Data Bank (PDB) being one of the most used open access databases. This investment into the future was crucial for the creation of the deep learning algorithm of AlphaFold2. AlphaFold 2 incorporates neural network engineering and training logistics based on developmental, physical, and geometric constraints of protein structures. This system collectively embeds multiple sequence alignments (MSAs) and pairwise features to facilitate and precisely project the 3D coordinates of the heavy atoms using the amino acid sequence and aligned sequences of homologues as inputs to predict the highly accurate protein structures. The advantageous use of AlphaFold2 has given us the ability to enhance our molecular design of pegylated trastuzumab, pegylated pertuzumab, and breast cancer related cell line (SK-BR-3 and BT474) HER2 receptors and specific domains. The use of these preliminary models will be for future studies to analyze binding interactions between different pegylated bioactive agents. These drug delivery methods represent the creation of a bright future with the use of Artificial Intelligence (AI), particularly in the understanding of the structural biology and structure function relationships between pegylations.

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

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Mucus is the gateway of pathogens inside the body. Mucus consists of glycoproteins called mucins which are rich in sequences of sugars commonly referred to as O-glycans. Since pathogens like viruses are also covered with sugars, any adhesion between the sugars on virus and mucin will modulate the former transport through mucus and into the host. To understand the rules of sugar-mediated adhesions between mucin-mucin and mucin-virus, the terminal sugars on mucin were cleaved with exoglycosidases at acidic pH and changes in aggregation tracked with Dynamic Light Scattering. The goal of this study is to determine if the acidic pH itself induced aggregation in mucin that was indistinguishable for sugar-induced adhesion effects. A pH titration study was performed on commercial mucin and the time-scale of mucin aggregation changes was tracked at different pH as well as the reversibility of the resulting aggregation effects when the pH change is neutralized. Results showed that mucin aggregates below pH 5, though the time scale of aggregation was slow for a narrow range of pH around 4.5. All pH induced aggregation was reversible as long the pH remained above 3. Our studies indicate that mucin aggregation by pH can be distinguishable by its reversibility from mucin aggregation facilitated by sugar-sugar adhesion.

Investigating the biophysical role of high mannose glycans using replication-deficient pseudotyped HIV as a model system

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The surfaces of cells and viruses are covered with short polymers of sugars known as glycans. These surface glycans are likely to be the first contact of viruses with host cells before stronger interactions with receptors facilitate viral entry into cells, and which may provide stealth against detection by receptors in the immune system. High mannose glycans are found on a number of pathogens such as HIV, SARS, Ebola virus, and several other pathogens. Our overall goal is to understand the biophysical mechanisms by which high mannose residues modify and protect biological surfaces and the reasons for their abundance on pathogen surfaces. To facilitate the research objective, replication-deficient HIV was pseudo-typed with gp120 proteins and produced in HEK cells. The specific aim of this study is to determine if the HIV produced in non-native producer cells is also enriched with high mannose glycans. The innovative aspect of the experiment methodology is using Dynamic Light Scattering (DLS) to map the glycan composition from the difference between DLS correlation curves produced by aggregation in virus-media-lectin and media-lectin solutions. Atomic force microscopic imaging was used to confirm if the changes in the DLS correlation curves indicated virus-lectin complex formation. Results of the mapping study indicate a predominance of high mannose glycans on HIV despite being produced in HEK cells. Other terminal glycans are present to significantly less extent. The findings suggest that

HIV produced in HEK cells is a good model for studying the protective biophysics of high mannose glycan shields.

Comparative study of disease categories: Electronic Health Records Interrogation

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Background: Although the advancement of electronic health records (EHRs) utilization in clinical research may allow for feasibility studies, and identify patients who are eligible for enrollment in clinical trials, it is a complex process to conduct clinical and translational research studies by merging data from different EMRs. However, it is imperative to note that leveraging EHRs to counterbalance these challenges is an area of intense interest and data sharing from hospitals may enable clinical research with large samples for a moderate or large effect size. To inform this issue, we worked across urban hospitals with data extracted from different systems, for patients diagnosed with diabetes and myocardial infarction, in the year 2013.

Method: Using ICD 9 codes for diabetes (25000) and myocardial infarction (41000), data were extracted from urban hospitals. It is important to note that ICD 9 was used instead of ICD 10 because one of the hospitals had an already existing dataset extracted from EHR using ICD 9.

Results: Patients discharged in 2013 from the selected urban hospitals with MI, were 3.8 times more likely to die while in admission and 4.2 times in MI+DM patients. Variables that impacted this critical result were age of the patients, followed by low density lipoprotein, systolic blood pressure and body mass index.

Conclusion: Comparative studies for preliminary studies through EHR interrogation is the future. This project has confirmed that similar studies should be encouraged and may lead to preventive health education that may ultimately prevent higher mortality rate in certain population.

Factors Influencing the Mortality Rate of Patients Admitted with Chronic Disease in Urban Hospitals in DC Metropolitan Area: EHR Big Data Analysis

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Background: Chronic disease is the leading cause of deaths worldwide. Lifestyle choices, such physical inactivity, poor nutrition, inadequate stress management, alcohol abuse, and tobacco smoking, are the major contributors for chronic disease development. Approximately 75% of Americans aged 65 or older suffer from more than one chronic disease, with the most prevalent combination being hypertension (HTN) with type 2 diabetes mellitus (T2DM), or Cardiovascular disease (CVD). However, the inability to effectively use electronic health records (EHR) to garner large clinical data on the prevalence and the factor that affects chronic diseases and their associated outcomes have been reported. We collaborated with a research institution located in the Washington DC metropolitan area to gain access to urban hospitals' datasets to extract unidentified data.

Method: One thousand inpatient data were extracted from 2014-2015 urban hospitals data warehouse using ICD-9 codes: 25000 for diabetes and 41000 for myocardial infarction. The data extraction design was purposely selected accordingly.

Results: A reduction in mortality rate (4%) was noted from 2014 to 2015. BMI, DBP, PP, glucose and AIC levels were all statistically significant across the disease categories ($p < 0.001$) with HDL significant ($p < 0.05$) for only 2014 but ($p > 0.253$) for SBP in 2015.

Conclusion: Access to enhance the use of readily available EHR data in future clinical research is new and involving. This innovative research method would enable future biomedical investigators to have access to available data than years of waiting for bed side data collection for pilot or population research.

The Genetics of Iodine Transformation by Pseudomonas mosselii

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Background: Iodine moves from aquatic, terrestrial, and atmospheric systems via biogeochemical cycling. Although researchers recently discovered bacteria that transform iodine, the genetics controlling iodine transformation in these microorganisms is unknown. Here, we present work that will eventually lead to the identification of the genes responsible for this activity in a Pseudomonas mosselii AD6 (AD6), a bacterium capable of iodine transformation that was isolated from the Hanford Site (Richland, WA), which is contaminated with radioactive iodine.

Methods: AD6 was made competent and transformed with a commercially available transposome kit. After PCR screening verified transposon insertion, a 10,000-member library was arrayed and subjected to iodide oxidation assays to determine loss of function. Disrupted genes in mutants of interest were amplified using random amplification of transposon ends PCR and submitted for sequencing. Sequences were then subjected to blastx for preliminary determination of gene functions. Additionally, a fosmid library was constructed with AD6 DNA in the pCC2FOS vector in Escherichia coli as the host. The library was arrayed and assessed for increased ability to oxidize iodide.

Results and Conclusion: <1% of transposition mutants consistently displayed decreased iodine oxidation, while ~3% consistently exhibited increased transformation. Initial findings indicated that the detected genes play diverse roles in cell physiology. Fosmid library analysis is ongoing. This work will increase our understanding of the mechanism(s) used by subsurface bacteria to transform iodine and participate in global iodine cycling, and contribute to ongoing bioremediation efforts.

Optimization and Characterization of Condensed DNA Nanocontainers having Protein Cargo

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DNA becomes compacted or 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 nano shells 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. The parameters that were varied for optimization were the ratio of DNA to polymer in the formulation and the media for transfection along with other parameters. The metrics for optimization were transfection efficiency, protein stability, and cytotoxic effects. BSA-TRITC protein and GFP DNA along with GFP protein and mCherry DNA were used to create the nanoshells. Transfection efficiency and cytotoxicity were tracked using fluorescence microscopy, 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. There was no aggregation of the particles observed in serum media. Well defined nanoparticles formed only within a range of DNA:polymer ratio. Optimization of the platform and generalizing it for various protein types will enable co-transfection of protein and DNA to become routine in molecular biology research.

Fructose Intake and the Risk of Nonalcoholic Fatty Liver Disease : A Systematic Review

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Background: Non-alcoholic fatty liver disease (NAFLD) is increasing in adults and adolescents living in the United States over the past 20 years. An excessive intake of fructose has convincingly been shown to increase fat accumulation in the liver. However, there is an ongoing debate on whether fructose plays a role in developing NAFLD. This paper aimed to study the relationship between fructose intake and NAFLD. Methods: This systematic review was conducted on PubMed, and Science databases to examine the association of fructose and the risk of NAFLD during the period September 2021 to March 2022. Studies of any design in individuals' (≥6 y of age), peer reviewed, published in the English language between 2011 and 2021 were included. Studies that did not meet the inclusion criteria were excluded from this review.

Results: Among 822 articles, 11 studies have met the criteria and were included in this review. Among the 11 studies, 6 observational and 5 trial studies were included. Three observational and three trial studies showed an association between fructose intake and the risk of NAFLD.

Conclusion: There is might a relationship between fructose consumption and the risk of NAFLD. However, the available data is not adequately robust to conclude the relationship between fructose and the risk of NAFLD. More studies with long-duration intervention design are needed to find the association between fructose and the risk of NAFLD.

Keywords: Non-alcoholic fatty liver disease, fructose, high fructose corn syrup, systematic review.

Optimization of Nanoparticle Size for Improved Drug Delivery to Tumors in Cancer Therapy.

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One of the challenges associated with the clinical use of polymeric nanoparticles for cancer chemotherapy is the inability to consistently obtain particle sizes <200nm. Reports show that smaller nanoparticles can penetrate better into tumors than larger nanoparticles. Also, larger particles are more readily taken up by cells of the mononuclear phagocyte system. Hence, it is imperative to develop stealth nanoparticles of optimal size for clinical applications. The goal of this study is to fabricate a stealth nanoparticle formulation optimized to minimize particle size for targeted drug delivery.

The fabrication of the PLGA-PEG nanoparticles was done using oil-in-water (o/w) emulsification method. Screening of formulation and process factors that impact particle size was done using the one-factor-at-a-time technique. This was followed by using full factorial statistical experimental design to screen for important factors and the interactions that determine and predict particle size. Using Minitabβsoftware, a 24 full factorial design was set up and the particle size data was used to generate a model for predicting and optimizing particle size to maintain batch to batch consistency. Backward elimination was used to improve the model. The fabricated stealth nanoparticles were characterized using transmission electron microscopy (TEM) to show the structural morphology and by dynamic light scattering (DLS) to determine the hydrodynamic particle size.

The predicted particle size from optimization studies was 168.333nm while the experimental data shows a mean particle size of 169.1nm. This result shows that the data fit the model and the nanoparticle size obtained is suitable for cancer treatment.

Exon 8 of ETR-1 is required to achieve full reproductive potential in C. elegans hermaphrodites

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Background: RNA binding proteins (RBPs) are key regulators of gene expression and play essential roles in animal development and survival. The eukaryote CUG-BP, Elav-like family (CELF) of RBPs regulates several RNA processing steps and dysregulation of CELF-mediated processes is implicated in numerous human diseases. In the nematode Caenorhabditis elegans the ELAV-Type RNA-binding protein, ETR-1, is one of two CELF RBPs. ETR-1 is required for development and a genetic null is early embryonic lethal. RNAi depletion of ETR-1 from the 4th larval stage results in increased germline apoptotic corpses and a reduction in reproductive capacity. The etr-1 deletion mutant, etr-1(tm6221), is homozygous embryonic lethal, and heterozygotes exhibit a 23% reduction in brood. ETR-1 has 19 splice isoforms and we hypothesize it functions in isoform-specific manners.

Methods: 24-hour fertility assays, RNAi, lifespan assays, developmental assays and microscopic analysis.

Results: Further depletion of ETR-1 by treating etr-1(tm6221)/+ hermaphrodites with etr-1(RNAi) results in a 36% brood reduction. Using a new mutant with a premature stop codon in exon 8, etr-1(lq61), we show that ETR-1 isoforms containing exon 8 play significant roles in development. etr-1(lq61) animals exhibit a 66.7% brood reduction, a 21.5% reduced lifespan, and a developmental delay throughout embryogenesis and larval development when compared to control animals.

Conclusion: We show that ETR-1 isoforms A and B, the only 2 isoforms to utilize exon 8, are important for reproduction, development, and longevity in C. elegans, supporting a possible isoform-specific function of ETR-1

Computational Mutagenesis of MERS-Spike Protein

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The recent COVID-19 pandemic has demonstrated the danger that coronaviruses pose to public health. The mortality rates of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and SARS-CoV are ~2-4% and 15%, respectively. However, the lesser-known Middle Eastern respiratory syndrome coronavirus (MERS-CoV) virus has the highest mortality rate, approximately 37%. A key component in the virulence of MERS-CoV is the binding of the spike protein or S-protein to the host receptor, dipeptidyl peptidase 4 (DPP4), which facilitates viral entry. The MER-CoV S-protein binds with the host membrane receptor. We applied a computational saturation mutagenesis approach to investigate the effects of missense mutations in the MERS-CoV spike protein on protein stability and binding affinity with DPP4. We generated 3,876 mutations in the MERS-CoV spike glycoprotein and found that most of these mutations would decrease the stability of the overall S-protein. However, most of the mutations generated in the spike protein had a neutral effect on the binding affinity of the MERS-CoV-spike for its host receptor. We analyzed N-linked glycosylation sites within the MERS-CoV spike receptor-binding domain (RBD). We found that many mutations in these sites were predicted to decrease the overall protein stability of the S protein. Additionally, we generated mutations in the DPP4 and identified several residues that contribute to the binding affinity of the MERS-CoV-2 spike for the DPP4 receptor, including three human variants that have been associated with reduced host entry. These results will provide insight into the S-protein and may be useful in developing vaccines.

Cardiovascular Disease in African-Americans: Health inequities and their consequences; A systematic Review:

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Introduction: Cardiovascular disease is one of the most lethal diseases in the United States accounting for a staggering 1/3 of deaths. African Americans are predisposed to several conditions such as hypertension, arterial stiffness, obesity, and diabetes; which are precursors to CVD. These factors occur younger in African Americans, making the life expectancy shorter than other ethnicities. Black men are 70% more likely to develop heart failure than their white peers and black women are 50% more likely to develop heart failure than their white peers. There is a great need for a CVD risk factor intervention catered to African-Americans.

Methods: It would be beneficial to do a case study on the availability of the nutritious foods in given African-American communities to assess nutritional status. Using this information, significant nutrition interventions would help to reduce the risk of obesity and diabetes, lowering the overall incidence of cardiovascular in African-Americans.

Outcome: With proper nutrition interventions the risk of CVD precursors; hypertension, obesity, diabetes, and arterial stiffness, the incidence of CVD could be greatly decreased. Due to cultural barriers a program specifically catered to African Americans would help to mitigate historical gaps. Additional research should be conducted on the historical events that could affect the nutritional status of African Americans in the US.

Expression of Glutamate Receptor Subunit Genes in Neurons Involved in Pre-pulse Inhibition

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Glutamate receptors have been proven to play a major role in prepulse inhibition in patients with schizophrenia and patients with Autism Spectrum Disorder (ASD). It is important to understand this mechanism to provide proper treatments enhancing patients' escape behavior, which is impared in these patients. Glutamate receptors are activated by the excitatory neurotransmitter L-Glutamate. This receptor is composed of two classes: metabotropic and ionotropic receptors. Ionotropic glutamate receptors include AMPA, NMDA, Kainate and Delta receptors. Functions of these receptors include responsibility for basal excitatory synaptic transmission, long-term potentiation (LTP), long-term depression (LTD), and other mechanisms of memory and learning. We examined the expression of subunit genes in these receptors in statoacoustic ganglion neurons which are critical for prepulse inhibition. It was found that several different types of glutamate receptor subunit genes are well expressed in anterior statoacoustic ganglion cells. Of the 43 genes examined, 11 genes exhibited evidence of alternative splicing. The NMDA receptor subunit genes included grin1a, grin1b, grin2bb, and grin2ca and the Delta subunit genes included grid1a and grid1b. The Kainate receptor subunit

genes included grm4 and grm8b. Furthermore, several of these genes were highly expressed in anterior statoacoustic ganglion cells. Grin1a, grin1b, grik2, grm4, grm8b, grid1a and grid1b were all highly expressed. This data shown here will be important for future work and in knowing the magnitude of how these genes are expressed in combination of alternative splicing events will aid in gene targeting. Ultimately, we will hope to see behavioral phenotypes in genetic alterations made.

Isolation and characterization of phage Funsized

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Bacteriophages are viruses that infect bacteria. In this study, we present a mycobacteriophage Funsized, a phage that infects members of the genus Mycobacterium that is being studied in Howard University's SEA-PHAGES program. Phages that infect this host are important to study because of the close phylogenetic relationship between Mycobacterium smegmatis and Mycobacterium tuberculosis, which causes the disease tuberculosis. The aim of this project was to explore phage diversity through isolation and characterization of mycobacteriophages from soil samples collected on Howard University's campus. Almost all the phages that were isolated were derived from an enrichment culture using the host Mycobacterium smegmatis (mc2 155). They were subjected to purification, high titer lysate generation, and DNA isolation. The genome of Phage Funsized was one of four sent for sequencing. The Funsized genome was determined to belong to subcluster B9, and a Siphoviridae. Further, the genome has 71,351 base pairs and a G-C content of 70.2%. Currently, the genome is being annotated using PECAAN with a cutoff E-value of 10e-4 used for HHpred and BLASTp evaluations. Starterator, Glimmer, and GeneMark are being used to call starts. As of now, there are only four other sequenced and verified members of the B9 subcluster in the Actinobacteriophage Database. Acquiring and understanding genomic information from a wide variety of clusters, including those that are currently underrepresented, will help to further the study of bacteriophages and assist in our understanding of the evolutionary mechanisms by which bacteriophages

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Time-Dependent Differences in Pain Assessments After Orexin Receptor-1 Antagonism in HbAA-BERK and HbSS-BERK Mice

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Data suggest that Orexin–A neuropeptide has an analgesic effect on inflammatory pain upon binding the orexin receptor-1. It may also affect mechanisms underlying the maintenance of hyperalgesia associated with neuropathic pain. Our previously published study demonstrated topographical differences in activation of orexin neurons in a mouse model of sickle cell disease (SCD). Those data suggest that subpopulations of orexin neurons are preferentially recruited during behavioral assessments for hyperalgesia. We seek to determine whether there are differences in pain assessments after orexin receptor-1 antagonism (SB-334867) in sickle mice that express exclusively (99%) human sickle hemoglobin (HbSS-BERK) and age-/gender-matched controls (HbAA-BERK).

Female transgenic HbSS-BERK and HbAA-BERK mice (n = 6/group, 20-30g) are habituated to each test protocol for thermal/heat, cold, and mechanical hyperalgesia. Behavioral assessments are recorded.prior to SB-334867 (20mg/kg, IP), 1 h, 24 h, and 48 h post-injection. Preliminary analyses show significant time-dependent differences in heat latency after SB-334867. Mean heat latency for HbAA mice was not significantly different between the various time points(p-value=0.103). Mean heat latency for HbSS mice was significantly different between time points (p-value=0.004) and post-hoc tests showed significant differences between pre-SB vs. postSB 1h ($p<0.05$) and 1h after SB-334867 vs. 48h after SB-334867 ($p<0.05$). Statistical analyses are underway to determine time-dependent differences for cold and mechanical hyperalgesia.

These findings suggest differential orexin receptor responsiveness in HbSS mice vs. HbAA mice. These data may provide a mechanism for the increased hyperalgesia in HbSS mice, which contributes to neuropathic pain observed in SCD.

Multiscale Study of Hydration, Salt Resistance, and Antibiofouling of Zwitterionic Materials

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Biofouling is a global problem caused by the gradual attachment of biomolecules and microorganisms, such as proteins, barnacles, and algae, to a submerged surface. For example, it increases the hydrodynamic drag on marine vessels' sailing, decreases the membrane's performance in water treatment, and causes immune responses in drug delivery. Developing a biocompatible and biofouling-resistant coating is essential to minimize the biofouling effects. Zwitterionic polymers are promising candidates to this end due to their electrostatically driven strong hydration. Experimentally, the antibiofouling property of zwitterions increases as the zwitterionic separation decreases. Employing quantum-based ab initio molecular dynamics and atomistic molecular dynamics simulations, we investigate the hydration of zwitterions of varied molecular structures. We further study their strong hydration's assumed origin, including the noncovalent interactions between the zwitterions and their solvent waters, using symmetry-adapted perturbation theory. Our simulations show that the zwitterionic-hydration is varied with the separation distance of oppositely charged moieties, and the induction interaction with hydrogen-bonded water plays a critical role. Our studies also revealed the mechanism of salt-resisting antifouling efficacy of the zwitterionic material, Trimethylamine N-oxide (TMAO).

Adhesion Kinetics for Staphylococcus Aureus during the biofilm evolution

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Bacterial adhesion on surfaces is the first step in the biofilm formation process. The ability of most bacteria to grow within structured microbial communities called biofilms is one of the major causes of antimicrobial resistance against antibiotics. Biofilms can withstand antibiotic dosages of up to 1000 times higher than they could resist as planktonic cells and are also associated with biofouling, where microorganisms attach to surfaces and reduce the performance of machines.

These aggregates of bacteria are mostly found in wet environments and develop under hydrodynamic stress. Thus, in order to further our knowledge of the biofilm formation process, it is vital to understand how bacteria adhere to surfaces under hydrodynamic forces. For the purpose of this study, Staphylococcus aureus planktonic cultures are first grown overnight in TSB without dextrose broth and then observed for cell adhesion under hydrodynamic stress using a BioFlux 200 system. Data from the study will show how cell concentration and shear stress affect bacterial adhesion over time and help develop a working kinetic model for bacterial adhesion in the early biofilm evolution stages.

The success of this project may lead to improved understanding and control of bacterial adhesion and biofilm evolution. This may ultimately lead to novel diagnoses and treatment methods for global challenges caused by biofilms.

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Application and Match Rates in the Surgical Oncology Match

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ABSTRACT: Purpose: The Society of Surgical Oncology sponsors the Surgical Oncology Match (SOM), which appoints general surgery residents into Complex General Surgical Oncology (CGSO) Fellowships. The purpose of this study was to understand trends in applications and match rates in the SOM.

Methods: The National Resident Matching Program provided applicant and program data from the SOM (2014-2021). Chi square tests elucidated temporal trends and compared the percentage of unfilled spots by applicant archetype.

Results: The annual number of applicants decreased from 103 to 90 (13% decrease) while the annual number of fellowship positions increased from 56 to 67 (20% increase) from 2014-2021. The annual percentage of applicants that did not match decreased from 46% to 26% ($p<0.05$). U.S. Allopathic graduates had higher match rates than non-U.S. Allopathic graduates, but this disparity narrowed over time. Approximately half of all applicants matched at their top three choices (1st – 29%, 2nd – 12%, 3rd – 8%). Applicants matching at one of their top

three choices increased from 36% to 50% ($p<0.05$). Only two positions went unmatched over the study period (0.4%).

Conclusions: Match rates in the SOM have increased over the past decade. About half of all applicants match at one of their top three choices for CGSO fellowship. More research is needed to understand disparities in match rates by applicant and residency program characteristics.

Prediction of the effects of missense mutations on human Myeloperoxidase protein stability using in silico saturation mutagenesis

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Myeloperoxidase (MPO) is a heme peroxidase with microbicidal properties. MPO plays a role in the host's innate immunity by producing reactive oxygen species inside the cell against foreign organisms. However, there is little functional evidence linking missense mutations to human diseases. We utilized in silico saturation mutagenesis to generate and analyze the effects of 10811 potential missense mutations on MPO stability. Our results showed that ~71% of the potential missense mutations destabilize MPO, and ~8% stabilize the MPO protein. We showed that G402W, G402Y, G361W, G402F, and G655Y would have the highest destabilizing effect on MPO. Meanwhile, D264L, G501M, D264H, D264M, and G501L have the highest stabilization effect on the MPO protein. Our computational tool prediction showed the destabilizing effects in 13 out of 14 MPO missense mutations that cause diseases in humans. We also analyzed putative post-translational modification (PTM) sites on the MPO protein and mapped the PTM sites to disease-associated missense mutations for further analysis. Our analysis showed that R327H associated with frontotemporal dementia and R548W causing generalized pustular psoriasis are near these PTM sites. Our results will aid further research into MPO as a biomarker for human complex diseases and a candidate for drug target discovery.

Bioinformatics Analysis of Coronavirus Spike and Human Receptor Proteins

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The emergence of the pathogenic of pathogenic coronaviruses, including SARS-CoV-2, SARS-CoV, and MERS-CoV are serious threats to global health. The receptor-binding domain (RBD) of spike (S) glycoprotein protein directly interacts with the human ACE2 on the host cell's membrane. In this study, we applied the computational saturation mutagenesis including the structure-based energy calculations and sequence-based bioinformatics tools to quantify the systemic effects of missense mutations on the protein structure and function. A total of 18,354 mutations in SARS-CoV-2 spike protein were analyzed and we discovered that the majority of these mutations could destabilize the entire S protein and its RBD region. The experimentally verified spike variation D614G in 5,703 virus strains can stabilize SARS-Cov-2 entire spike protein. Moreover, we showed that most mutations in N-linked glycosylation sites can increase the S stability. In addition, we investigated SARS-CoV-2 RBD 3,705 mutations and human ACE2 11,324 mutations and found that the mutations located in the interface of RBD-ACE2 complex can alter its binding affinity. Interestingly, SARS-CoV-2 neighbor residues G496 and F497 have different effects on RBD-ACE2 binding and ACE2 contact residues D355 and Y41 are critical for this protein-protein interaction. In addition, we applied similar approaches to investigate the effects of S mutations in MERS-CoV and SARS-CoV on protein stability and virus-receptor interaction. The analysis is critical for understanding the roles of coding mutations on viral pathogenesis and can provide potential target sites in the development of drugs against COVID-19.

The case of obstructive Jaundice

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The purpose of this case report is to examine the thorough differential diagnosis list in a patient presenting with jaundice and to analyze the etiology of the laboratory data of a patient with jaundice. In this report, we will discuss a patient with clinical symptoms and laboratory findings of obstructive jaundice. In conclusion, in spite of the potential barriers to care many patients experience, this case shows the medical and surgical management of biliary strictures; as well as suggests a potential area for preventing strictures in patients with chronic pancreatitis.

Activation of Calcium-Activated Chloride Channels Suppresses Inherited Seizure Susceptibility in Genetically Epilepsy-Prone Rats

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Inherited seizure susceptibility in genetically epilepsy-prone rats (GEPR-3s) is associated with increased voltage-gated calcium channel currents suggesting a massive calcium influx resulting in increased levels of intraneuronal calcium. Cytosolic calcium, in turn, activates many processes, including chloride channels, to restore normal membrane excitability and limit repetitive firing of the neurons. Here we used EACT and T16Ainh-A01, potent activator and inhibitor of calcium-activated channels transmembrane protein 16A (TMEM16A), respectively, to probe the role of these channels in the pathophysiology of acoustically evoked seizures in the GEPR-3s. We used adult male and female GEPR-3s. Acoustically evoked seizures consisted of wild running seizures (WRSs) that evolved into generalized tonic-clonic seizures (GTCSs) and eventually culminated into forelimb extension (partial tonic seizures). We found that acute EACT treatment at relatively higher tested doses significantly reduced the incidences of WRSs and GTCSs, and the seizure severity in male GEPR-3s. Furthermore, these antiseizure effects were associated with delayed seizure onset and reduced seizure duration. Interestingly, the inhibition of TMEM16A channels reversed EACT's antiseizure effects on seizure latency and seizure duration. No notable antiseizure effects were observed in female GEPR-3s. Together, these findings suggest that activation of TMEM16A channels may represent a putative novel cellular mechanism for suppressing GTCSs.

African American Maternal Health Crisis During COVID-19: Scoping Review of Strategies and Clinical Interventions

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PURPOSE: The ongoing COVID-19 pandemic exacerbated the inequities of the African American maternal health crisis and made the United States' health care system deficiencies visible. This scoping review is to examine the literature regarding African American mothers already affected by health disparities during the pandemic.

METHODS: Arskey and O'Malley's (2005) framework was used to guide a scoping review conducted in five stages: 1) identifying the research question; 2) reviewing relevant studies; 3) selecting studies to be included in the review; 4) charting the data; and 5) collating, summarizing, and reporting the results.

RESULTS: The findings revealed while few studies featured African American women, many mothers faced pandemic-related challenges. These challenges were sometimes offset by community and institutional support services. Maternal depression and anxiety increased and were associated with several factors including perceived risk of getting the virus, high levels of economic stress, relationship distress, and lower social support. New mothers reported increased feelings of loneliness, uncertainty, and stress related to feeling unprepared for birth. Mothers also felt robbed of the joy of motherhood. Expanding the scope of telehealth to include doula support, prenatal risk assessment, postpartum depression screening, and childbirth education may reduce health disparities during the pandemic and beyond. Additionally, community-based doulas play a role in ameliorating racial disparities in birth outcomes.

DISCUSSION/CONCLUSION: Mental health concerns and social and economic impacts of the pandemic were elucidated. Support services such as telehealth and community-based doulas may improve outcomes for African American mothers during the ongoing COVID-19 pandemic and beyond.

SNAP Education, Food Insecurity, and Low Income Populations: A Systematic Review

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Introduction: The Supplemental Nutrition Assistance Program- Education (SNAP-Ed) is the nutrition education component of SNAP. Research shows that health outcomes that children may face as a result of food insecurity range from birth defects, anemia, lower nutrient intakes, cognitive issues, and aggression and anxiety. They also have a higher risk of being hospitalized and just poorer health overall. Nonsenior and senior adults both are more likely to face lower nutrient intake and mental health problems and depression. Non-Senior adults also have a greater chance of dealing with hypertension, diabetes, hyperlipidemia, and worse health outcomes (Gunderson, 2015). Education can play a vital role in lowering the impact of food insecurity and lack of knowledge. Thus, the goal of this research is to identify interventions that have or can be useful in lowering the impact that food insecurity has on low income households.

Methodology: This project analyzes SNAP-Ed articles that were found through databases such as MEDLINE, PUBMED, JSTOR, OVID, and Wiley Online Library. The keywords utilized were : SNAP-Ed Impact on Food Insecurity, SNAP-Ed impacts, Food Insecurity, SNAP-Ed Health Outcomes, Food Insecurity Resolutions, and Nutrition Education. The articles used were dated on or after 2010.

Preliminary Results: During the past 22 years, SNAP-Ed has been focused on educating and gathering information on whether education had a significant impact. To this point, SNAP-Ed can have a significant impact on low income households' eating habits and nutrition knowledge, which, in turn, leads to better health.

A Case of Metastatic Anaplastic Thyroid Carcinoma After Total Thyroidectomy

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Background: Anaplastic thyroid carcinoma is the rarest and most aggressive of all thyroid cancer types, having a mean survival of 6 months. It accounts for about 1-2% of all thyroid malignancies and likely arises from a prior differentiated or poorly differentiated thyroid carcinoma. The incidence of this disease has been declining in recent years due to improved management of well-differentiated thyroid carcinomas. When present however, patients most commonly present with a rapidly enlarging thyroid mass with symptoms related to compression such as hoarseness, dysphagia, and stridor.

Case: A 68-year-old female presented with complaint of a painful palpable lump in the right arm. Further workup revealed a soft tissue mass measuring 90 x 64 x 44 mm in the mid to distal right humerus determined to be metastatic carcinoma consistent with metastatic thyroid carcinoma. The patient underwent radical resection of the lesion with complex endoprosthetic reconstruction of the right distal humerus and elbow. Microscopic examination of the resected sample showed an infiltrative, pleomorphic tumor with bizarre nuclei and numerous mitotic figures, positive for cytokeratins and focally for TTF1, consistent with thyroid origin consistent with anaplastic thyroid carcinoma. The patient's medical condition continued to deteriorate due to oligometastatic disease.

Conclusion: This report presents an unusual case of anaplastic thyroid carcinoma that presented as metastatic invasion to bone years after total thyroidectomy and radioactive iodine ablation. Continuing surveillance with blood markers (Tg) or imaging is warranted in patients with tumors that present with more aggressive behavior to identify progression and metastases early.

Biointerfacial Phenomena and Applications

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Understanding biointerfacial phenomena (adsorption, polarization and electron transfer) is crucial to the development of biomaterials and bionanotechnologies. To achieve structure-function design, we apply multiscale simulations (quantum, atomistic and mesocopic) in combination with experiments at the interface between chemistry, physics and biology for applications in biomaterials, biosensing, bioremediation and energy. Two projects will be presented to illustrate how we approach the different aspects of interfacial phenomena and their applications: 1) abiotic-biotic interfacial electron transfer and Redox for applications in bioremediation and bioenergy; 2) antibiofouling zwitterionic polymers. In the first project, our first-principle kinetic Monte Carlo simulations combined with atomistic MD simulations revealed that the interfacial behavior (orientation and structure) of outer-membrane multiple-heme protein of dissimilatory metal-reducing bacteria is key to extracellular ET and redox. In the second project, our multiscale simulations at quantum and atomistic scales revealed the mechanism of zwitterionic polymers' hydration, salt resistant and antibiofouling mechanism.

Nutrition and Attention-Deficient Hyperactivity Disorder (ADHD) in African American Women: A Systematic Review

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Background Attention-deficient hyperactivity disorder (ADHD) is a complex neurodevelopmental disorder characterized by inattentive and hyperactive-impulsive behaviors that negatively impact mental and physical health. The prevalence of ADHD is 0.67-1.42% in White individuals versus Black individuals, 0.22-0.69%, respectively. Recent studies report a higher prevalence of ADHD diagnoses in males versus females; however, women with ADHD are less

likely to be referred for diagnosis and treatment, specifically African American women. Black women are more likely to be overlooked and less likely to receive treatment compared to whites and other minorities. Barriers involved in the lack of care in addressing ADHD in Black women include mental health stigma, negative perceptions of pharmacological therapy, and disparities in care; thus, there is a need for increased screening for ADHD and alternative treatment options as nutrition therapy.

Purpose Increased risk of low consumption of brain-healthy nutrients such as zinc and vitamin D may impact the development and management of ADHD; thus, the proposed study postulates that nutrition therapy could be a promising alternative in managing ADHD symptoms, specifically in Black women.

Method This study employs a systematic review of peer-reviewed articles from 2001-2021 using keywords "ADHD," "African American women," "brain-healthy nutrients and "nutrition."

Major Findings/Conclusion There is a lack of data regarding the diagnosis and treatment in this underrepresented population. Previous studies suggest that barriers to diagnosis and treatment include the perception of medication. Future research requires inclusive data on African American women to examine further the link between nutrition and ADHD.

A Preliminary Analysis of the DDB1 Gene: Genome-Wide Association Studies in African and admixed African American Populations - Is our skin different?

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Skin color variation is one of the most observable traits and is hypothesized to have evolved in response to regional differences in levels of ultraviolet radiation. In dermatology, this approach has been used to identify susceptible variants for skin diseases and single nucleotide polymorphisms associated with pigmentation traits. Many databases are comprised of predominantly European American participants and only few have explored pigmentation variants in descendants of ancestral West African or African American populations. Recent studies have identified both novel and known skin pigmentation variants that are predictive of skin color. Loci in or near SLC24A5, MFSD12, DDB1/TMEM138, and OCA2/HERC2 are significantly associated with skin pigmentation in eastern and southern African populations. Analyses of pigmentation diversity in admixed populations with ancestry from both West Africa and Europe found a significant correlation between levels of African ancestry and dark pigmentation. Still, the variants associated with pigmentation across diverse populations remains largely understudied, with a paucity of literature exploring skin genetic architecture in AA populations. DDB1 functions in DNA repair and is regulated by UV exposure and has been correlated with skin pigmentation, vitiligo, and skin cancer. This gene is associated with pigmentation in Africans with high levels of European admixture. Here, we evaluate the association of DDB1 with African populations, highlight the possible phenotypic variations between African and admixed AA populations, and discuss the advantages of conducting future GWAS in the Washington, D.C. metropolitan area to better understand dermatological diseases that disproportionately affect skin of color patients.

The use of probiotics in managing and improving oral health: a systematic review

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Over 3.5 billion people around the world are impacted by a variety of oral health diseases that include dental caries, periodontal disease, tooth loss, oral mucosal lesions, oropharyngeal cancers, oral manifestations of HIV/AIDS, necrotising ulcerative stomatitis, and oral trauma. Although oral disease is a major public health problem, research in this field is limited in marginalized communities. New research is exploring the use of prescribed probiotics to improve clinical outcomes of oral health. Hence, the purpose of this systematic review is to explore the use of probiotics as an effective, low-cost treatment for oral disease in low income populations.

Methods: A systematic review will be conducted using articles from PubMed and Google Scholar from the past 10 years to determine the effectiveness of administered probiotics in better oral health outcomes in those with poor oral health.
Expected Outcomes: It is expected that this systematic review will provide additional evidence to address chronic oral health in low-income populations. Furthermore, these populations will benefit from the use of probiotics to decrease plaque accumulation and gingival inflammation and increase saliva production which will result in improved oral health.

Effects of Environmental Conditions and Urbanization on Ant Diversity

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In recent years the temperature of the Earth has been gradually increasing. This global issue has affected many biological organisms residing on Earth including ants, a very ectothermic specie that relies on the outside temperature. Ant populations happen to be found in almost all terrestrial habitats across the globe and by studying these tiny creatures scientist are able to gain an insight on the effects of environmental conditions on biodiversity. The Barcoding US Ants is a project that allows citizen scientist to track ant species across the United States. In this research, the diversity of ants was tracked in two Urban areas: Washington, DC and New York to compare the effects of environmental condition and urbanization on ant biodiversity. Two hundred and fifty samples were collected in both urban areas. DNA was extracted using the Chelex method, PCR was used to amplify the COI barcode region and analyzed by Gel Electrophoresis. Successful PCR amplicons were sent to Genewiz, LLC for sequencing to determine the taxonomic identification of the species of ants. Phylogenetic analyses based on the CO1 gene region, for the subfamily Myrmicinar showed that the use of DNA barcodes for estimating community phylogenies can help inform conservation priorities across habitats and landscapes.

Heart Development and Anatomy in p63-/- Mouse Mutants

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Transcription factor p63 is a member of the p53 family of tumor-suppressor genes. P63 is active in a multitude of processes during development such as proliferation, apoptosis, and differentiation. Additionally, p63 is vital for the maintenance and stratification of epithelial tissues throughout the body. Mutations in the p63 gene lead to several autosomal dominant syndromes such as Ectrodactylyl-ectodermal dysplasia cleft, Ankyloblepharon-ectodermal defects-cleft lip/palate (or Hay-Wells syndrome), and Acro-dermal-ungual-lacrimal-tooth. These syndromes have various combinations of limb malformations, orofacial clefting, and ectodermal dysplasia, and increased risk of congenital heart defects. A model of human disease, p63-/- mutant mice show a characteristic phenotype highlighted by epithelial defects, including facial clefts and the absence of limbs. Both the ectodermal and endodermal epithelia influence the formation of the heart throughout early embryonic development. Within this study, we aimed to analyze heart morphology and histology in p63-/- mice between developmental stages E16 and P0. Our findings show that P0 p63-/- mutants possess several cardiac abnormalities, including dilated cardiomyopathy, thin ventricular walls, and abnormal ventricular trabeculation. Furthermore, we evaluated the appearance of these abnormalities during the mouse development by analyzing development from E16 to P0. This in-depth analysis of heart development and anatomy in p63-/- mutants provides us with a model to evaluate the risk of and the mechanisms underpinning congenital heart defects in humans with p63 mutations.

The impact of Simulation-Based Training on the confidence in performing Cardiopulmonary Resuscitation among Internal Medicine Residents.

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Background: Simulation-based training (SBT) has established its role in preparing medical professionals for situations requiring accurate and timely decisions. Cardiopulmonary resuscitation (CPR) is a life-saving skill formally taught to medical residents. Residents are required to be CPR team leaders and assume any role required. Evidence suggests that SBT significantly improves knowledge and skills in CPR performance. However, providers' confidence gradually declines with time, and most providers lack the confidence to lead CPR with time.

Aim: The study aims to assess the impact of simulation-based training on the confidence in leading CPR and taking on any role needed on the team.

Design: Quasi-experimental

Methodology: The study included thirty-five internal medicine residents from Howard University Hospital, all certified in advanced cardiovascular life support. A three-day workshop with a hands-on SBT exercise was conducted, allowing every participant to lead or play another role in the CPR simulation. In addition, pre- and post-questionnaire surveys were

conducted to assess its impact on their confidence (using a 10-point Likert scale) in leading and assuming other roles on the CPR team.

Results: The average score for performing adequate chest compressions and for being the team leader, respectfully, improved from 7.86 to 8.46 ($P < 0.003$) and 5.34 to 6.91 ($P < 0.001$). Residents' self-confidence survey showed statistically significant improvement in all aspects of training.

Conclusion: SBT improves medical residents' confidence in performing CPR. Considerations should be made to incorporate SBT as part of the formal residency training curriculum to enhance performance and improve patient outcomes.

Improving Intensive Care Unit Nurses' Knowledge on Delirium through a Quality Improvement Initiative in an Inner-City Hospital

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Background: Delirium is a common clinical syndrome observed in the Intensive Care Unit (ICU) with associated increased morbidity and mortality. Despite available guidelines on routine screening, delirium remains underrecognized. Lack of education on delirium and screening tools are significant barriers to delirium screening by nurses. Evidence suggests that education on delirium and screening tools improve nurses' knowledge and confidence in delirium recognition. A prior study at this site revealed that only 32% of nurses were confident with delirium recognition, 19.23% use screening tools, and lack of education as significant barriers to delirium screening.

Aim: The study aimed to increase ICU nurses' knowledge on delirium and validated screening tools to improve delirium assessment.

Design: Quasi-experimental

Setting: Howard University Hospital ICU

Methods: A quasi-experimental design included a one-hour educational session with a ten-question pre-and post-test for twenty-three nurses.

Results: Out of 10 questions, the mean pretest score was 2.9 (95% CI: 2.2-3.6) with a mean post-test score of 7.2 (95% CI: 6.6-7.9). There was statistical significance between the pretest and post-test means with a mean difference of 4.3 (95% CI: 4-5.3, p-value <0.001)

Discussion: This study demonstrates that education on delirium and screening tools improve nurses' knowledge of delirium assessment, as evident by the results.

Conclusion: ICU delirium is a common but preventable syndrome. Nurses will be adequately equipped to prevent and accurately detect delirium for improved patient outcomes with the necessary training. A collaborative effort among all healthcare workers is critical to prevent and manage delirium for improved outcomes.

BUSINESS

Inventory Pooling for Mobile Money Agents in the Developing World

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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.}

Game of Homes: The Impact of Short-Term Rentals on housing availability on Housing Choice Voucher Holders

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The impact of Short-Term Rentals (STRs) on local neighborhood housing outcomes have been the subject of intense and publicized debate amongst market actors in many cities and localities, including the capital of the United States, Washington DC. These housing anxieties are especially heightened in a city with stringent limitations on land and air space. While there is growing literature on the socio-economic impact of STRs on housing prices, neighborhood change and displacement of local renters, this paper contributes foundational research on HCV tenancy in private rental units. I argue that STRs have most adversely impacted the housing stock of voucher dependent household and is increasing exacerbating the housing affordability crisis. I explore the geographic outcomes of inbound revenue flows into Washington DC using eight years of historical Airbnb data. Segmented at the Zip Code level, I measure housing stock lost to tourist-induced gentrification and attempt to quantify the short-term housing displacement experienced by tenant's reliant on subsidized housing in the private market while predicting long-term displacement effects in the local Washington DC housing market.

Lessons on Leadership from Cognitive Dissonance Theory

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Cognitive Dissonance Theory explores the desire to seek consistency between cognitions and the drive to alter one's cognitions when they become inconsistent. In the time since Leon Festinger introduced the theory more than 60 years ago, it has received considerable attention in research and thus has undergone several refinements, expansions, and clarifications over time. Though the theory has several implications for understanding leadership and leader-follower relations, it has not been a dominant theory utilized to understand leadership and leader-follower relations. Thus, in this work, I will provide an overview of Cognitive Dissonance Theory and review its implications for leadership research and practice. I will emphasize what we know from some of the earliest studies on cognitive dissonance theory as well as chart a course forward for future research and practice of leadership.

Can Russians Evade Economic Sanctions Imposed From Invasion of Ukraine? Eastern Caribbean Citizenship by Investment Programs Unintended Consequences

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Financially strapped governments in the Eastern Caribbean have successfully implemented creative revenue streams by adopting nontraditional methods, such as Citizenship-by Investment Programs (CIP), commonly referred to as "passports for sale." The typical CIP offers non-citizens at least two investment paths to citizenship: (1) contribution to a fund which is used to finance various government projects and (2) investment in government approved real estate and/or investment in government approved business projects. The CIP provides island nations with substantial contributions to the government treasuries, real estate development, increased local employment and more recently, funding for the new University of the West Indies fourth landed campus on Antigua. In turn, the CIP provides participant investors and their families with citizenship which grants them visa-free access to at least 140 countries thereby decreasing travel restrictions and, in some instances, taxes on worldwide income. This paper reviews the history, evolution, and impact of these programs on the economies in Antigua, Dominica, Grenada, St. Kitts and Nevis, and St. Lucia. The paper will examine recent changes that the CIP have made or pledged to make to their programs that will impact Russian participation since the Russians invasion of Ukraine started in February 2022. The paper will also analyze selected economic sanctions imposed against Russians by the US and other countries that are designed to disrupt economic activity and isolate Russia from international finance and commerce. Finally, the paper will illustrate loopholes within CIP that can allow Russians to evade some economic sanctions.

Race and Accounting Education

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There has been some movement in the accounting profession to become more accountable around issues of race such PwC's Diversity & Inclusion Transparency report. The American Accounting Association has also developed special issues in some of its journals and created opportunities for people to dialogue about race and racism. Even before the events of 2020, initiatives such as the PhD and Pipeline project have been implemented to attract People of Color (PoC)to the academic and professional field of accounting. While much passion and energy has been spent in advocating for an equitable playing field, more insights are needed into how accounting is taught in the classroom and its role in creating a sustainable DEIB (Diversity, Equity, Inclusive, and Belonging) environment. This study focuses on exploring the underlying beliefs in accounting among instructors and its connection to DEIB. While emphasis is placed on a shareholder-focused perspective among instructors and textbooks, there is evidence to suggest that instructors would appreciate material with a diverse representation of users and an increased focus on values (Ferguson et al., 2010). The aim of this paper is to provide some concrete ways for instructors to diversify their curriculum by gathering responses from instructors around these two questions: what is accounting? and who does it serve? Once their responses are analyzed, the paper will reflect on how to create more inclusivity and belonging in the classroom and the challenges involved in furthering interest in accounting as an equitable field of study among PoC.

US Tax Law and Policy Discrimination Against African Americans: A 400 Year Historical Review (1619-2019)

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This paper will conduct a 400-year historical review of US tax laws and policies, from 1619-2019, that have systematically exploited African Americans: during slavery, the pre/post-Civil Rights era and into the 21st century. During slavery, taxes were imposed on the importation of the enslaved, on slave owners based on the number of slaves owned and by the federal government to finance wars. Many states also imposed poll taxes on each resident. The poll tax on free Negroes were usually more than double that of Whites and were used to restrict African Americans from voting in some Southern states. During the pre/post-Civil Rights era, Internal Revenue Service (IRS) policies promoted racial segregation by granting tax-exempt status to private schools created to evade integration mandated by Brown vs. Board of Education and to neighborhood associations that had racially restrictive covenants that forbade home sales to African Americans. After Brown, some Southern public-school districts shuttered to avoid integration. Before the Fair Housing Act of 1968, many Blacks were redlined and deprived of the benefits of homeownership. These tax policies have a dual effect; not only did they discriminate against African Americans, but they also deprived them of the benefits of taking advantage of the itemized deductions on their tax return thereby reducing their tax liability. US tax policies continue to discriminate against African Americans in the 21st century. In 2015, the 10 most audited counties by the IRS were predominantly poor Black while the 10 least audited counties were predominantly rich White.

CREATIVE ARTS & DESIGN

Art Therapy Education at Undergraduate and Graduate Levels

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In higher education, one critique has been the lack of support for art programs. Historically, there were times when visual art fields were minimized to the production of artwork simply for entertainment. This stance is reflected in the attitudes of some department heads who determine the courses for art majors and professors who teach the curriculum. (Cureau, 1973). However, attitudes are subject to change and the value of art education is reinstated in society. (Stepney, 2019) Expressive art classes are staples in public education. Art therapy, compared to art, has limited accredited programs offered to higher education students. The purpose of this study is to investigate how art therapy is taught at the undergraduate and graduate levels. To conduct this study, we reviewed the list of art therapy programs and their accompanying curriculums. The list was generated from the American Art Therapy Association (AATA) and the Commission on Accreditation of Allied Health Education Programs (CAAHEP). These institutions provide resource lists for students who are interested in applying for art therapy programs. From this list, we identified each program's education level, its core curriculum emphasis (psychology vs. studio arts), the inclusion of multicultural courses, and other key information. Lastly, the program's core curriculum requirements (psychology, studio art based, or an equal amount of credits in both disciplines). Observations from this study will help indicate essential courses to an art therapy program and what aspects need to be broadened. Emerging programs could use this information when developing their curriculum or seeking accreditation.

The Effects of Extreme Weather Conditions on Different Insulation Materials

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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.

Adaptive Architecture for Space Habitation

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The presentation will convey the work from three research areas (territoriality, functionality and mental health) that have led to prototyping for an adaptable space as a test module for other spaces within crewed and non-crewed missions. A three-dimensional hex volume is being developed as a type of adaptable, tessellated module. This work involved the union of diagrammatic use studies, comparative terrestrial and space-bound scale studies and the spatialization of geometries. This component of the project culminates many theoretical

aspects with the merging of the three distinct research projects into a single design idea and physical expression. Once parti development (conceptual design studies) of the ARED module has reached a level that is ready for the design development stage, the goal is to modify the hex design and translate it into other spaces within the vessel (dormitory spaces, workspaces, etc.) that have a common language, but uniquely adaptable features in the vessel. This portion of the project will not only see a development of discrete spaces but begin to explore the physical circulation between them in order to better understand flow and connectivity. This work results from prior test opportunities for nested, collapsible, multifunctional and transformable elements which embrace territoriality theories (robot and human proxemics), responsive architecture, post-Anthropocene architecture and smart systems. The work presented represents the team's progress in year three of the five year grant as part of the Habitats for Optimized Missions of Exploration (HOME) Space Technology Research Institute for Deep Space Habitat Design.

The Effectiveness of Dance/Movement Therapy on Body Image for Adolescents

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The purpose of dance/movement therapy is to meet individuals' psychological, emotional, physical, and social needs through non-verbal communication. Dance/movement therapy has been used as a psychotherapeutic tool for adolescents to evaluate their body image perception. After conducting a literature review, researchers often rely on the definition of dance/movement therapy provided by the American Dance Therapy Association (2009). However, another definition from Levy (1988) describes dance/movement therapy as a movement tool to express individuals' internal and psychological states and enhance their psyche. Both descriptions are interchangeable as they promote the well-being of individuals through movement. This review found that participants who engaged in dance/movement therapy were white female adolescents who attended middle school or high school (Corteville, 2009). Data was gathered through qualitative and quantitative measures and pretest-posttest designs. Researchers conducted interviews and administered questionnaires to measure body image and self-esteem (Corteville, 2009). Participants engaged in dance/movement therapy to improve body image and self-esteem. Post-intervention, another questionnaire was administered to measure how participants perceived themselves and their bodies. Overall, it was found that dance/movement therapy effectively improved body image and self-esteem for white female adolescents (Corteville, 2009). Although data support the effectiveness of dance/movement therapy, research is limited among diverse populations. Research on dance/movement therapy among Black female adolescents has rarely been conducted. It is difficult to report the effectiveness of dance/movement therapy for body image of Black female adolescents. The information gathered from this study will be implemented into future research on dance/movement therapy and body image for diverse populations.

EDUCATION & OUTREACH

Metastatic Pancreatic adenocarcinoma presenting as metastatic Abscess of Liver and Spleen in dialysis patient: a case report

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A 78-year-old male with end stage renal disease on dialysis and hypertension presented for abdominal pain and altered mental status. Physical exam revealed generalized weakness and confusion. Laboratory studies showed elevated liver enzymes and leukocytosis. Computed tomography (CT) abdomen and pelvis showed multiple hypoattenuating hepatosplenic foci with splenomegaly. Hepatitis, autoimmune panel, human immunodeficiency virus, syphilis screen were negative. One set of blood cultures grew Clostridium inoculum. Liver abscesses were drained and grew Escherichia coli. Repeat contrast CT of the abdomen and pelvis showed a large splenic focus suspicious for an abscess. Laparotomy with lavage, splenectomy and liver biopsy were performed. CA 19-9 and CA 125 were remarkably elevated. Pathology report showed pancreatic adenocarcinoma metastatic to spleen and liver. Immunostains were positive for CK7, CK20 and CDX2 suggesting pancreaticobiliary cancer. Peritoneal fluid grew vancomycin resistant Enterococcus faecium. Daptomcyin and ceftriaxone were initiated. CT with pancreatic protocol showed pancreatic tail mass and a lytic lesion on the right acetabulum. The patient was unsuitable for further invasive procedures or chemotherapy. The diagnosis of metastatic pancreatic adenocarcinoma was elusive and only revealed after extensive investigation. It presented atypically with multiple hepatosplenic abscesses. This reminds physicians that elderly patients with multiple hepatosplenic abscesses with elevated tumor markers must be thoroughly evaluated for underlying malignancy including pancreatic cancer. Being a dialysis patient may have contributed to seeding bacteria into metastatic and infarcted foci facilitating development of multiple abscess.

Test-taking anxiety in occupational therapy students: a preliminary report

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Test- taking anxiety (TTA) is prevalent amongst college students with 41% of students reporting they have experienced it. While TTA may help motivate students to learn and study, it may also have negative effects on students such as making them feel fatigued, overwhelmed, and unable to focus. Research has suggested that healthcare students may experience a particularly high prevalence of TTA due to frequent high-stakes assessments in health care programs. One study found that 50.9% of nursing students experience TTA. The aim of this pilot study was to trial a novel questionnaire with occupational therapy students (OTSs) at Howard University to determine if the questionnaire was acceptable, and if TTA was prevalent amongst OTSs. Of the eleven students who participated in the pilot study, 100% reported experiencing TTA, with the most significant concerns being that they felt they were not prepared for an exam or that they had trouble focusing during an exam. When asked to identify the most anxiety inducing types of assessments from a list; 80% of participants identified lab practicals and competencies and 60% identified presentations as the most stressful. 100% of students reported they felt comfortable completing the questionnaire and that the questionnaire was of a reasonable duration. The results suggest that TTA is an issue faced by the majority of OTSs and a further large scale study with OTSs is indicated to better understand how students experience TTA and what faculty and students can due to decrease the negative impact of TTA.

Mental Health Disparities Among Minority College Students

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Mental Disorders—also known as mental health issues—include an array of conditions that affect the daily mood, thinking, and behavior of an individual. Dating back as far as two decades, there has been a report of an increase in the number of students with depression, anxiety, pschiatric illness, substance missuse, and suicidal rates. For minority groups, additional stressors may include racial and ethnic disparities(discrimination), limited availabilty/access of mental health clinicains, and stigmas to seeking psychological help. Therefore, the purpose of this study is to evaluate ways

in which a higher education affects the mental health of minority college students. This study will utilize systematic reviews from databases such as PubMed using the keywords "mental health disorders" "minority" "college students" and "higher education". The articles evaluated will date back ten years(2011-2021) in order to identify health disparities. Surveys will be conducted on graduate and undergraduate students of different ethnicities and race to assess symptoms of mental illnesses. From this study, it will be determined that minority groups will exhibit severe mental illness symptoms such as depression and stress, while also having low rates of psychiatric diagnoses. The prevalence of mental illness in minority groups will reveal a disparity in access to psychiatric care for these minority college students. From this, access to care on campuses should be provided to encourage positive mental health. The results of this study contribute to findings from previous studies in revealing that minorities experience health disparities in the stigma of getting help and access to that help.

School Psychologists' Perspectives and Practices of Social Justice Work

Presenter's Name: Erika Clark
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Previous research shed light on the impact school code of conduct and discipline practices had on Black students' engagement in their schools. Schools that endorse zero-tolerance policies, exclusionary discipline (i.e., suspension and expulsion), and other punitive measures to respond to student behaviors and conflict tend to disproportionately use these strict practices on Black students, which further push them out of schools and increase their contact with law enforcement and juvenile carceral systems. Due to underlying negative biases that adults have about Black students and families, even well-intentioned school-based practices can be harmful to Black students and further push them out of schools. The purpose of this study is to investigate school psychologists' knowledge of and involvement in school discipline procedures, as well as their attitudes towards alternatives to exclusionary discipline.

To better understand school psychologists' attitudes towards alternatives to punitive practices, one must investigate how they view their roles in the schools they provide services to and how they envision themselves implementing social-justice work when delivering services. Since exclusionary school discipline and its alternatives are one of many factors that contribute to positive and supportive school culture and climate for Black students to succeed, school psychologists may find other creative ways to disrupt Black students pushed out of their schools and onto pathways to juvenile carceral systems. Examining the scope of school psychologists' perspectives and practice provides insight into the social justice work they achieve and the barriers they face when implementing and sustaining equity-centered school-based practices.

An Evaluation of the Impact of Academic Policies and Athletic Procedures for Student Athletes

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The current study is an evaluation of the ways academic policies and athletic procedures can impact learning for student athletes as inconsistent practices regarding athletic travel and make-up work can have negative effects on learning for student athletes. A total of 11 participants (i.e., 8 student athletes, 3 faculty members) participated in this qualitative phenomenological study. Chickering's student development theory and Kolb's learning theory framed the current inquiry into (1) the needs of student athletes and the ways they process important information (e.g., policies and procedures) and (2) related faculty guidance, student affairs, and the governing body for athletics, practices, and policies that impact student athletes' learning.

Several themes emerging from the data, including impact/motivation, process/policy, lack of communication, and course difficulty for student athletes and policy, process, and knowledge and understanding for faculty. The themes detected in the data were used to create an intervention that can be used to govern the make-up work process for student athletes, faculty members, athletic administrators, and student affairs professionals.

The Impact of Parental Involvement and Monitoring on Self-Efficacy Among African American 5th Grade Children

Presenter's Name: Leila Fitt
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Parents' level of monitoring and parenting style plays a vital role in young children's behavior. Maccoby and Martin's (1983) categorization of the responsiveness and demandingness of parenting styles has a strong influence on the interactions and standards set outside of parent-child relationships. Additionally, Bandura (1977) emphasized the importance of the four sources of self-efficacy: mastery experiences, vicarious experiences, social persuasion, and emotional states. The goal of this study is to examine the relationship between parent-child relationships and self-efficacy of 5th grade African American children. The study is designed to compare the aspects of parental monitoring and perceived interest/competence in reading, math, and science in young children. It is important to discern within-group differences as we understand factors that contribute to positive learning outcomes in African American children.

The study used data from the Early Childhood Longitudinal Kindergarten Class 2010-2011 (NCES, 2001) to investigate gender differences in mathematics, reading, and science self-efficacy and the impact of parental involvement and monitoring on self-efficacy among African American 5th grade children. Preliminary results revealed that girls (M=3.1) had higher reading self-efficacy compared with boys (M=2.59). Additionally, results from a linear regression revealed that parental involvement was a significant predictor of mathematics self-efficacy (β=-.19, p=.04). Implications for educational policy and additional findings will be discussed.

That's Not Me: A Study of Self

Presenter's Name: Destinee Freeman
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Autoethnography is a research perspective where the researcher is the subject of the study. In this study, my goal is to connect my experiences with the theories of the imposter phenomenon, autoethnography, and teacher studies. I was curious to know and understand how the imposter phenomenon impacted my teaching practices. Specifically, I wanted to explore my ever-changing feelings and behaviors in the classroom and how I treat my students. Descriptive coding was used to categorize feelings and experiences. Keywords and phrases were highlighted and provided with a code that described the underlying feeling experienced. In analyzing the data and looking for patterns, I developed five descriptive codes: Denial, Imposter, Perfection, Failure, and Depression and Anxiety. My research results have shown that my students are negatively impacted when I am experiencing the imposter phenomenon. From this research, I invite others to explore how they can improve their mental-emotional well-being.

Keywords: autoethnography, imposter phenomenon, perfectionism

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Assessing School Psychology Graduate Programs' Admissions Criteria from an Equity Perspective

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The National Association of School Psychologists (NASP) recognizes the increasing need for more racially and ethnically diverse School Psychologists (Miranda, 2014). More than 80% of school psychologists identify as White (NASP, 2020), while the percentage of White students expected to enroll in public schools by 2029 is 43% (NCES, 2020). The current demographic differences between school psychologists and school-aged students in the United States undergirds the importance of recruiting racial and ethnic minoritized (REM) students who bring diverse perspectives and skillsets to the field (Proctor et al., 2014). School psychology recruitment literature outlines the importance of displaying diverse recruitment practices, communicating antidiscrimination policies, providing minority-based financial aid, committing to diverse training opportunities, and displaying faculty with diverse research interests (Biddell et al., 2002). While most of these recruitment practices seem promising, the extent to which school psychology programs implement these strategies is still unknown. Through a systematic collection of data on school psychology admissions criteria (e.g., GPA and GRE requirements, letters of recommendation, written statements, etc.), this study will illuminate systemic factors that prevent access to school psychology graduate programs and provide relevant recommendations to improve admissions processes. With data from the NASP Graduate Program Database, program-specific departmental websites, and a voluntary survey from school psychology program coordinators, an assessment of equity-based admissions practices in school psychology is plausible. The lack of diversity in the field creates a dire need for research assessing admissions criteria and processes that inhibit REM students from applying and getting accepted into school psychology programs.

Examining the Impact of Poor Dietary Habits on the Development of Dental Caries: A Systematic Review

Presenter's Name: Tori Miller
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Introduction: Over 3.5 billion people are impacted by dental caries. Dental caries is linked to systemic health issues, such as; head and neck cancer, children's growth and cardiovascular disease, immune system disease, and other health-related conditions. Researchers indicate that African Americans and non-Hispanic whites are particularly vulnerable to developing dental caries; thus, researchers have focused attention on minority communities. There is low evidence that addresses food insecurity and the lack of nutrition education as it relates to dental caries. Hence, the aim of the study is to analyze available information about the relationship between food insecurity and rates in the development of dental caries and to use this knowledge to summarise the prevalence of dental caries in these communities and to assess the potential social determinants of health in relation to a nutritional diet and behaviors. Methodology: The proposed study will utilize a systematic review with articles from PubMed, Scholar Google, and other peer-reviewed journals within the last 10 years. The purpose of this study is to conduct a systematic review to determine the causes and interventions communicated to minority communities about nutrition and oral health. Preliminary results: Oral health has not improved in the last 25 years, and oral conditions remained a major public health challenge all over the world. Most research studies answer a research question on prevalence and causes based on nutritional assessment. To this point, this study will address public health efforts to address food insecurity and minimize oral health disparities.

The Role of Nutrition in Covid-19 Susceptibility of Disease: A Systematic Review

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Introduction: SARS-CoV-2, the virus that causes COVID-19, is providing unprecedented difficulties. Many nutrients have a powerful impact on the change of the body's immune system in regards to the susceptibility, progression of symptoms, prognosis of severe disease, and probability of survival. The goal of this study was to look at the most recent research on how malnutrition in all of its forms (under- and overnutrition, as well as micronutrient status) can affect COVID-19 susceptibility and development.

Methods: This study compiled data on 13 nutrient-related components and their possible interactions with COVID-19: overweight, obesity, and diabetes; protein-energy malnutrition; anemia; vitamins A, C, D, and E; PUFAs; iron; selenium; zinc; antioxidants; and nutritional support. Searches took place between May 16 and August 11 2020. All original research was considered if it covered: severe acute respiratory syndrome coronavirus (CoV) 2 (SARS-CoV-2), Middle East respiratory syndrome coronavirus (MERS-CoV), or SARS-CoV viruses and disease susceptibility or disease progression, as well as the nutritional component of interest, without regard to study design.

Results: There is currently limited evidence that high-dose micronutrient supplements will either prevent or speed up recovery from severe disease. Clinical trial results, on the other hand, are anxiously anticipated. Given the recognized negative effects of all forms of malnutrition on the immune system, public health initiatives to combat micronutrient deficiencies and undernutrition are still crucial. Furthermore, obesity and type 2 diabetes prevention has been shown to minimize the likelihood of serious COVID-19 outcomes.

The Akoma Project: A Decolonial Process for Black Disabled Students, their Families, and the School-to-Prison Pipeline

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The Akoma Project is an action research process aimed at capturing the stories of directly impacted Black and Brown disabled youth self-advocates and their family caregivers in the District of Columbia. At this stage in the project, we are identifying and analyzing trends that can be remedied via anti-racist and anti-ableist public policy naming that reimagines public safety via seeking data explaining the phenomenon of the school-to-prison often touches on the disproportional representation in rates of school suspensions, expulsions, seclusions, and restraints via Black and Brown disabled children and youth. The Akoma Project aims to provide a qualitative narrative to understand the uniqueness that students receiving special education and related services have when navigating the public school system. By capturing the stories of encounters of those directly impacted within the networks of carceral systems connected students that also follow these so-called at-risk students, their family

caregivers, and the advocates that stand by their side during these tough times, the Akoma Project synthesizes and uses this information from the grassroots and uses the information to reshape the public policy efforts to sharpen the due process protections as students and families navigate our local actualization of "care not cops" via the school-based behavioral health system. We achieve these by working closely with directly-impacted families, organizations, and coalitions.

Closing the Discipline Gap: How Cultural Divides Can Increase Inequality

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The purpose of this study is to examine the discipline gap in high schools and the role that cultural communication issues play in perpetuating this gap. Black students are historically and systematically punished more often and more harshly than their White peers. This study will further examine whether cultural factors could be at play. Data will be collected from recent graduates of high school – college freshmen attending university in Washington, DC – who will answer survey questions about their experience with high school discipline. If a correlation between student-teacher communication issues and school discipline is found, it would expand the current literature surrounding the discipline gap. Teacher-student communication may be reinforced as a driving factor behind issues in student discipline and help further the discourse on this persisting problem. After collecting qualitative and quantitative data through a survey with both open and close-ended questions, several notable findings and trends have emerged. Upon examining the responses between Black and White participants, it can be surmised that they had different experiences in school with regard to discipline and interactions with their teachers. The data provides responses to the research questions that have guided the direction of this research and also adds context to the previous literature on the topic. Additionally, cultural identity theory underscores much of the qualitative and quantitative data that has been collected.

A Deep Examination of the Relationship Between Peer Victimization and Social Anxiety in Adolescence.

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According to Urie Bronfenbrenner (1994), one's relationship with their peer group can have an impact on their development. Peer victimization occurs when children face either indirect or direct aggression from their peers (Hamilton et al., 2014). Since children look for acceptance within their peer group, being rejected can lead to both anxiety and depressive related symptoms as they transition into adulthood (Hamilton et al., 2014). The purpose of this study is to investigate the relationship between peer victimization and social anxiety in children.

The study used data from the Early Childhood Longitudinal Kindergarten class 2010-2011 (NCES, 2001) to investigate the relationship between peer victimization and social anxiety in third, fourth, and fifth grade children. Preliminary results revealed at significant correlation between peer victimization and social anxiety in third grade children (r= .50). Furthermore, third children reported higher social anxiety (M=2.4) compared with fourth grade (M=2.1) and fifth grade (M=2.1) children. Third grade children also reported higher incidences of peer victimization (M=2.2) compared with fourth grade (M=2.0) and fifth grade (M=1.9) children. Implications for policy and practice and additional findings on racial and gender differences will be presented.

Exploring Self-Efficacy Beliefs and Educational Commitment in Post-Secondary Women with Chronic Illness

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Abstract: Recent research demonstrates that college students diagnosed with chronic illnesses experience a wide range of challenges that impact their education. The psychological and emotional effects as-sociated with living with illness influence the way students commit to achieving educational goals. This study aimed to investigate motivational factors among female college students with chronic illnesses in order to understand their impact on the students' ability to continue working towards their educational goals. In particular, the

study at hand focused on females, age 18 and older, who lived in the United States, and have been diagnosed with different types of cancers.

The study utilized a purposive sampling approach, with data collection being comprised of inter-viewed seven female participants. As for its primary methodology, this study used semi-structured interviews, as well as Bandura's theory of self-efficacy for its theoretical lens. A thematic analysis of the data was performed in an effort to examine patterns in students' motivation and experiences. The study found that spirituality and/or religion, along with support from family and friends, was a primary motivator cited by participants. Financial motivators and academic support from students' professors and their peers were also an integral sources of support for the survivors. Students' services and academic accommodations, on the other hand, proved to be less compelling as motivational factors. This study holds many important implications for increasing the rates of completion of college education among women with cancer.

Keywords: breast cancer, motivation, self-efficacy, higher education, self-regulation

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Heart Disease in African American Women: A Systematic Review

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Cardiovascular disease (CVD) is the leading cause of death in African American women. Despite recent improvements, heart disease remains the leading cause of death among black women, with stroke coming in third (NIH). The reasons for the difference may include various individual, programmatic, and environmental influences. Understanding these influences has shown to be pivotal in creating effective prevention guidelines. Thus, the goal of this research is to examine the present state of heart disease in African American women compared to other ethnicities and identify the factors that account for the high prevalence of heart disease among African American women.

A systematic review will be conducted to examine the socioeconomic and environmental factors that affect the rate of cardiovascular disease in African American women. This project utilizes articles from 2010-2022 to provide a holistic review of factors increasing cardiovascular disease in African American women. Its purpose is to provide an in-depth examination to be used in the development of possible nutrition interventions for African American women. Diabetes, smoking, high blood pressure, high cholesterol, physical inactivity, obesity, and a family history of heart disease are all major risk factors for heart disease and stroke in African Americans. Furthermore, when compared to women of other ethnicities, African American women have nearly twice the risk of stroke as Caucasians and are more likely to die at a younger age. A greater understanding of the complexities of African American women's health disparities and culture is needed in order to create effective nutritional interventions.

Effect of Adherence to Mediterranean Diet during Pregnancy on Children's Health: A Systematic Review

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Introduction: The diet during pregnancy impacts the in-utero environment. Maternal nutrition has a large impact onto the foetal growth and development since evidence shows how a well-balanced diet can reduce the odds of having a premature birth. Premature births is the leading cause of perinatal morbidity and mortality. Adhering to a Mediterranean diet can improve pregnancy since maternal diet is an important influencer of a child's health. The goal was to verify the association between maternal adherence to a Mediterranean diet during pregnancy and the child's health outcomes.

Methods: Two investigators searched on electronic databases Medline, EMBASE and Clinical Trials by searching specific key words. There was no restriction regarding the time period or the publication status. The investigators reviewed to ensure there was no papers without full-text in English, as those would be excluded from the search. The investigators also ensured there was no bias to the studies.

Results: 29 studies were used for the analysis and were published between 2008 and 2018. It was found that woman who did not adhere to the Mediterranean diet had decreased intra-uterine size and had lower birth rates when comparing to woman who highly adhered to the diet. In some studies, it showed that adherence to a Mediterranean diet showed reduced risk of early preterm birth. Adherence to Mediterranean diet during pregnancy can positively impact offspring not only in fetal growth but also later in the child's life.

Fruit and vegetables intake in adolescents and mental health: a systematic review

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Introduction: An issue that affects the whole world is mental disorders. 1 in 4 people in the world will be affected by a mental disorder in their lifetime. Acknowledging the possibility of being affected by mental health, there are published studies that show how balanced diets and high intakes of fruits and vegetables lower the risk of mental health issues in adolescents. Fruits and vegetables are important to everyone's diet as they include important nutrients that contribute to the overall health of the body. The studies that were reviewed focused on depression and depressive symptoms but also included an array of characteristics that contribute to a person's mental health. The goal of this systematic review was to look at observational reviews to analyze the association between how much fruit and vegetables a person consumes and if it can promote positive emotions and contribute to better mental health.

Methodology: Two researchers overlooked the studies through PubMed and Web of Science to assess for bias, missing information, and to review the overall quality of the studies. They looked at studies that discussed the amount of fruits and vegetables consumed and the association between the two. Studies published until June 2019 were screened to be included in the search.

Results: After reviewing many studies, it was concluded that fruits and vegetables impact the mental health positively. It is recommended that at least 5 portions of fruit and vegetables be consumed a day as there is evidence that it will positively increase your mental health.

Peer-to-Peer Point-of- Care-Ultrasound Training in Internal Medicine Residency Program: A Pre-Post Pilot study and Quality Improvement Initiative

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INTRODUCTION: Point of care ultrasound (POCUS) is the use of ultrasound by the clinician at the patient's bedside and helps make patient care decisions. POCUS improves diagnostic accuracy and physical examination skills. We discuss a pre-post study using a peer-peer training method on diagnostic POCUS in an internal medicine residency program.

METHODS: A pre-assessment survey was sent to all internal medicine residents (PGY 1-3), n=76, to assess interest, knowledge, and utility of POCUS in patient care practice. Two six-week sessions were held, running from December 16th, 2021, to March 10th, 2022. Six residents in two teams who consented and were able to complete the training sessions were included in the analysis. Instructors included an American college of physicians (ACP) POCUS trained internal medicine resident, supervised by pulmonary critical attending physician and fellows. Pre- and post-session evaluations were sent to participating residents. Each session was divided into didactic, and bedside training, for 2hours.

RESULTS: On the pre-assessment survey, 91.49% of residents reported no training as the main challenge to using point of care ultrasound. Post-session evaluation scores were higher than the pre-session scores. Each of the first team participants taught a session for the second team of participants.

CONCLUSION: The results show that a dedicated peer-peer teaching approach improves sonographic knowledge among internal medicine residents. It is an effective strategy for teaching POCUS to Internal Medicine residents. This approach may allow broader adoption of POCUS in medical education, especially when faculty expertise is limited.

Nonmarriage and Nonprobate

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NONMARRIAGE AND NONPROBATE
Are you or someone you know living with another person in a long-term, committed relationship? The answer is probably yes since one out of every ten couples in the United States has chosen to live together without marriage. But what happens when one partner dies? How is the decedent's property distributed? The answer is less than clear. Unlike marriage, there are very few inheritance laws that deal directly with nonmarriage.

The probate process can be an expensive and lengthy process. Even for those cohabiting adults who have taken the time and expended the money to draft a will, scholars have written cautionary tales warning about the myth of testamentary freedom and being overly dependent on a will. As a result, many adults often pursue nonprobate options where their wishes are less likely to be questioned and more likely to be given immediate effect.

This paper advocates for the advancement of legislative and other regulatory reforms to increase awareness and acceptance of nonprobate options such as payable on death bank accounts, death beneficiary designations for motor vehicles, and transfer on death property deeds. It proposes strategies to make such options more accessible, more understandable, and more widely known to the public to preserve family wealth in diverse relationships without creating imbalance within existing systems.

Effectiveness of Community nutrition education programs in the treatment and prevention of chronic diseases

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Background: Several Studies including a recent Milken Institute study have demonstrated that realistic modifications of diet and lifestyle, driven by effective nutrition education programs, can prevent most chronic disease conditions or delay 40 million cases of chronic illness annually.

Methods: Using Preferred Reporting Items for Systematic Reviews and Meta- Analyses guidelines, 21 databases were searched using variants of keywords, "nutrition education" "effectiveness" "Community-based" "Interventions" "Programs" "non-governmental organizations" and "Chronic diseases". Included studies were written in English; peer-reviewed journals published between the years 2015 and 2021 that report information on effectiveness of nutrition education programs in the United States; and organizations that provide nutrition education.

Results: The studies failed to clearly state if the positive outcomes of the nutrition education programs were sustained over time and programs readily accessible.

Although strategies of the interventions across the reviewed studies were effective in the short term, there were no evidence to demonstrate that the positive outcomes of the nutrition education programs were sustained over time.

The studies showed that more than half of the participants included in the studies completed the first 6 months of the intervention however dropped out of the program before the end of the duration of the program.

Research suggests that the limitations in effectiveness of nutrition intervention are due to myriad social environmental barriers that impede improvement in health-related behaviors.

Conclusion: Although the nutrition education programs were effective, duration of the program that resulted in long-term favorable outcomes and a standard for program accessibility are yet unknown.

A Systematic Review: The Impact of Inadequate Dietary Intake in Adolescents with Type 1 Diabetes

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Introduction: Type 1 diabetes (T1D) Mellitus is the most common metabolic disorder in adolescents aged 10-19. Prevalence in Black youth is 37.8 per 100,000 individuals; that incidence rate is approximately 8 times that of the general population. Unfortunately, socioeconomic and health disparities impair one's ability to properly manage T1D. African American youth have higher risks for chronic complications of diabetes perhaps due to a disconnect between health care providers and minority families. Moreover, 44.7% of African American youth are overweight and obese. Youth's knowledge of their dietary regimen accounts for over half of their adherence to a healthy diet, making nutritional management critical in individuals aged 10-19. A healthful diet can mitigate hypo- or hypoglycemic fatalities. Thus, the proposed study will examine the relationship between a poor diet and increased episodes of hypo- and hyperglycemia in Black youth.

Method: A systematic review will be conducted to examine the impact of dietary behavior and other nutritional-related risk factors to address hypo- and hyperglycemia. Articles from 2010- 2020 will be utilized to develop a culturally-based nutritional intervention to mitigate T1D in Black youth.

Expected Outcome: The study denotes a tremendous need for nutritional intervention in Black adolescents to maintain and minimize health complications related to hypo- and hyperglycemic episodes. Research on health inequity and disparities in healthcare are also needed. Future research will explore socioeconomic challenges that present difficulties for patients seeking impartial healthcare.

The Disproportionate Prevalence of High Blood Pressure in African American Women

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Introduction: In 2015-2016, 108.2 million Americans were diagnosed with hypertension, a disease with high prevalence among African Americans. Black women are 60% more likely to develop hypertension than white women. The risks of hypertension can be fatal if left untreated, and can lead to serious health risks such as cardiovascular disease, heart attack, stroke, and many other serious conditions. Research finds that the mortality rate of black females more than doubles the rate of mortality by hypertension when compared to their non-hispanic, white counterparts. This health disparity has influenced further intervention revolving around African American women. The goal of this research is to discover nutrition interventions that have helped to treat hypertension among African American women in the United States.

Method: Implementation of a systematic review will be established to observe the influence of dietary habits on blood pressure. Articles published between 2010-2021 will be used to initiate an intervention aimed in assisting African American women.

Expected Outcome: The aim of this study is to find a nutrition intervention successful in aiding black American women with controlling their blood pressure. It will also be established to ultimately reduce the gap of morbidity mortality rates associated with hypertension between black and white women. Further research will dive deeper into the underlying socioeconomic effect on controlled blood pressure, sought out medical treatment, and nutrition education.

ENVIRONMENTAL SCIENCES & STUDIES

Comparative Analysis of the Kinetics of Growth and Viability of Shewanella oneidensis MR-1 in Tryptic Soy Broth versus Glucose-Based Minimal Media

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Coauthors: Elan Holston, Mahtab Waseem, Patrick Ymele-Leki

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.

Evaluation of the WRF Model for Simulating of Bore Waves over the U.S. Southern Great Plains

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Bores in the atmosphere are wave disturbances linked to severe weather conditions in areas such as the U.S. Southern Great Plains (i.e., Oklahoma, Texas, and Kansas). At night, temperature differences between the Rocky Mountains and the Great Plains, cause bores to develop and serve as a mechanism in the initiation of thunderstorms. Records of high precipitation levels in the Southern Great Plains are attributed to mesoscale convective systems which are linked to the intensity of nocturnal low-level jets. A lack of accurate prediction and knowledge of nocturnal low-level jets in the Southern Great Plains is observed. Our study proposes to design a numerical experiment to capture bore waves using observational radar data (NEXRAD) and atmospheric conditions from ground-based (ALVICE Raman lidar) within Kansas and surrounding areas.

By extension, the radar and lidar observation data is employed to numerically evaluate Ensemble WRF System performance on simulating atmospheric conditions to identify bore development characteristics. By comparing our WRF model output data with observational data from the 2015 Plain Elevated Convection at Night (PECAN) campaign, our study will show how numerical modeling can be used in predicting such events which address this under-sampled area of research for the Southern Great Plains.

Keywords: Undular bores; Radar, Lidar, WRF model, Numerical modeling

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Experimentation Towards Enhancing in vitro Iodine Transformation by Shinella sp.

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Background: During World War II and the Cold War the United States Government enriched plutonium at the Hanford Site in Washington. Much of the waste that accumulated as a result of these activities was buried underground, including radioactive iodine, I129. The nearby Columbia River is under threat of contamination by I129 because it is mobile in soil and groundwater. Certain bacteria in the soil at Hanford have been found to transform iodine species, including Shinella AD47, which has a high capacity to reduce iodate and oxidize iodide. We are interested in understanding and improving the ability of these bacteria to oxidize iodide and reduce iodate for bioremediation processes. Here, we determine the impact of various media on Shinella AD47 growth and lay the groundwork for investigating the ability of specific media or nutrients to increase iodide oxidation by the organism. Methods: Growth curves for Shinella AD47 were conducted in 1/10th-strength tryptic soy broth containing 0, 5, or 50 mM KI, R2-A broth, and marine broth to determine whether any of the media better supported growth of the bacteria. Results and Future Directions: Preliminary results indicate that culturing Shinella AD47 in marine broth consistently increased growth as compared to any other media. No difference in growth was detected in tryptic soy broth containing any amount of KI or R2-A broth. The immediate next steps of this research will determine whether increased growth in marine broth leads to increased iodide oxidation by Shinella AD47.

The Phylogenetic Characterization of Cupriavidus necator AD60 and Understanding its Ability to Reduce Iodate

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The Hanford Site was used during World War II and decades after for plutonium production, resulting in ~ 440 billion gallons of radioactive waste, some of which has leaked into the environment. Research at this site includes the development of bioremediation strategies using native bacteria, some of which are able to transform iodine – one of the radioactive contaminants at the site. Here, we present work in which we confirm the identity of Cupriavidus necator AD60 (AD60), which was isolated from the Hanford Site, and begin to uncover the genetic mechanisms by which it reduces iodate to iodide. Methods: The 16S rRNA gene of AD60 was amplified and sequenced, followed by GenBank analysis of resulting sequences. A subset of mutants from a Tn5 library in AD60 was grown anaerobically, and colorimetric iodate reduction assays were conducted to determine mutants that exhibited significantly less reduction than wild type. Results and Conclusion: Sequencing revealed that AD60 had a 96.73% identity to previously sequenced C. necator samples. Contrary to previous C. necator studies, AD60 was able to grow well anaerobically. This evidence indicates that AD60 may be a novel strain of C. necator and warrants additional characterization. <10% of the ~480 mutants screened exhibited a decreased ability to reduce iodate. Sequencing of the mutants of interest will be the first step in identifying the genes responsible for iodate reduction. This work will inform bioremediation strategies at the Hanford Site and allow better understanding of the contribution of bacteria to environmental iodine chemistry.

Analyzing conditions of growth of Shewanella oneidensis MR-1 planktonic and Biofilm cultures

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Radioiodine-129 (I 129) is a radioactive contaminant that has been leaking from storage tanks at the Hanford Site. The different grade of I129 in the contaminated groundwater is predominantly as iodate, organo-iodide, and iodide.

In ex-situ bioremediation, toxic materials are collected, and bioremediation process is carried out at an offsite location. Shewanella oneidensis MR-1 is a strain of bacteria known to reduce various types of heavy metal contaminants such as nitrate, Uranium, and silver.

We hypothesized that planktonic and biofilm cultures of S. oneidensis MR1 can be used for the purpose of ex-situ bioremediation and analyzed the growth of MR1 biofilms under varying conditions. S. oneidensis biofilm cultures were grown under static conditions in TSB and glucose based minimal media (GM9) in borosilicate glass tubes and microwell plates. Growth cultures were monitored by absorbance readings using a TECAN infinite M200 Pro microplate reader. Preliminary data suggest that planktonic and biofilm growths of S. oneidensis MR-1 cultures are dependent on the growth media, time, surface area, and conditions of growth.

Further assays are underway to analyze the effects of S. oneidensis MR-1 planktonic and biofilm cultures on the bioremediation of iodate in aerobic and anerobic conditions. S. oneidensis MR-1 cultures will be grown under optimal conditions in GM9 in the presence or absence of iodate, and iodate concentrations will be monitored by colorimetric assays.

The ability to grow and harvest biofilm and planktonic cultures of Shewanella oneidensis MR-1 may help develop alternative methods to cleanup nuclear contamination waste and novel bioreactors.

A Storm is Brewing: Risk Perceptions and Decision-Making among Emergency Managers

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How can emergency managers (EMs) make decisions when severe weather is bearing down on a vulnerable population? EMs serve as an essential link between meteorologists and the public during inclement weather conditions, performing a variety of duties from sounding sirens to evacuating towns. They must understand and relay large amounts of complex information in a domain of science that, in practice, lacks standardization. The EM role is more dynamic than ever, as managers must collaborate with forecasters and determine how to protect an increasingly at-risk public. Although a relatively large body of work has focused on modeling communication between forecasters, EMs, and the public, few studies have investigated how EMs make decisions; it is critical to the entire communication pipeline to understand what affects EMs' risk perceptions as their decisions often directly impact the public. This research aims to identify and characterize the factors that affect EMs' risk perception through the analysis of results from two displaced real-time severe weather events that included group interviews and multiple-choice survey questions. These data were collected during the National Oceanic and Atmospheric Administration (NOAA) Hazardous Weather Testbed Spring 2019 experiment. This project is guided by Coleman's (1993) assertion that risk perception is the multifaceted, cognitive assessment of one's likelihood of coming to harm. The goal is to characterize situations in which emergency managers' decision-making processes may be altered by their environment.

Sustainable development in Ghana

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Looking at indigenous decision making models to strengthen grass roots participation in sustainable development planning.

Data-driven analysis to predict influent flow for improved water resource recovery facility process control

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Water resource recovery facilities (WRRFs) are affected by storms and there aren't good ways to link wet weather events with flows. Many facilities collect process data via sensors. However, the composition of wastewater can block or corrode parts of sensors used to collect process data. To support continuous process monitoring when instances of faults, interference, and fouling occur, we investigated the use of a random forest (RF) model based on theory of ensemble learning to predict dry and wet weather influent flow at a large WRRF in Washington, D.C based on historical performance data. We evaluated the performance and reliability of the model in terms of mean absolute error (MAE) and mean absolute percentage error (MAPE) during late Summer and early Fall months. This was based off the complex relationship of flow with rainfall, times of the day, meteorological seasons, effluent ammonia, and NOx concentrations measured per hour. The morning hours (5am – 12pm), rainfall, the Fall season had the greatest contribution while the winter season and afternoon hours (12pm – 4pm) had the least contribution to predicting both dry and wet weather flows. When the model training set was resampled to balance dry and wet weather flows, the generalization error was reduced by 25 MGD and 10.1% for MAE and MAPE, respectively. This study suggests that the model can be (i) applied to predict expected changes in influent flow based on changes in effluent water quality, and (ii) utilized as a low-cost option to determine the efficiency.

Chemicals and Indoor Air Quality

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Despite being one of the biggest contributors to overall health and well-being in homes and various other construction types, indoor air quality (IAQ) may not be very well known. It is essential that such important matters be brought to a substantial level of public awareness in order to effect

positive change. This research initiative seeks to put numbers to those unacquainted with the topic. In doing so, it will reveal, to some extent, a general measure of cognizance on the issue. As a result, preventative measures as well as those dealing with present problems regarding poor IAQ can be better focused.

Our Minds Control Our Future: Examining the Connection Between Cultural Orientation and Varying Sustainability Attitudes and Practices

Presenter's Name: Karis Thomas
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With the undeniable consequences of the climate crisis reaching a critical breaking point, concerns surrounding the American public's inability to reach a clear consensus regarding climate change mitigation continue to halt meaningful action. Social psychologists argue factors such as cultural orientation influence whether a society places value on abstract issues such as climate change (Schmitt et.al, 2020). Furthermore, within the realm of Social Psychology, studies highlight a correlation between cultural orientation and varying levels of risk perception, specifically in regards to attitudes towards the climate crisis (Schmitt et.al, 2020). Based on previously established theoretical frameworks, the current study investigates whether a correlation exists between individuals' Cultural Orientation (Triandis & Gelfand, 1998), or rather the presence of predominantly individualist or collectivist attitudes, and the selective support of sustainable practices and attitudes towards sustainability in HBCU students. Using a quantitative approach to data collection, the researcher will attempt to examine the correlation between participants' individualistic or collectivist attitudes and their subsequent personal sustainability practices as well as their overall attitudes towards sustainability. The purpose of the study is to foster awareness of Western society's dire need for an ideological transformation in regards to the climate crisis.

Remediation of Iodate Contamination Through Shewanella Oneidensis MR-1 Planktonic and Biofilm Cultures

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Radioiodine-129 (I129) from leaking nuclear waste storage tanks is a major groundwater contaminant at the Hanford Site in Washington State with speciation of I129 predominantly being iodate, organo-iodide and iodide.

Shewanella oneidensis MR-1 is a strain of bacteria known to reduce silver and uranium and has been validated for its potential to serve as an ex-situ bioremediation agent against iodate. A proposed bioremediation solution is to use microbial dissimilatory reduction of iodate to iodide. This study hypothesizes that planktonic and biofilm cultures of S.oneidensis can effectively reduce iodate to more readily remediable chemical species through chemical or biological approaches. For the purpose of this study, S.oneidensis planktonic cultures were grown in minimal media (GM9) in the presence and absence of iodate under both, aerobic and anaerobic conditions. Iodate concentrations were monitored by colorimetric assays with UV Spectrophotometry. Data suggests that planktonic cultures of S. oneidensis can reduce iodate by 28% under aerobic conditions, and no reduction occurs under anaerobic conditions.

Further assays are underway to analyze the effect of biofilm cultures and conditions of S.oneidensis growth on the bioremediation of iodate. These cultures will be grown under static conditions in GM9 in the presence or absence of iodate, and iodate concentrations will be monitored by colorimetric assays.

Success of this project will result in the validation of using planktonic and/or biofilm cultures of S. oneidensis for possible contamination cleanup of nuclear waste. This may lead to the development of novel microbial bioreactors for the bioremediation of groundwater, soils and sediments.

ETHICS, LAW & RELIGION

The Longest Yard: Pgymalion Depictions of Black Athletes
Presenter's Name: Camille Alexander
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Negative press coverage affects the way black athletes are publicly perceived. In turn, negative press coverage impacts the performance of black athletes. I question and confront the representation of black athletes in media to delve into this ongoing practice of 'othering' and exclusion. The ideal representation for black athletes, male and female, is accurate, empathetic, and humanistic representation. The reality is that popular media depicts black athletes in a way that casts them "outside the purview of polite society" (Coates, 2018, p.74). The consequences of such inaccurate, unempathetic, and non-humanistic portrayals are a negative public opinion of black athletes and increased sanctions on black athletes. The antagonization of black athletes through this medium is a direct offshoot of racism and white supremacy. A redress of grievances in the field can only occur with a factual analysis of the marginalized population.

Neurodiversity and the Mental Health Crisis
Presenter's Name: Harold McDougall
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This is an investigation into the sources of contemporary policy difficulties managing problems experienced by the neurodivergent, aka "mental health issues."

It begins with an examination of the sources of stigma towards neurodivergent individuals, and proceeds to an examination of failed policies of the past and their consequences (, e.g., homelessness following closure of prison-like insane asylums in the 1960s, spurred by then President John F. Kennedy). The study continues with an examination of the present state of mental and behavioral health policy structures, identifying shortcomings and promising new initiatives. The study concludes with an examination of the various social movements emerging to respond to the mental health crisis.

Preliminary results:

1. Identification of primary sources of stigma toward the neurodivergent, intersecting with new science relating to the growth and development of the brain

2. Documentation of the breakdown in mental and behavioral health policy from 1960 to the present

3. Documentation of innovative solutions to the crisis, involving reform of the existing system, decentralization of care to the community level, and modifications of police response to emergencies

4. Analysis of emerging social movements to promote social justice for the neurodivergent, including interviews with advocates and policy practitioners

HUMANITIES

Pride & Joy: Southern College Football Dominance and the Black Student-Athlete Experience
Presenter's Name: A'maiya Allen
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The Southern region of the United States is known for many things: great food, slow-paced lifestyle, southern hospitality, and sports, specifically football. This strong football culture is supported by an extensive history of top-tier college football programs. In fact, in the past 20 years, 17 colleges in the Southern region have captured national football championships compared to any other region (Barra, 2012). With this statistic in mind, it is clear that college football programs in the Southern region outperform those programs in the North. Although the South's culture revolves around football and sports, the phenomenon alone is not enough to consecutively capture national titles. The research will reveal why this dominance has sustained over a long period of time and compare mass communications and internal operations of both regions to find various strengths and weaknesses. The primary goal of this study is to investigate opportunities for Northern college football programs to be better equipped to compete with the South's football programs. The data will show the aspects in which Southern football programs exceed and the history upon which they are built to provide a successful blueprint for other struggling college football programs. Additionally, the research will explore the types of mass communication methods used in Northern and Southern regions programs including PR items, website publications, and social media. Lastly, it will uncover experiences of Black athletes who face identity issues transitioning from being a minority in a campus setting and the majority in an athletic environment on a day-to-day basis.

The Resilience of British West Indian Immigrants in the United States Experiencing Elevated Societal Stress
Presenter's Name: Selena Cuffy
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This presentation will speak on the presence of the British West Indian population in the United States and how their utilization of cultural practices, prioritization of family and community aides in conquering race-related stress, and mental health disparities in the United States. The term British West Indian is currently used to refer to people from the countries in the Anglophone Caribbean region (Brooks, 2013). West Indians commonly migrate to major cities along the coast of the United States and when assimilating into these communities, they keep with them a strong sense of community and cultural pride, which is acknowledged as adaptive coping habits as they transition into predominantly White society. This transition puts this population at risk for race-related stressors such as discrimination and marginalization. It must be mentioned that mental health disparities because of racial discrimination pose a big threat to minorities in the United States, especially the Black population, and Caribbean immigrants make up the largest subgroup of immigrants in the Black population. One definition of resilience states that it is determined by the ability to cope and manage stress. Because of the negative help-seeking attitudes of the Black community in the United States, the examination of the informal methods of mental health services is imperative to discuss in order adequately aid this population. This discussion will look at resiliency factors that aid British West Indians as a substitution to mental health services and compare these informal techniques to counseling psychology techniques and theory

Reading Between the Lines: Emancipatory Narratives and their Role in Social Progress
Presenter's Name: Jamecion Green
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The emancipatory narrative is a staple in African-American literature. This paper analyzes the emancipatory narrative as an act of resistance against slavery. Building on James Olney's "I Was Born: Slave Narratives, Their Status as Autobiography and as Literature," one can begin to expand upon the conventions of slave narratives and take note of how their authors rejected or reimagined the tropes used against them. Using the autobiographies of Frederick Douglass, Olaudah Equiano, and Harriet Jacobs as a guide, readers can better understand the stereotypes most associated with the work of each author, as well as the strategies they employ to abolish harmful narratives—and slavery itself. The author discusses the potential applications of these texts for social justice, namely in strategic communication and representations of the Black community.

Chinese Trade Shock and Employer Concentration
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This research assesses the impact of Chinese Trade Shock, the swift rise of import penetration from China to U.S, on local-level labor market's employer Concentration. The paper extends the work by Acemoglu et al.(2014) on the effects of Chinse import penetration on US job market. Using commuting zone-level data analysis, the study finds a significant and negative effect of Chinese trade shock on overall commuting zone employer concentration and in those industries more exposed to trade. However, the paper finds a significant and positive impact of Chinese trade shock on commuting zone employer concentration in non-exposed and tradable industries.

African American Women & Suffragists: The Pioneers and Fuel of the Civil Rights Movement
Presenter's Name: Zora Mckissic
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Coauthors:

In this research paper, I explore how African American women activists during the 19th century influenced African American women activists in the 20th century by studying women-led political-social movements. This paper focuses on the Women's Suffrage Movement in the 19th century, as well as the Civil Rights Movement of the 20th century. By analyzing forms of leadership and strategies of political-social movements through the utilization of tactics such as large-scale organizing, mass-media usage, campaigning, and demonstrating, comparisons can be drawn between these movements, which suggests influences from the prior generation of women. This paper concludes by contextualizing the influence of 19th century African American women activists on 20th century African American women activists, which also aims to highlight the instrumental role of African American women in the Civil Rights Movement, which was pioneered and maintained by African American women, contrary to much of history's recording of that period of history.

Black Undergrounds: Subterranean Geographies in Contemporary Black American Literature
Presenter's Name: John Merritt
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School/College: Arts & Sciences
Presentation Type: Oral Presentation
Faculty Advisor: Jennifer Williams
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Coauthors:

This thesis takes as its focus representations of subterranean spaces in works of contemporary black American literature. I argue that contemporary black writers have drawn upon underground spaces because the underground has been home to the things, ideas, and peoples deemed undesirable by the aboveground since the very beginning of modernity. Building upon the work of urban geographers Thomas Heise and David L. Pike, alongside Katherine McKittrick's idea of "black geographies", I examine how three works of contemporary black fiction use underground spaces to create geographies that resist the hegemonic landscapes of aboveground society. These works include The Man Who Lived Underground by Richard Wright (2021), Linden Hills by Gloria Naylor (1985), and The Underground Railroad by Colson Whitehead (2016).

Women Faculty of Howard University Department of Afro-American Studies - Women at Howard University Project Abstract

Presenter's Name: Tiffanee Moore
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Presentation Type: Oral Presentation
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Coauthors:

The history of African American women in the early decades of the twentieth century is inseparable from the Pan-African and Civil Rights movements. Howard is no different. The presence of women within the student body and faculty did much work for the university's legacy but also beyond the academic world. The demand for a dedicated department of Black Studies at Howard in the 1960s represented a call for the curriculum to reflect the changing world of black life in America. Revolutionary change cannot happen without black women. Howard University was a catalyst for countless black female graduates and faculty that would go on to make history. Despite the importance of these women in Howard's early history and leadership, their role has not been thoroughly examined. The current study seeks to redress this omission in part by focusing on the contributions and legacy of the women faculty and students in the Department from its inception to the present day. Using a range of evidence, this report historicizes the contributions of women faculty who formed an integral part of the Department of Afro-American Studies as well as the legacy of the first classes of women in the student body since its inception. By reviewing sources and organizing data, this study analyzes the diversity of the department from its inception and seeks to provide context to the trends of gender make-up through the years.

Angel Barrios and the First Flamenco Deep Song Contest of Granada (Spain, 1922)

Presenter's Name: Trinidad Pardo Ballester
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The flamenco musician composer and scholar, Angel Barrios, exerted along his father, "El Polinario" a decisive influence on the Flamenco Deep Song Contest of Granada, Spain in 1922. The tavern of "El Polinario" located at the Alhambra of Granada, was a critical environment for the starting and development of the idea of the I Flamenco Deep Song contest, and the space where another informal "Flamenco Contest" took place while waiting for the real one. "El Polinario was a Flamenco musician and scholar as well as a promoter of the Arts.

The friendship between Spanish composer Manuel de Falla and Angel Barrios started during the first decade of the XX century and was strongest during the years 1915 and 1919, when de Falla moved from Madrid to Granada. My research conducted at the Alhambra archive in Granada and at the Andalusian Music Documentation Center shows the strong family connection between the Barrios and de Falla families as well as the involvement of Angel Barrios in the Flamenco Deep Song contest. However, due to a disagreement between both friends, Angel Barrios did not attend the Contest neither did his father.

My hypothesis is that the charismatic presence of Angel Barrios in the First Deep Song Contest was essential to the promotion of the Contest and to the trajectory of Flamenco in Spain as evidenced by his artistic creations.

PHYSICAL SCIENCES & ENGINEERING

Synthesis and Characterization of nanocomposite cellulose sponges for environmental remediation
Presenter's Name: Temiloluwa Akande
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Because of their high surface area to volume ratio and stability, nanomaterials give promising results for environmental remediation. My research stems from the platform technology created at Northwestern University in which an already synthesized sponge is coated with nanomaterials for environmental remediation.

However, to optimize the quality and functionality of sponges, there is a need to further understand the platform materials synthesis and its interface as its architecture can help understand the properties that contribute to its remediation ability. So, it raised specific questions: can we synthesize our own cellulose-based sponge thus providing a platform for its technology to be tuned to a variety of remediation processes? What additional flexibility does this present?

The goal of this project was to create an in-situ sponge embedded with nanoparticles for environmental remediation and understand the structure-property relationship of materials to see ways the sponge technology can be improved. To do this, I altered process parameters relating to the design of the cellulose sponge, the synthesis approach, and nano-composition. At the core of this project was my use of characterization tools to study features such as sponge porosity and microscale interface thus influencing my decisions regarding the ideal choice of precursor materials. I also explored the applications of the sponge even beyond its immediate use. Results show that by modifying process procedures, optimization of the sponges occurs. Tests were conducted and show our nanocomposite sponges to be applicable for oil-water remediation and further research is being discussed on their application in microplastic filtration.

Reduction of Capacity Fading in High-Voltage NMC Batteries with the Addition of Reduced Graphene Oxide
Presenter's Name: Yahya Alqahtani
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Lithium-ion batteries for electric vehicles (EVs) require high energy capacity, reduced weight, extended lifetime and low cost. EV manufacturers are focused on Ni-rich layered oxides because of promising attributes which includes the ability to operate at a relatively high voltage. However, these cathodes, usually made with nickel-manganese-cobalt (NMC811), typically experience accelerated capacity fading when operating at high voltage. In this research, reduced graphene oxide (rGO) is added to NMC811 cathode material to improve the performance in cyclability studies. Batteries made with rGO/NMC811 cathodes showed a 17% improvement in capacity retention after 100 cycles of testing over a high-voltage operating window of 2.5V - 4.5V.

Utilizing the Vapor Pressure Acquisition Systems (VPAS) to Obtain Vapor Pressure Data of Volatile Organic Compounds (VOCs) and a Binary VOC Mixture
Presenter's Name: Malachi Berry
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School/College: Graduate School
Presentation Type: Oral Presentation
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Coauthors:

The objective of this investigation is to determine the vapor pressure (VP) as a function of temperature for a series of pure liquid volatile organic compounds (VOCs) and a binary VOC mixture. This was done to test the performance of our Vapor Pressure Acquisition System (VPAS). The VPAS is an enhanced version of an ebulliometer that automatically acquires VP data of a VOC at its boiling point from a pre-set temperature(s) and pressure(s). The VOCs used in this study were ethanol, n-Heptane, and Iso-octane. The binary mixture contained 87% Iso-octane and 13% n-Heptane by volume/volume(v/v). This is the simplest formulation of 87-grade gasoline. The heat of vaporization (ΔHvap) of the VOCs and binary mixture was computed from their VP data using the Clausius–Clapeyron equation and applying a linear least squares regression fit to the experimental VP data. The slope

of the fit (-ΔHvap/R) is used to predict ΔHvap. The empirical ΔHvap's were in excellent agreement with their literature values.

Investigation of Mechanical and Microstructural Properties of Additively Manufactured 316L Stainless Steel

Presenter's Name: Melody Chepkoech
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The evolution of additive manufacturing (AM) has provided enormous freedom to the design and fabrication of parts with complex geometries. Extensive studies have been conducted on the optimization of the fabrication parameters with less studies being done on the effect of part thickness on the mechanical performance of AM parts. This study investigates the impact of part thickness on the mechanical and microstructural properties of AM 316L stainless steel. For this purpose, AM samples with 1.5 mm and 4.0 mm thickness were fabricated and used to conduct mechanical and microstructural characterization. Uniaxial tensile tests were conducted using a 50 kN Instron 5569A dual column tabletop testing machine at a strain rate of 0.002 s-1. The tensile tests showed that the samples with 1.5 mm thickness exhibited lower yield strength compared to those with 4.0 mm thickness. The higher tensile strengths of the AM 316L SS can be attributed to the unique microstructures formed due to complex thermal distribution during fabrication. Microstructural characterization was conducted using Scanning electron Microscopy (SEM) and the Electron Back Scattered Diffraction (EBSD) on the fractured and unfractured surfaces. The SEM images of the fractured surfaces showed ductile fracture as characterized by the spherical micron-sized dimples. EBSD tests were carried out to determine the grain size, shape, and orientation. The EBSD orientation maps and corresponding pole figures revealed elongated columnar grains with grain sizes of up to 36 mm. Additionally, the Inverse Pole Figures (IPF) revealed that the cell structures had a preferential orientation of á001ñ.

Wearable Technology in Public Transportation as an Application of Nondeterministic Finite Automata (NFA)

Presenter's Name: Benjamin Corriette
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This paper chronicles the research conducted by the author on how wearable technology is an application of Nondeterministic Finite Automata (NFA). The paper also describes what NFA is, contains several diagrams to illustrate its application to wearable devices, and shows how NFA can be improved so that individuals with disabilities can have a more accessible user experience while using wearable devices. Traditionally, wearable devices have been manufactured for able-bodied people who can see, hear, and feel the device during its use. However, making the device accessible to the disability community is usually an afterthought, or many times ignored altogether. There are many disabled persons who use public transportation while utilizing mobility aids, such as white canes and guide dogs, to navigate safely through what can be a chaotic environment. What this research explores is the possibility that improving the NFA in wearable devices can allow the disabled to leverage wearable technology for a safer commute.

Keywords: Wearable technology, wearable devices, Nondeterministic Finite Automata, NFA, human-computer interaction, accessibility, public transportation, disabled

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A Pattern-Recognition-Based Mesh Refinement Method for the Moment Method Analysis of Electromagnetic Scattering Problems

Presenter's Name: Christian Diaz Caez
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Basis functions that describe both the amplitude distribution and the traveling wave phase variation of the induced surface current have been successfully applied over large patches. Although such basis functions generate accurate results for smooth and convex objects, they cannot describe accurately the current distribution on objects with non-smooth and/or concave surfaces. In this work, a nonuniform mesh refinement method is developed based on a current pattern recognition technique to describe standing wave distributions more accurately. The simulation results on the nonuniform mesh grids achieve much better accuracy and a lower overall computational cost.

Did the COVID-19 Vaccine Rollout Effect Transportation Demand: A case study in New York City?

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The influence of vaccination on transportation has been the subject of only a few studies thus far, therefore the objective of this study is to investigate the influence of the COVID-19 vaccine out on transportation in New York City. An ARIMA time series analysis was done on driving, transit and walking data from Apple Mobility Reports. The result of the time series analysis showed that complete vaccination numbers positively influenced driving demand in both Manhattan and Brooklyn. First dose vaccination number did not influence driving demand, possibly suggesting complete vaccination lead to increased travel safety perceptions. Transit ridership was unaffected by both complete set and first dose vaccination numbers. Walking was positively influenced by first dose vaccination numbers only in Manhattan. Overall, Manhattan appeared to be more influenced by COVID-19 cases, deaths, hospitalizations, and vaccination then Brooklyn.

Factors affecting mobility choices during COVID-19 era: A case study on New York City

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This study aims to identify the factors affecting the mobility choices (e.g., transit, car, walk) during COVID-19 in New York City. This study also generates a series of post-pandemic scenarios based on these factors. Despite the fact that the COVID-19 pandemic evolved over time, most of the current studies are heavily relied on cross-sectional datasets to understand individuals' mobility choices. To address this gap, this study uses time-series and panel datasets and estimated aggregate and disaggregate level models to assess individuals' mobility choices. The time-series data comes from the NYC's Health Department, Apple's Mobility Trends Reports, Google's COVID-19 Community Mobility Reports, Local Area Unemployment Statistics (LAUS) Program, and the American Community Survey (ACS). The panel dataset is from New York City's Citywide Mobility Survey (CMS). The time-series model result reveals a negative correlation between transit demand and grocery stores and parks activities during the pandemic. Walking demand increases with increased trips to transit stations, residential areas, and parks. The econometric model results show that employment status, reduced hours or pay cut at the workplace, income, age, race, family size, and vehicle ownership are the factors that affect individuals' mode switching behavior during the pandemic. These models can be used for forecasting purposes in the post-pandemic era.

Formation of Protein Corona on Gold and Silver Nanoparticles

Presenter's Name: Timothy Tizhe Fidelis
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The exposure of nanoparticles to biofluids leads to rapid coverage of proteins, named protein corona(PC), which alters nanoparticles' physicochemical and biological properties and can introduce subsequent propagation of biofouling through the attachment of biomolecules and microorganisms. Fundamental studies of the PC are thus critical to the increasing applications of nanoparticles in nanotechnologies and nanomedicines. In this work, we employed mesoscopic coarse-grained and atomistic molecular dynamics (MD) simulations to study the formation of PC on metal nanoparticles (silver and gold). We examined the nanoparticles' size and surface hydrophilicity effects on formation dynamics and the structure of protein corona. Our simulations revealed the different adsorption dynamics of small-sized ovispirin-1 peptides on silver nanoparticles, including the direct adsorption of a single peptide and peptide aggregate, multi-step adsorption, and intermediate cycle of desorption and re-adsorption. Notably, the whole process of peptide adsorption on hydrophilic silver nanoparticle surfaces can be generalized as three stages: diffusion to the surface, initial landing via hydrophilic residues, and the final attachment. The decrease in silver nanoparticles' size leads to faster adsorption with more heterogeneous peptides' interfacial dynamics, a denser and inhomogeneous peptides' packing structure, and a wider distribution of adsorption orientations. The corona structure was found to be dependent on protein types. Ovispirin proteins form homogeneous single-layered adsorption in comparison with the lysozyme's inhomogeneous multilayered aggregates on gold NP surfaces. Subsequent atomistic MD simulations demonstrated that on both silver and gold nanoparticle surfaces, adsorbed peptides display changes in their secondary structure, resulting in further changes in corona compositions.

An Invitation to the (Double) Riordan Group
Presenter's Name: Shakuan Frankson
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The Riordan group is a group of infinite, lower-triangular matrices that are defined by two generating functions, g and f. The kth column of the Riordan matrix has entries from the generating function gf^k. In the Double Riordan group, there are two generating functions f1 and f2 such that the columns, starting at the left, are defined by multiplying g by f1 and f2 alternately. The Double Riordan group is a generalization not of the Riordan group itself but of its checkerboard subgroup.

One of my proposed projects was to utilize my findings for the A and Z sequences of the inverse and product of double Riordan arrays to see if I can find an isomorphism between the Riordan group and a subgroup in the double Riordan group. This presentation will provide a brief introduction to the Riordan group, explain the key elements for my research problem, and point towards a possible solution.

Gas Separation By Adsorption
Presenter's Name: Silvina Gatica
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The separation of gas mixtures is a widespread strategy used in industry and society. Within the last decade, environmental efforts have focused heavily on reducing CO2 in the atmosphere.

The separation of light gases by adsorption has attracted attention due to its low energy cost and safety for the environment. Other methods include cryogenic distillation, chemical sorption in liquids, and membrane purification. Researchers have intensively investigated gas adsorption in materials like MOFs, mesoporous carbon, activated carbon, silicalite, nanoporous carbon, and graphene experimentally or theoretically. In this talk, I will discuss computational methods to study the adsorption of mixtures, focusing on Molecular Dynamics and Monte Carlo simulations.

Development and optimization of a tribo-electrification separation process for dry fractionation of yellow pea flour
Presenter's Name: Sama Ghadiri Gargari
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Presentation Type: Poster Presentation
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Using a lab-scale tribo-electrostatic separator, a sustainable environmentally friendly dry fractionation technique was developed for the production of protein-enriched yellow pea flour. Mixed-level full factorial experiments (32×22) were designed to examine the impacts of milling type (Ferkar and pin milling) and milling intensity (0.14 and 0.5 mm) as qualitative operating factors as well as air flow rate (7, 9, and 14 LPM) and plate voltage (±3, ±6, and ±12 kV) as quantitative operating factors on protein content, yield and protein separation efficiency of protein-enriched concentrates. Considering the main effect and polynomial interactions, a multiple linear regression model was developed to estimate the statistical correlation between the four operating and three response factors. Although plate voltage was the only main effect having no significant impact on protein content, its interaction with milling intensity was found to be effective on protein content. While plate voltage was the only main effect significantly impacted protein separation efficiency, the polynomial interactions between flow rate and plate voltage as well as milling type and intensity showed significant impacts. The process was optimized using the developed predictive model to maximize the protein separation efficiency while maintaining a minimum protein content of 57%. Pin milled yellow pea flour with 0.14mm milling intensity was optimal at 7LPM (laminar flow) and ±6.5kV with 57.1% and 62% protein content and separation efficiency, respectively. The predictive model was validated by conducting experiments on a random operating condition.

Acknowledgment: The authors acknowledge USDA-NIFA-AFRI Grant #2020-67021-31141 for its financial support.

Investigation of the output of the sPHENIX Geant4 Simulation
Presenter's Name: Alex Holt
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Coauthors: Dr. Mickey Chiu, Lameck Mwibanda, Abdullah Alsayegh, Reem Alreshidi, Dr. Stacy Ann Nelson

sPHENIX is the super Pioneering High Energy Interaction eXperiment at the Relativistic Heavy Ion Collider. This experiment will perform high precision measurements of jets and heavy flavor observables for nuclear collision systems elucidating the microscopic nature of strongly interacting matter ranging from nucleons to strongly coupled quark-gluon plasma.

One of the sPHENIX detectors is the Beam-Beam Counters (BBC) also known as the Minimum Bias Detector(MBD)that provides the main trigger for heavy ion collisions. We used the Pythia8 MC package to process the input to the sPHENIX Geant4 simulation. The Pythia8 platform simulates p+p collisions. We had investigated the sum of charges in the north channels of the BBC detector compared to that of the south channels. The charge in the BBC are the number of photo-electrons that are seen in the photomultiplier tubes. This study resulted with a MIP peak at around 120 p.e., on top of an exponentially falling background.

Finite-size and Surface effects: Deep Defects in Nanostructured SiC

Presenter's Name: Tamanna Joshi
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Presentation Type: Oral Presentation
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Spin-active deep defects in wide-bandgap semiconductors like silicon carbide (SiC) are being studied for application in quantum technologies, such as quantum computing, and nanoscale field sensing. Often these applications involve nanostructuring of the host semiconductor. In a nanostructure, the electronical and optical properties are expected to be affected by surface and quantum confinement effects. In our work, we investigate these finite size effects by studying the properties of silicon vacancies with different charge states in 2H-SiC (wurtzite) nanowires. Defect properties like formation energy, spin, and spin polarization energies are shown to be site-dependent in the nanostructured host. Our results indicate that a surface acts as a sink for the defects, and the migration of defects towards the surface may lead to the loss of the signal from a defect placed in a nanostructured host.

Tribo-electrostatic charging and separation behavior of plant protein-fiber mixtures

Presenter's Name: Botagoz Kuspangaliyeva
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Background: The traditional aqueous plant protein extraction methods have major drawbacks because of their high energy consumption and alteration of product's native properties. Tribo-electrostatic separation is a recent and sustainable approach for dry fractionation of plant constituents based on different charging properties of proteins and carbohydrates.

Methods: A custom-built bench-scale tribo-electrostatic separator was designed at our Bioprocess Engineering Laboratory that includes gas cylinder, fluidized bed, charging tube and fractionation chamber with two electrodes supplied with high negative and positive voltages. The feed particles are charged upon colliding with the tube wall and other particles; then they are separated under the electric field generated by electrodes in the chamber. Charging experiments of pure initial materials were carried out with three different lengths (50, 100 and 150 cm) of polyvinyl chloride (PVC), copper, nylon and Teflon tubes. Extraction experiments of various binary model mixtures prepared from soybean protein and fibers such as cellulose, de-alkaline lignin and alkaline lignin were conducted using 150 cm PVC and Copper tubes to understand the separation behavior of plant protein and fiber particles.

Results and Conclusions: Charging performance of single materials has improved with reducing particle concentration in the tribo-charging tube. The yield of the protein-enriched fractions increased with the protein content of starting compound. For all the binary blends, protein and fiber were enriched in the protein-rich and fiber-rich fractions, respectively. We will further investigate the separation behaviors by studying the net charge of plant-fiber mixtures.

Acknowledgment: The authors acknowledge financial support of NSF HBCU-UP-RIA #1900894.

Role of FPGAs in Human Computer Interaction Based Systems

Presenter's Name: Cameron Lewis
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Researchers in the field of human-computer interaction are looking for new ways to recreate organic, human-like interactions between humans and computers. The goal is to replace the traditional keyboard and mouse with more advanced methods of communication like speech or gesture recognition. However, advanced methods require high computing capabilities to process and interpret the data being received from the sensors in the environment. The tradeoff for high computing capabilities is higher power consumption and size. Researchers and designers have implemented Field Programmable Gate Array (FPGA) as their hardware of choice to process their advanced methods of communication to combat this problem. FPGAs are considered a viable solution because of their low-power consumption and small size. In this survey paper, there will be a review of the different types of FPGA-based designs for human-computer interaction situations. The goal is to examine the role of FPGAs in Human-Computer interaction-based systems. From this goal, the next steps will be to look into the other problems in the HCI field and see if FPGA-based designs are viable solutions. This paper will also specify the best methods and designs for specific HCI situations for researchers to use when considering future work in this field.

Combating Growing Antibacterial Resistance Through the Use of Polyhedral Boranes

Presenter's Name: Brittney Menefee
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Vancomycin is a glycopeptide antibiotic that is considered one of the strongest, or "last resort" antibiotics used to combat multi-drug resistant (MDR) bacteria. However, antibiotic resistant "superbugs" such as Staphylococcus aureus, Streptococcus pneumoniae, Mycobacterium tuberculosis, and Enterococcus faecalis are becoming increasingly resistant and more prevalent to vancomycin and its derivatives. This rise in resistant bacteria has led to a decrease in the effectiveness of antibiotics, raising widespread global health concerns. Over the last decade, elucidation of the vancomycin mode of action suggests that there is a secondary binding mode that relies on a steric and hydrophobic interaction between the binding pocket on the bacteria cell wall. Carboranes possess a unique three-dimensional super-aromatic robust geometry that has been widely studied for its usefulness in medicinal applications. Previously studied antibiotic candidates containing carborane exhibited low toxicity while effectively disrupting cell wall formation, resisting bacterial degradation, and remaining stable under biological conditions. For these reasons, my research has focused on the development of carboranyl-vancomycin derivatives as a sustained resolution to increased antibiotic resistances. This will be accomplished by synthesizing a series of carboranyl-vancomycin derivatives that will present significant steric interaction upon incorporation into the bacterial cell-wall effectively killing the bacteria and providing a new class of antibiotics

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The Probabilistic Automaton and Its Applications

Presenter's Name: Kyndra Middleton
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Coauthors:

There are numerous overlaps in topics in computer science and statistics, and researchers often collaborate across disciplines for more effective, informed results. One such similarity across disciplines is the probabilistic automaton (PA) in statistics which can be thought of as a generalization of the deterministic finite automaton (DFA) in computer science. Probabilistic automata in statistics are more commonly known as Markov Chain which can be used to describe how something transitions from one state to another based on probability. This differs from the DFA in computer science which does not rely on probabilities, but the concept between states and transitions are consistent. The current paper will discuss similarities and differences between PA in statistics and DFA in computer science, focusing specifically on birth and death processes which are continuous-time Markov Chains. Birth and death processes can be used to study diseases such as the coronavirus disease 2019 (COVID-19), population increases (or decreases/extinctions), queues such as standing in line outside a store, etc. After the discussion on similarities and differences, the paper will go into a detailed explanation of a specific Markov Chain and provide recommendations for future research on ways this Markov Chain can be improved. By improving upon the probabilistic model, researchers – inclusive of statisticians, epidemiologists, economists, and computer scientists – will be able to better contribute to society in a more effective, efficient manner.

Influence of substrates on properties of defect-based quantum emitters in hexagonal boron nitride

Presenter's Name: Sai krishna Narayanan
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Over the last two decades, the search for room-temperature qubit candidates has revived interest in the study of deep-defect centers in semiconductors. Amongst 3D crystals, deep defects in diamond and silicon carbide have been shown to be promising spin-qubits. However, there is an increasing interest in exploring quantum emitters in layered 2D semiconductors, such as hexagonal boron nitride (hBN) and transition metal dichalcogenides. Unlike 3D semiconductors, a 2D layered material offers greater potential for the deterministic placement of a deep defect in the 2D-matrix, providing a scalable platform for quantum applications. In addition, properties of the layered materials and hence, their defects, can be tuned by: (a) applying strain [Phys. Rev. Research 2, 022050(R) (2020)], and (b) by controlling the composition via the number of the layers and/or choice of the substrate. Although, observed in experiments [ACS Nano 11, 3328 (2017)], the substrate effects have remained relatively unexplored in theoretical works. Using silicon dioxide as a prototype substrate in our density functional theory-based calculations, we show how substrates can affect the ground- and excited-state properties of deep defects in hBN.

External mechanisms of controlling Rayleigh-Benard convection in Newtonian nanoliquids

Presenter's Name: Meenakshi Nerolu
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The effect of three different types of time-periodic modulations on the Rayleigh-Benard-system involving Newtonian nanoliquids is studied. Multiple-scale analysis (homogenization method) is used to arrive at the Ginzburg-Landau equation. The curiosity in the work is to know the individual effects of (i) rotation, (ii) gravity and (iii) temperature modulations on Rayleigh-Benard convection in weakly electrically conducting Newtonian nanoliquids. A significant effort in this research is devoted towards linear and nonlinear stability analyses as well as the homogenization method which leads to the Ginzburg-Landau evolution equation. Although several studies have concluded similar results for nanoliquids compared with those of pure base fluids, many fundamental issues like the choice of phenomenological models for the thermo-physical properties and ``the" best type of nanoparticles are not well understood. This research focuses on several important issues involving mathematical and computational problems arising in heat transfer analysis in the presence of nanoliquids. Effects of various nanoliquid parameters, frequency and amplitude of modulation on heat transport are analyzed. This investigation focuses on five nanoliquids, with water as a carrier liquid and five nanoparticles, viz., copper, Copper Oxide, Silver, Alumina and Titania. Enhanced heat transport was observed for rotation, gravity and temperature modulations.

An Agent-Based Model of COVID-19 on the Diamond Princess Cruise Ship

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We model the COVID-19 outbreak and shipboard quarantine with a 3-D agent-based simulation of a SEIR model which preserves the ratios of crew, passengers, and shipboard space. The stochastic model captures the movement patterns of passengers and crew members on-board the ship, as well as how this movement changed once quarantine is established. The study includes the derivation of the basic reproduction number based on contact numbers and transmission rates. We capture the number of contacts between two people when they remain within the model equivalent of a 3-foot radius for 60 minutes and the transmission probability per contact. We show that, based on the measured reproduction number, an outbreak is bound to will occur in the majority of simulations even with quarantine imposed on the ship. We also show that most infection on board occurs by others of the same group (passenger or crew), with passengers causing the majority of infections.

A first principles study of n-doping of cubic boron nitride with carbon

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Cubic boron nitride (cBN) is a super-hard, ultra-wide bandgap material that is being explored for extreme applications. To realize cBN-based devices, however, one needs to controllably n- and p-dope cBN, which has remained a challenge for this material. Recent progress in harnessing the full potential of cBN include: (i) an elucidation of reasons behind doping limitations in a comprehensive theoretical study [arXiv:2107.04454] and (ii) a successful doping of cBN with carbon in experiment [ACS Applied Electronic Materials 3, 1359 (2021)]. However, the identity of the carbon-based shallow defect remains unknown. In the present theoretical work, we use density functional theory to investigate properties of carbon as a dopant, and the effects of different intrinsic and extrinsic defects that are often present in cBN. Our analysis reveals the possible candidate carbon-based defects with ionizable, delocalized (shallow) impurity states.

Understanding Interactions of Gold and Silver Nanoparticles with Proteins to Achieve Optimum Surface Plasmon Effect

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Improving the detection limits and specificity in spectroscopic methods will allow for earlier disease detection. Surface Enhanced Raman Spectroscopy (SERS) offers the opportunity to do so based on environmental or biological factors. The surface plasmon resonance effect of gold nanoparticles (AuNPs) has shown the potential for more effective detection via SERS based on trace amounts of a specific biomarker and offers the potential for a more targeted and robust response. This work seeks to better understand the plasmonic effect of nanoparticles when interacting with proteins and other biomarkers. For this purpose, AuNPs are synthesized via the Turkevich method to isolate nanoparticles in a range of sizes from approximately 10 to 25 nm that are then used as is or as seeds to develop larger spherical or anisotropic nanoparticles such as nanorods and prisms. These nanoparticles will then be coordinated with various thiol-containing organic molecules as well as a range of proteins and are characterized through several spectroscopic methods to assess the size, shape, and plasmonic effect of these particles.

Radiation Effect on SRAM-based FPGAs for Use in the ISS

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Field Programmable Gate Arrays (FPGAs) are popular devices generally used for its reconfigurability and massive throughput, it can be used as a prototype, controller, and other applications. However, like most integrated circuit (IC) it is susceptible to radiation effects from ionizing particles especially from outer space. This is a study of SRAM based FPGAs and its feasibility to be used in low orbit space such as in the ISS. Common radiation effects such as single event upsets (SEU), multiple bit upsets (MEU), and total ionizing dose (TID) are studied for their separate effects on FPGAs. Although radiation hardened FPGAs (like anti-fuse FPGA and specific flash FPGAs) are already being utilized in space, SRAM based FPGAs are being studied for its commonality, cost of implementation, greater amount of logic, and its ability to be reconfigured versus a one-time configured anti fused FPGA. Mitigation techniques such as memory scrubbing, Triple Modular Redundancy (TMR), register/combinational logic designs along with prevention techniques are also studied for their effectiveness against radiation effects. Modeling tools such as SPENVIS is used to graph and list the different flux from both the atmosphere and orbit. SPENVIS also includes different models of shielding materials and radiation buildup based on a user given time frame. Since different SRAM based FPGAs are manufactured and routed differently, they are independently studied for different radiation effects.

Understanding the Planetary Atmosphere: A Tale of Uranus and Neptune

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The ice giants, Uranus and Neptune, are extremely unique to the solar system and are a great mystery to science; with the icy duo being on the outer edge of the solar system they have been difficult to explore since Voyager 2 in 1986 and 1989. The mystery of the ice giants has captivated the scientific community not only to the lack of information but the complexity of their atmospheres such as their interior, cloud composition, haze layers, and vertical processes.

The atmospheric composition of ice giants can provide key details of the formation and habitability in our solar system and in exoplanetary systems. Ice giant atmospheres are divided into three regions, two of which will be examined: the troposphere and the stratosphere. The troposphere is composed of ammonium hydrosulfide and water ice. While the stratosphere contains methane and a deeper understanding into their photochemistry. This photochemistry is composed of oxygen bearing molecules and particles which may interact differently than Earth's particles. These particles will be generated using the computational method, the Community Aerosol and Radiation Model for Atmospheres (CARMA), to provide chemical, microphysical properties, and interactions in their upper atmosphere. We will review previous observations, experimentation, and computational methods to provide a better understanding of the atmospheric conditions of the ice giants.

SOCIAL SCIENCES

Improving Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) Skills in Women in Transitional Housing in Preparation for Independent Living

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The homeless population in America has been on an upward incline. Due to pandemic restrictions, healthcare services have been inaccessible for this population. The U.S. health system has implemented the use of telehealth services to produce a safe and risk-free environment for patients and clinicians. In this study, we will investigate the effectiveness of telehealth services for women in a transitional housing program to improve Activities of Daily Living (ADL) and Instrumental Activities of Daily Living skills (IADLs) in preparation for independent living. Two instruments will be used to assess self-care skills and the effectiveness of this service. The 20 items ADL/IADL Checklist will be utilized to identify problem areas of need. The Performance Assessment of Self Care Skills (PASS) will be utilized as a pre/post-test to measure the occupational performance of daily task skills. The pretest will be conducted onsite. Upon completion of the pretest, intervention sessions will be rendered via telehealth for 6 weeks. The final post-test will be completed onsite. The purpose of this project is to investigate the perceptions and abilities of clients who live in transitional housing in reference to their ADL/IADL skills. This telehealth service delivery method may have a positive impact for the homeless population to improve ADL/IADL skills to support independent living.

The Impact of Female Labor Force Participation Rate on Economic Growth Theoretically and Empirically: OECD Countries Case Study

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Over the last decades, female participation and representation in the labor market have been gradually increasing. A number of research studies have investigated the factors and determinants of female labor force participation rate, while relatively fewer studies explore the potential impact of FLFP rate on the economy. The objective of this study is to examine the effect of FLFP rate on economic growth in OECD countries as a case study for the last three decades theoretically and empirically. Furthermore, the paper shall consist of the analysis of three different subcategories; total FLFP, skills level, as well as age group. Thus, the estimated rate of FLFP in the OECD members has increased roughly from 48% to 52% between 1990 and 2017.* FLFP rate with medium and high skills has a statistically significant impact on economic growth, whereas low skills female workers have a positive but slight effect.** Female workers whose age 25 and older, up to 64 years old, have a robust impact on the economic growth, yet the female labor under the age of 25 contributed negatively to the economy which could be attributed to several reasons, one of them is the pursuit of educational attainment.

*According to the World Bank Development Indicators (WDI), the labor participation rate of female age 15+.
**Skills are defined based on OECD data source as; high skills for tertiary; medium skills for high school; low skills for below high school.

The Effects of Psychosocial Factors, Stress, and Coping on Maternal Well-Being

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According to the CDC's National Vital Statistics Report (2022), there were 3,605,201 births within the year of 2020 in the United States. Becoming a mother is a personal journey and just like any journey, there are blissful and stressful moments. Identifying and managing those stressful moments are extremely important to the facets of motherhood, including maternal well-being. The literature is consistent in identifying factors that contribute to maternal well-being (i.e., education level, socioeconomic status, mental health, partner/social support and maternal care services/literacy). However, there is a lack of research examining how new mothers cope with stressful factors. Therefore, this research will investigate the relationship between contributing factors and maternal

well-being, operationalized as life satisfaction. In addition, the research seeks to examine the potential moderating role of coping styles (approach and avoidant strategies) in the deleterious impact that stressful factors can have on maternal well-being, as indicated in the literature. Hayes' (2018) regression-based model of moderation will be used to test the hypothesis that the relationship between stressful live events and maternal life satisfaction will be moderated by coping styles among mothers within 1st year postpartum.

Fruit and Vegetable Consumption Decreased among Various Demographic Groups since Covid-19 Pandemic

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The Covid-19 pandemic results in disruptions in economy, social, food security, and stress level of different individual. These changes influence on eating behavior of individuals with various demographic backgrounds. The study's aim was to determine which demographic groups had more significant change in fruit and vegetable consumption since Covid-19 pandemic. The study design was cross-sectional with total of 10,035 participants aged 40-100 years old were employed through Qualtrics by dietary screening tool. SPSS software was used by Wilcoxon's signed-rank tests to analyze the data. Participants were 57% female (43% male), White (75%), African-American (14%), Asian (%7), and Hispanic (4%). The age distribution was 40-60 (38%), 61-80 (%59), and 81-100 (%3) years old. Since Covid-19, fruit consumption significantly decreased among female ($P < .001$), male ($P = .02$), age groups of 40-61 ($P < .001$) and 61-80 years old ($P < .001$), and race groups of Hispanic ($P = .008$) and White ($P < .001$), and all education group ($P < .001$). Vegetables consumption decreased among different demographic groups; however it was not significant except in age groups of 40-60 ($P = .002$), and 81-100 ($P = .002$). Vegetable consumption remained same since pandemic within college degreed participants. These decrease may cause from financial instability and fear of being in the society. The study's results can be used for developing plans for times of crisis by developing some nutritional strategies.

Black Communities and Domestic Terrorism: A Content Analysis of Media Used in Race Riots

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The Reconstruction and Jim Crow eras were defined by social/racial tensions, economic competitiveness, and the eagerness of white people to return to pre-Civil war society. A side effect of these conditions were massacres, or more commonly referred to as race riots. However, it was not these conditions alone that laid the foundation for massacres/race riots to happen. The use of the media and language played an important role by capitalizing off the racial tension. This paper will study four massacres/race riots during Reconstruction and Jim Crow: Memphis (1866), Colfax (1873), Wilmington (1898), and Elaine (1919). I intended to explore the intersection of violence and rhetoric used to justify and incite others to terrorize Black people and Black communities. Using sources i.e., newspapers, speeches, etc., I will conduct a content analysis to quantify the trends and patterns of white supremacist rhetoric and how it transfers into egregious acts of violence. My analysis will explore the role that racist and white supremacist discourse played in degrading Black people and communities, thus impeding the social progress of the Reconstruction and Jim Crow eras.

The Effects of Daughter and Father Relationships and its Impact on Romantic Relationship Satisfaction in Black Women

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The purpose of this comparative study was to explore the effects of Black daughter and biological father relationships as a result of attachment styles. We looked at this impact on partner selection, and its effects on relationship satisfaction within their romantic relationships. Though these topics have been thoroughly researched in general populations, there is a lack of literature specific to Black relationships. There is a need to explore the transference of childhood attachment styles to adulthood and its impact on Black women's partner selection and satisfaction. Findings will aid in improved insight and therapeutic outcomes for Black women.

The Symbolic Annihilation of Black Girls: How K-12 Charter Schools Marginalize Black Girls through Magazine Advertisements

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This study examines discourse around desirability in K-12 school settings as expressed in educational advertisements for K-12 schools in a major city. By conducting a content analysis of a magazine that was created as a marketing vehicle and recruitment tool for public schools, this study explored the extent to which school advertisements reinforce dominant ideologies about what student demographics are desirable. This study also examines societal expectations for students of various racial and gender identities within the political economy of school choice. Using the critical framework of Black feminism to elucidate the intersections of race and gender in the context of the political economy of education, this study interrogated how marginalization of Black girls has been perpetuated by the visual recruitment methods used by charter schools in Washington D.C. Ultimately, the findings suggest that Black girls lack social desirability, defined by a White capitalist system that reinforces dominant ideologies, when it comes to the representation of students in K-12 school magazine advertisements.

Soulful Consciousness: An Examination of the Legacy of the Sound of Philadelphia and Cultural Identity Development

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Although interpretations of the human experience vary individually, they are uniquely shaped by collectivity and relative interactions. This concept of unity without uniformity is signified within the Africana worldview, especially evident in the ways music was used as a creative means of resistance in the face of oppression by Black artists in America. Particularly, the onset of the 1970s marks a transformative period for Black identity development and artistic expression. The sound of "young America" was annotated by new constructions of soul music that examined the Black experience while also reinforcing cultural pride and awareness. The legacy of Philadelphia International Records (PIR) is a paragon of this shift. Whether emphasizing romanticism or communalism, PIR's music was philosophical and thought-provoking. The present work undertakes the study of the socialization of Africana meaning-making practices. The discography of The Sound Of Philadelphia (TSOP) is surveyed by the author to sonically contextualize the cultural identity development of African Americans throughout the late 20th century.

Evaluations, Communities of Color and 5 Suggestions for Improvement

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As humans continue to create and implement social programs and projects, the need for high quality, culturally responsive evaluations will also continue. Evaluations in communities of color, however, have sometimes been known to, directly or indirectly, cause damage though by promoting racial and cultural biases that further stigmatize and misrepresent these communities (Thomas et al., 2018; Caldwell & Bledsoe, 2019; Thomas & Campbell, 2021). This poster session, based upon the results of a content analysis, will highlight specific examples of how evaluations can and have hurt communities of color and offer ways evaluators can minimize or overcome these problems. The content analysis will entail a systematic examination of selected literature (e.g., AEA journals, related books, blogs) published between 2000-2022 to identify problematic themes related to the history and contemporary experiences of communities of color with evaluations and continuing problems arising from those relationships. Based upon this content analysis, the authors will recommend five adaptations for evaluators to make to address changing dynamics and expectations when working in communities of color. The goal of this poster session is to bring attention to factors that facilitate the poor relationship between evaluations and communities of color and to illuminate suggestions for improvement. This poster is related to the conference theme as we are urging evaluators to adapt to the dynamic needs, priorities, constraints, and opportunities when working with communities of color.

The Role of Protein Supplementation in Ameliorating Functional Losses Among Aging African American Groups in the United States

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Background: Adequate intake of protein is essential in maintaining health. It is widely known for its health benefits on the human flora. The one-size-fits-all protein recommendation does not consider age-related changes in absorption, metabolism, immunity, hormone levels, or progressing frailty.

Objective: To show that higher dietary protein consumption is beneficial to support good health, promote recovery from illness, and maintain functionality in older adults aged 65 to 85 years.

Method: The search was conducted using the following databases: Google Scholar and Elsevier. Elsevier and Google Scholar were searched using MeSH terms for articles published from 2011 to 2021. Inclusion criteria included men and women ages 65 to 85 years, functionality - classified as frailty; English speakers, and studies conducted in the United States (US). The Exclusion criteria were gray literature, abstracts, and informational pieces.

Results: The search results from all databases used yielded 3,425 studies. Out of 131 studies, 15 studies met the predetermined criteria for inclusion - 10 systematic reviews, 2 randomized clinical trials, 2 literature reviews, and 1 cross-sectional study. Nine out of the fifteen studies met both the inclusion and exclusion criteria. The total relevant publication summed up to nine studies. Five studies developed updated evidence-based recommendations for optimal protein intake needed by older people. Two studies showed the linkage between higher protein intake and skeletal muscle function in the elderly.

Conclusions: New evidence shows that higher protein supplementation in older adults is beneficial to support good health, promote recovery from illness, and maintain adequate functionality.

Housing Affordability and DC's Homeowner and Renter Property Tax Credit
Presenter's Name: Bethel Cole-Smith
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DC continues to face a housing crisis and housing affordability is a key concern of policymakers. DC's Homeowner and Renter Property Tax Credit (Schedule H) is a circuit breaker tax which provides a refundable credit for lower-income residents whose homeowner tax bill (for owners) or imputed property tax payment (for renters) exceeds a percentage of their household income. To what extent does Schedule H increase housing affordability for program participants? Is the impact different for homeowners compared to renters? Does the program have an impact on the effective poverty rate? This paper uses administrative tax data from the DC Government to answer these questions. First, a comparison is made between the proportion of housing burdened residents with the Schedule H credit and without it, to determine the impact on housing affordability. Second, a difference in difference approach is used to exploit the program expansion of 2014 allowing for understanding of the impact of the program expansion on housing affordability. Third, the incidence of poverty is calculated using a pre-Schedule H household income, as well as a version of household income which includes the credit as an add on. Each of the approaches is applied for homeowners separate from renters. Preliminary results indicate that while Schedule H increases affordability, the size of the credit is relatively small. The expansion increased program participation particularly among seniors. However, the positive effect was mitigated by the stronger rise in housing costs, particularly within the home ownership market.

Beauty Standards of Black Men: The Impact of Colorism
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Colorism has been linked to various negative outcomes for Black people. A significant deficiency exists in publications as most research focuses on Black women and women of color. This study aims to review literature that explores the experiences of colorism amongst Black men in America and its effects on self-concepts and beauty standards. Needs for this research stem from the lack of literature specifically aimed at Black men and how colorism affects them psychologically and implications that may result. This comparative study reviewing the current literature was compiled as a basis for future studies on this imperative subject matter.

Masc Scripts, Masked Men?: A Proposed Study of Self-Gender Policing in Gay African American Men
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Boys and men in the United States are expected to adhere to masculinity standards. Gay African American men are held to the same standards despite being judged as "not real men" because of their sexual identity. Research has demonstrated that gay African American men are subject to similar gendered socialization processes as their heterosexual counterparts. As such, these men may be inclined to perform masculinity when social contexts demand it. They may do so by engaging in self-gender policing: the alteration and restriction of expressions that could be perceived as feminine as well as the enactment of masculine expression. Using Interpretive Phenomenological Analysis, the present study seeks to explore the lived experiences of gay African American men who engage in self-gender policing. It aims to elucidate their reasons for self-gender policing, what the experience is like for them, what it means for them to meet masculinity standards or not, and how their cultural identity influences their actions. The findings can used to inform masculinity discourse and the clinical work of helping professionals working with gay African men who present with concerns related to masculine norms and socialization. This presentation will accomplish the following: discuss the precarious nature of masculinity in the U.S.; review traditional and Black masculinity standards to which gay African American men may be held; provide a model through which to understand self-gender policing; explain the present study's methodology; and facilitate an interactive discussion as it relates to the study's structure, rationale for inquiry, and expected findings.

Past and Present: A Study of Oral Traditions that Heal and Mitigate within the Black Diaspora

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Oral traditions such as storytelling travel from generation to generation in attempts to maintain a culture and its memory (Mitchell, 1986). Storytelling, Negro spirituals, and the church affiliated call and response laid the foundation for artists of the Harlem Renaissance to demonstrate the importance of a crucial concept that many struggled to find within the Black Diaspora, identity ("Say It Loud", 2020). Social identity functions as a person's awareness of belonging to a social group or category combined with the value and emotional significance of belonging(Hughes et. al, 2015). The combination of social identity theory developed by Hogg (2006) and the research about internalized racism, which predicts negative effects of self and group evaluation due to treatment or stereotypes, can be utilized to observe and predict mental health patterns. Researchers have been able to conclude that while ethnic identity is less related to mental illness,African Americans display a strong racial identity and positive group evaluation relates to lower mental health syndromes such as depression (Hughes et. al, 2015). This study aims to investigate how oral traditions serve as verbal healing agents for individuals within the African diaspora and mitigate mental health disparities. Studies regarding activities supplementing the idea of positive social identity, such as spoken word, often provide a means of educating, empowering, and supporting individuals within communities of color (Fisher, 2003). These studies represent attempts to promote and continue lost cultural practices. Here, spoken word and storytelling are the two primary avenues that will be observed.

Educating Howard Nursing Students about Human Centered Design(HCD) for Expectant and Parenting Teens (EPTS) presenting with challenges to finish High School: A Pilot Study

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Background: Parenting is not easy at any age. Expectant and parenting teens, face additional challenges which in many cases have led to dropping out of school. Human Centered Design (HCD), is a creative approach to problem solving that allows direct input from the users which leads to empathetic ideation, prototyping and ultimately implementation. Nurses can use HCD to create interventions that are based on empathy and are end-user specific. Before nurses can begin to practice HCD, they must first be provided with meaningful and specific education about HCD.Therefore, the aims of this study are to: (a) evaluate the effectiveness of HCD education for Howard Nursing students. (b) Using a case scenario, design an intervention that is HCD informed. Method: This is a pilot study with a mixed methods design. Quantitative data were collected with a 17-item pre- and post-education questionnaire. Qualitative data were collected by asking nursing students their view of HCD after their 8 week rotation at DCNEXT. Results: A total of 25 nursing students participated in the HCD education. None of the students had previously heard about HCD. There was a '0' score on the pre-education survey while a 100% score on the post-education survey. All the students planned to integrate HCD in their practice. Conclusion: The students were able to use the HCD process to develop a logo that would be placed on EPTs Childcare website. 25 students were trained on HCD.

Keywords: HCD, EPTS, Nursing students.

Quantifying the impact of Sanitary and Phytosanitary (SPS) Measures in Agriculture: United States Beef Exports to Japan

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This paper estimates the impact of Japan Non-Tariff Measures (NTMs) categorized as Sanitary and Phytosanitary (SPS) imposed on United States (USA) Beef Exports. SPS measures may have a dual impact on trade as catalysts or barriers. Japan has recently implemented NTMs on global Beef exports, particularly implementing SPS measures on USA Beef exports; USA Beef Exporters argue the SPS measures are more restrictive than necessary under the SPS Agreement. SPS measures are becoming more popular in use, and the effects of these newly implemented measures are largely unknown. Using a structural gravity approach with bilateral import data from the United Nations (UN) Comtrade and NTM data between Japan and top Beef exporters from 2010 to 2019, we disentangle the trade effects of Japan's SPS measures. We conclude that the SPS measures imposed by Japan on USA Beef exports are a significant barrier to trade. Our findings show that the imposed SPS measures decrease the USA Beef export value by 2.8% or 56 million in monthly trade value. Our findings have important policy implications: SPS measures are increasing in use, and the effects across different commodities need further exploration to determine effectiveness.

Evaluation of a Sleep Education Program: Addressing Sleep Hygiene among Adolescents during the COVID-19 Pandemic

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Sleep is essential to adolescents' mental health. Insufficient sleep can pose a myriad of risks, such as attention and behavioral problems, poor academic performance, and mood disturbance. Since the emergence of coronavirus disease-19 (COVID-19), there have been rising concerns about the implications of the pandemic on adolescent sleep hygiene. The recurring waves of COVID-19 have presented various lifestyle changes, including lockdowns, travel restrictions, and virtual learning, which have impacted adolescents' daily routines. Considering the limited literature on this emerging topic, it is essential to address sleep hygiene among adolescents in light of the stipulations during the pandemic. The aim of this program was to integrate sleep education into a pre-existing infrastructure of school-based health services in two urban public middle schools to increase sleep knowledge among underserved adolescents. Clinicians in our program conducted sleep education modules with 80 students (61.3% female; 73.8% African American; mean age = 11.86 years) during their virtual health education classes. A culturally responsive video that addressed sleep health topics was viewed by students. The students were asked to fill out a survey concerning sleep duration and sleep knowledge at two intervals: prior to watching the video (pre-intervention assessment) and after watching the video (post-intervention assessment). The preliminary results of the program revealed significant improvement in sleep knowledge (d = -0.37) following participation in the program. Follow-up studies are required to see whether the increase in sleep knowledge can be translated into actionable and sustained behavior changes among adolescents.

Exploring Black Learning, Love, and Loss

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Historically, Black familial and marital relationships have endured as a central consistency in Black lives as they experience various life and role transitions. Graduate students in particular experience a great deal of transitions and are expected to manage stress as well as the disparity between their family and neighborhood culture and that of their academic institution (Howard, 2017). One substantial transition that disproportionately affects Black families and students is the possible loss of a child. According to the Centers for Disease Control and Prevention, Black families experience a higher prevalence of child death where the 2019 death rate for Black children was 85 per 100,000 (2020), which has deleterious effects on the marital/familial system. The death of a child places a great amount of stress on the parents' marriage and is a significant risk factor for divorce (Albuquerque et al., 2016). Examining this potential stressor is important for this population, considering that divorce rates among Black women are reportedly higher than all other racial groups and Black women are the most educated group in the United States (Schweizer, 2019). This presentation will utilize a strengths-based approach to explore adjustment within roles of African American marriages and families that are associated with familial structural shifts. Moreover, we will teach critical skills related to communication and highlight unique ways we can support graduate students experiencing loss within our research and practice.

Doing Black Podcast Studies: Exploring the Black Oral Tradition and Critical Media Literacy in Alternative Media

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Presentation Type: Oral Presentation
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Black podcasts exist as a new form of digital media that is quickly growing in popularity but remains understudied. This study will employ the circuit of culture as a theoretical framework and seeks to: conceptualize Black podcasts as an alternative media news source; recognize Black podcasts as a form of critical education; and conceptualize Black podcasts as a form of critical media in popular culture that transforms communities through counter-hegemonic dialogue between producers and consumers that continues the tradition of Black orality.

These goals will be achieved by conducting a thematic analysis on three Black podcasts in order to analyze the ways Black podcast hosts use Black oral traditions to encourage critical dialogue and provide more diverse representations of Black communities. Focus groups with Black podcast listeners will also be employed to garner insights about their consumption habits, contributions to the podcasts they listen to, and how listening to Black podcasts helps them to think more critically about media.

Preliminary results indicate that Black podcasts engage in critical dialogue that exposes hegemonic structures in mainstream media and promotes ways to challenge hegemony. In addition, Black podcasts are community centric and work to integrate their audience's perspectives within their content. Furthermore, Black podcasts employ Black oral traditions within their shows, primarily the use of humor, storytelling, and Black vernaculars. This study contributes to cultural studies by validating Black podcasts as a communication practice that fosters community building and serves as a critical educational tool in the fight against oppression.

The Aesthetic of Gentrification: An Analysis of the Relationship Between Murals, Graffiti, and Gentrification in the Union Market District

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Gentrification is a major social force and developmental ideology that is affecting communities nationally and internationally. In Washington D.C. the effects of gentrification are being felt across quadrants and neighborhoods. The neighborhood including and surrounding Union Market—known as the Union Market district—is one that has been subject to rapid gentrification in recent years. This project focuses on the Union Market district and on the visual interplay between graffiti (civilian posted street art, typically without permission) and murals (formally commissioned street art). The study sought to uncover how gentrification relates to murals, how graffiti interact with these murals, and how graffiti asserts identity. Research using public, city-planning documents provided background information on gentrification plans and served as a reference for locating the area defined as the Union Market district. Examination of all murals and graffiti within this neighborhood, supplemented by photographs, allowed for the documentation of the relationship between the two types of visual expressions. Interviews with selected businesses help clarify the relative chronology of the art. The results of this project suggest that murals are often employed to reinforce the aesthetic of gentrification. Visual forces are a powerful and important part of asserting a gentrified area as gentrified. Murals have been used to mark Union Market implicitly as "developing." Graffiti often interacts with murals, either by proximity or superimposition, offering a counter-narrative. This project illustrates the unspoken ways in which neighborhoods express their own identities and assert singularity within the alienating anonymity of the gentrified city.

Student debt, Housing Payments, and COVID-19: Implications of Paused Student Loan Payments

Presenter's Name: Felipe Juan
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Student debt has become a major topic of conversation since the continual increase of student loans, doubling to $1.75 trillion in 2022. With the current pause on student loan payments expiring on May 1st, 2022, the implications and anticipation of those with student debt has very current implications which can influence consumption and saving as the Covid-19 pandemic continues. This paper attempts to determine the relationship between housing payments and student debt using the Survey of Household Economic Decision-making (SHED). Preliminary analysis suggests homeowners would benefit more from paused student loan payments from 2019 data based on the ratio of median student debt payment to mortgage payment but recent changes to the SHED have allowed for linkages between various years to

examine. This allows for a longitudinal analysis to examine the variation which has resulted from the Covid-19 pandemic, attitudes towards having to repay, and changes in jobs, especially for those who did not obtain a four-year degree after taking one or more student loans and those currently unemployed while not having to pay their loans.

Unemployment Insurance and First Eligibility: Exogenous or Endogenous?

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Coauthors:

Since the inception of unemployment insurance (UI), debates have sparked regarding the efficacy of this social safety net. Current research examines unemployment insurance as an exogenous factor, but policymakers' goals may differ from the purpose of unemployment insurance. The assumption is that policymakers want to provide unemployment insurance with easier access during economic downturns. However, the degree to which policymakers desire to accomplish this goal varies due to different factors. This paper attempts to provide evidence that unemployment insurance eligibility is an endogenous factor, rather than exogenous. This implication hints at different motives policymakers have when deciding what eligibility requirements are needed for unemployment benefits for displaced workers. Using various controls for race, union density, and employment, among other variables, preliminary results indicate there is some statistical significance between first eligibility requirements to qualify for unemployment insurance and the recipiency rates for each state. This implies policymakers have alternative motives to assign certain eligibility requirements, potentially creating more difficult barriers for workers who have lost their jobs and providing more insight into the contention of unemployment insurance. The data used is compiled from various sources from the US Department of Labor, state UI recipiency rates, Community Pulse Survey, examining 2006 through 2019 using the variation of the Great Recession of 2008.

"I'm a Weirdo": Gender, Race, and Autism Representation in Television Comedy Atypical

Presenter's Name: Charrosé King-Mathews
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Presentation Type: Oral Presentation
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Women and racial minorities are disproportionately diagnosed with autism compared to their white male peers (Aylward et al., 2021), negatively affecting their opportunities for treatment and a better quality of life. On Netflix, a show called Atypical centers on the experiences of a white, middle-class autistic boy in high school named Sam. The show had some of the most poignant observations of my own life that I had ever seen on television—and I am a Black woman in her thirties who had not yet been diagnosed with autism. Identifying so strongly with Sam convinced me to get clinically tested, which led to a diagnosis confirming that I am autistic. Black women are at significant risk of having their medical challenges ignored due to a systemically racist medical system (Malat, 2006; Kennel et al., 2019). Media such as Atypical have a discursive role in how society perceives certain traits, illnesses, and disabilities. As diagnoses for autistic women climb (Gould, 2017), demand for treatment will rise, and comedy can be effective in making challenging situations less daunting. After analyzing Atypical's scenes with mixed methods of textual analysis and autoethnography, I expect to find significant differences between my experiences and Sam's based on our race and gender differences. I will use the theory of intersectionality to identify places where interwoven marginalized identities may compound challenges. By studying those differences, I hope to help expand our understanding of autism to improve diagnosis and treatment options for Black women and girls.

The Impact of Covid-19 on the Mental Health of College Students

Presenter's Name: Dominique Knott
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Presentation Type: Oral Presentation
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Background: The COVID-19 pandemic has significantly impacted the mental health outcomes of those in the United States. Mental health costs amongst college students are widely felt across many college campuses.

Objective: The purpose of the following study was to examine the impact of COVID-19 on the mental health of college students. Moreover, the study explores how the pandemic affected the mental health of minority college students, particularly those attending a Historically Black College or University (HBCU).

Methods: A review of the literature was conducted to determine the impacts of the pandemic on the mental health of college students. These findings were examined with key informant interviews by directors of college mental health counseling centers. An innovative solution was conceptually

developed,drawing from the key findings from the literature review and key informant data. This research was funded by the Howard University School of Social Work Founders Fellowship Program.

Results: The findings from these data sources show that college students experienced an increase in reported stress, anxiety, and depression. Students reported a loss of connection and belongingness to the campus university. There was a positive correlation between a sense of belongingness and the mental health challenges students experienced. Staffing challenges at university counseling centers and a lack of resources for students contribute to high rates of mental health challenges. The implications for research, policy, and practice are discussed through the Howard University School of Social Work Black Perspective lens. An innovative solution is presented using digital multimedia imaging and architecture.

Black Daughters and Disordered Eating: Parenting as Prevention and Treatment

Presenter's Name: Jonece Layne
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The prevalence of eating disorders does not vary significantly across racial groups. However, the female to male prevalence ratios of the most common adolescent and adult eating disorders – anorexia nervosa, bulimia nervosa, and binge eating disorder – are 10:1, 10:1, and 2:1 respectively, showing that these are of special concern among women (APA, 2013). Despite endorsing comparable levels of disordered eating behaviors, Black women endorse fewer eating disorder cognitions than White women (Moore et al., 2014). Furthermore, evidence-based treatments have been shown to contribute to a reduction in eating disorder cognitions among Black women, but not to a corresponding reduction in eating disorder behavior (Masuda et al., 2018). These results suggest that disordered cognitions play a smaller role in the pathology of Black women with eating disorders than they do for White women, providing reason for researchers to adopt a different conceptual model that better explains the behavior in the target population. We propose a bioecological model, to be evaluated in a subsequent study, that considers the interactive effect of environmental, cultural, social, and personal factors on the individual in addition to the effects of each factor singly. Ethnic identity and parenting have emerged as variables of particular interest, with the potential to serve as protective factors. According to this model, psychologists should empower Black parents to take an active role in eating disorder prevention and treatment for their daughters by fostering the development of their daughters' ethnic identity and strengthening specific parenting dimensions, like connection and nurturance toward daughters.

Disinformation on Social Media During a Pandemic

Presenter's Name: Keesha Middlemass
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Coauthors: Roger Caruth, Bahiyya Muhammad, Angela Pashayan, Natalie Gayles

In four linked presentations, the Digital Informers will: 1) explore the history of disinformation in the Black community (Natalie Gayles); 2) problematize the issue of disinformation (Angela Pashayan); 3) explore the role social media plays in spreading disinformation to the Black community (Dr. Roger Caruth); 4) look at the consequences of disinformation during a pandemic (Dr. Keesha Middlemass); and then 5) conclude with best practices on how to combat disinformation on social media (Dr. Bahiyyah Muhammad). Each presentation will build upon the previous one to tell a holistic story about the rampant spread of disinformation on social media and how disinformation has shaped who gets vaccinated. Preliminary analysis based on data collected in 2021 shows participant's political leanings and where they get their news information shapes their belief systems. The data analysis allows us to examine the key differences between who in the Black community is getting vaccinated and who remains (at the time of data collection) unvaccinated. Despite evidence that Black people have been dying from covid-19 at higher rates than other racial groups, the group of Black people who get vaccinated and do not get vaccinated is linked to the time each spends on social media and if they believe in conspiracy theories.

Pelo Bueno?: A Discussion on Redefining 'Good Hair' for Latinx Women in the U.S.

Presenter's Name: Ashley Ortiz
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White-dominated American culture has racialized beauty so that hair that reflects European ancestry is more attractive than hair that reflects African ancestry. For Latinx women, their identity and beauty have been constructed by these ideals and stereotypes of what constitutes 'good hair." This qualitative study aims to uncover how concepts of good

and bad hair expose American beauty standards akin to the internalization of white supremacy and its influence on Latinx identity through racially salient features like hair color, texture, and hairstyles. Through exploration of meaning and rich experiences of Latina women's hair, this study seeks for discussions on messages that communicate hair valuations to Latinx women, perceptions of racial and ethnic identity due to their hair, definitions of good and bad hair, and their motivations for desiring their meaning of good vs. bad hair. Preliminary data results from a thematic analysis will be presented.

Can Systemic Racism Be Dismantled?

Presenter's Name: Vanesa Perry
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Coauthors:

Can systematic racism, defined in this work as the battle of the beast, actually be dismantled? According to this author, not in our lifetime. Psychological as well as societal ills within American society, coupled with ancestral memory, make systematic racism an intergenerational trauma thus an intergenerational battle; one that must be fought in each successive generation before it may ultimately be dismantled. As such, each generation has its particular role to play in this battle. White supremacy, the culprit who undergirds systematic racism, is itself a psychological disfunction brought to this land in the psyches of many of its European settlers which has perpetuated itself, in some, from generation to generation through ancestral memory and learned behavior. Its effects crowd our history; slavery, 1612-1865; the Trail of Tears, 1830-1839; the Tulsa Race Riot, 1920; the Civil Rights Era, 1954-1968; reaching into the present day with the continual shooting of African American youth in our city streets and culminating into that iconic moment in the death of George Floyd, May 25, 2020, just to mention a few. Thus, as the fruit of white supremacy lures its ugly head, in each successive generation, the battle must continually be fought by all those to whom it affects.

Keywords: systematic racism, ancestral memory, white supremacy, intergenerational battle

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The New Mammy: How Lovecraft Country's Hippolyta Freeman Circumvents Stereotypes About African American Women

Presenter's Name: Aisha Powell
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Lovecraft Country was a horror sci-fi show that premiered on HBO in August 2020. The series followed the lives of a Black couple, toggling living in a racist town, uncovering family secrets and traveling through time to save their future. While the plot centers on the reality of combatting a racist world in a fictional fantastical way, it also features the lived experiences of three prominent Black women. Historically, African American women are portrayed in highly stereotypical roles in the mainstream media– the most prevalent being that of the mammy – that revolve around character assassination, false moral assumptions, and highly biased physical attributes. Even in the turn of the 21st century, and a litany of reports calling for more diverse representations of women in the media, Black women are still seen in these stereotypical roles. The premise of Lovecraft Country, however, allows for a bit more nuisance and depth to the roles of Black female characters. This study will examine the development of Hippolyta Freeman – the housewife mammy figure with adventurous dreams of finding out who she really is. Utilizing a media content analysis and critical analysis, the researcher analyzed all 10 episodes of the show to map the growth and trajectory of Hippolyta during the first season. Guided by Black Feminist Thought, the study aims to center Hippolyta's experience as "Black" and "women" within the show, and subsequently reality, and how she subverts stereotypes, social inequality and hegemony throughout the series.

Imperfectly perfect: Examining psychosocial safety climate's influence on the physical and psychological impact of perfectionism in the practice of law

Presenter's Name: Samantha Powers
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Existing evidence suggests that perfectionism is related to depressive symptoms, burnout, and clinical disorders and that socially prescribed, rather than self-oriented, perfectionism is the most maladaptive. Thus, social expectations of perfection can have detrimental effects on workers that may

result in negative organizational outcomes. Using a sample of 176 Arizona attorneys, this two-wave longitudinal study examined whether psychosocial safety climate (PSC) may reduce perfectionist ideals and, in turn, improve employee well-being. Expectedly, PSC negatively influenced physical and psychological distress 2 months later directly and indirectly via socially prescribed perfectionism, suggesting that the beneficial impacts of positive PSCs may manifest over a relatively short period of time. Contrarily, self-oriented perfectionism was not related to PSC, suggesting a demand-resource mismatch, and positively related to physical symptoms only. These results suggest a more complex relationship between self-oriented perfectionism and employee well-being, perhaps depending on other variables.

The Relationship Between Spirituality and Creativity

Presenter's Name: Garima Rokaya
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The relationship between spirituality and creativity has a long history within human civilization (Sasso, 2020). Since humans are both creative and spiritual beings by nature, there is an inseparable relationship between both (Corry et al., 2015). While the relationship has been studied theoretically, there are still overarching empirical questions about the nature of the relationship between these two constructs. In this study, we will report the findings from a systematic review of existing literature about the relationship between spirituality and creativity. Spirituality is believed to take us to the inner realm, which is the basis of creativity. When our mind is calm and relaxed, creativity wells up from within (Narasimhan, 2018). Hence, this study will give insights about spirituality giving space to creativity in our mind. This research will draw a connection between past research and current ideas about spirituality and creativity. By having a more empirical understanding about their relationship, it can be useful for creating opportunities for people to sharpen their creativity skills, have better mental health and an improved relationship with themselves and the environment(Corry et al., 2015).

"You Shouldn't Have to Feel Like That Here": Differences Between HBCU STEM Male and Female Perceptions of Racism and Sexism

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Coauthors:

The National Science Foundation (NSF) has reported that 30% of Black Science and Engineering (S&E) doctorate recipients earned their bachelor's degree from Historically Black colleges and universities (HBCUs), yet HBCUs represent nearly 3% of U.S. institutions of higher education (Toldson et. al., 2021). Existing research explores the manner in which undergraduate minority students perceive and cope with events of racism and sexism at predominantly white institutions (PWIs), yet investigations about the experiences and perceptions of minority students at predominantly nonwhite institutions such as HBCUs is contemporary at best (Lewis et al., 2013; Sanchez et al., 2018; Solorzano, Ceja, & Yosso, 2000; Toldson, 2021). Given that HBCU's have been shown to be the leader in production of Black Science Technology Engineering and Mathematics (STEM) career professionals, exploration of student experiences and perceptions of discrimination such as racism and sexism at HBCUs is of interest. Specifically, the experience of Black STEM female students at HBCUs is of intrigue as they simultaneously belong to two historically marginalized groups which allows susceptibility to racism and sexism. The following will be a literature review detailing the history, significance, and rationale of the larger investigation. The aim of the larger investigation is to compare perceptions of racism and sexism of male and female STEM students exclusively at HBCU's. The use of secondary data from the HBCU-Core NSF grant funded project will be utilized to ascertain and compare any differences in the perception of male and female STEM students at HBCUs.

Behind the Scenes: How Inclusivity Affects African-American's Involvement in Musical Theatre

Presenter's Name: Lauren Smith
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In recent years, the conversation around diversity, equity, and inclusion has become a heavily discussed topic for the workplace. There has been a call for the United States workforce to better reflect the people within American society today rather than the largely white demographic of past years. This movement has also swept the entertainment industry, where campaigns such as #OscarSoWhite and #DearWhiteAmericanTheatre called into question the lack of diversity in film, award shows, and theatre. Musical theatre specifically remains largely undiversified and little integrated. Faces on stages are changing, but behind the scenes, the world is still struggling to adjust. Composers, producers, and other key players remain permeated with a white male

demographic. This study explores the way that inclusivity- or the lack thereof- within the field of musical theatre affects the participation of African-Americans in this career. Primary research on training programs across the U.S., combined with surveys and interviews of students and industry professionals highlight their experiences and provide the necessary insights that help understand this phenomenon. Results suggest that the lack of inclusivity as well as a lack of resources for adequate training impede African-Americans from pursuing this career path. As difficult as it already is for Black performers, the obstacles only grow larger for those who may want to discover the avenues of composition, playwriting, or production. This project reveals the added issues that further prevent Black students from pursuing musical theatre when compared to White students who have greater access to opportunities.

The Role of Sociopolitical, Religious, and Personality Factors in Vaccine Uptake and Hesitancy: Implications for Public Health Approaches.

Presenter's Name: Tess Starman
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Coauthors: Jules Harrell, Terri Adams, Ronald Hopson, Michelle Dovil

The COVID-19 pandemic has led to the worst public health crisis in modern history. According to the Center for Disease Control, vaccinations are considered the best antidote to the virus, yet a large segment of the population remains hesitant of the vaccine. The ability to increase vaccine uptake relies upon the availability of accurate and reliable information, and the proper behavioral responses of the public. This study aims to examine the role of avoidance coping, religious coping, trust in government, and race in relationship to vaccine hesitancy and uptake. In a national survey of United States adults (N=1582) from May 2021, this study finds that avoidance coping is a strong predictor of vaccine actions and intentions. Additional analysis suggests that religious coping moderates the relationship between avoidance coping and vaccine hesitancy differently depending on race. Trust in government also impacts the relationship between avoidance and hesitancy of vaccination, though it functions differently depending on racial identity. The findings from this study suggest that messaging around the COVID-19 should not only take into account the array of coping styles employed by the United States population throughout the pandemic thus far, but also utilize socially indigenous messengers within particular groups, namely religious groups, to increase vaccination rates.

Assessing Female Representation in the Department of African Studies, Howard University

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In the mid-1900s, the American university system experienced a wave of reforms amidst the socio-economic changes that swept across the country. The intense social and political pressure led universities to adopt more inclusive strategies to ensure educational equity and diversity within their communities. Since then, women have made significant gains within the university system. However, despite these advancements, women in general, and particularly Black women in academia still face major hurdles in their professional careers.

This qualitative study adopts a feminist lens to assess the status of female students, staff and faculty. Particularly, it examines this within Howard University's Department of African Studies since its inception in 1953. The study finds that female students, faculty, and staff have been integral to the successes recorded by the department. Moreover, a comprehensive history of the department cannot omit the esteemed and pioneering role of female students, faculty, and staff. Nonetheless, the study also finds that despite balancing teaching and administrative responsibilities with high-quality research, female faculty are yet to become full professors. The department's lack of a female chair in its sixty-nine years existence reiterate this point. This indicates that there are underlying impediments that female faculty struggle with within the Department of African Studies, Howard University. Subsequently, this paper examines these latent obstructions and their implications on gender dynamics within Howard University and higher education generally.

Key words: Academia, University system, Gender Equality

Bangladeshi Immigrants' Preventive Health Practice and Stress Management During COVID-19: A Cultured-Centered Approach

Presenter's Name: Jamal Uddin
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Coauthors: Wei Sun

Underrepresented communities were disproportionately the victims of the COVID-19 pandemic across all states in America. Therefore, the study investigates the health experience of Bangladeshi low-income immigrants in the USA to understand their preventive health practice and the stress-buffering process during COVID-19. The culture-centered approach is applied for data analysis. Conducting 15 interviews, including working women and undocumented immigrants, this study finds that the immigrants put God as the central phenomenon to address the COVID-19 related health risk. Their preventive health practice and stress-buffering process were dominated by the traditional home remedies, common preventive measures, and prayers. However, undocumented immigrants were in vulnerable conditions mostly for job loss or continuous working amid fear and not having financial support from the government.

Big Data Analysis of Nigeria's Financial Transactions
Presenter's Name: Aisha Udochi
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This paper investigates important questions around economic organization and specifically whether there was a statistically significant change in market concentration between goods and services industries after the COVID-19 pandemic hit Nigeria. This research contributes to broader discourse on development economics, income inequality, and the power of financial technologies to bridge gaps in wealth outcomes. The United Nations notes that "critical data for global, regional, and national development policymaking is still lacking. This is particularly true for the poorest and most marginalized [populations]," including the world's most populous black nation, Nigeria. With access to a unique and big data dataset of financial transactions on Nigerian firms and banks around the country this paper sheds light on market concentration and makeup for the seventh largest population in the world. Additionally, financial data typically comes in gross flows, however, this data set is comprised of granular observations, making it especially valuable and capable of providing rich insights into the business cycles and distribution of wealth in Africa'smrichest country. We find that despite being susceptible to underdevelopment phenomenon the "advantage of backwardness" was unable to shield Nigerian industries from the adverse impacts of the COVID-19 pandemic calling for greater intentionality around development and financial inclusion strategies at the local and federal government levels.

"We started out with clues, and now it's what... student loans?": Encoding & Decoding Nostalgia in Blue's Clues 25th Anniversary Video
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This study uses Stuart Hall's encoding and decoding model of communication to investigate the ways in which Twitter users derived meaning from Nick Jr.'s nostalgic Blue's Clues 25th anniversary video. It was determined that while the overall goal of the network was to generate revenue and viewership for Blue's Clues and You!, Twitter users – who did indeed decode according to the three positions Hall advocates – showed responses that overwhelmingly adopted the preferred reading. When considering the encoding and decoding model's propensity for collective action and resistance, questions arise. One of which is: do capitalistic endeavors such as the Blue's Clues text negate authenticity on the part of the text, and valuable meaning making on behalf of audiences? Keywords: Blue's Clues, encoding, decoding, Nick Jr., cultural studies, nostalgia

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Representations of Black Love in Contemporary Romance Novels: How Do We Get to Happily Ever After?
Presenter's Name: Dana Williams-Johnson
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Romance novels are one of the top selling genres within fiction and help to shape how society views love and relationships. They are also rooted in White hegemonic ideas of love, relationships, and gender roles in society. Romance novels that make it to the best seller lists often exclude Black men as the main love interest and reserve them for African American romance imprints. What does that lack of Black men to love say about how society views Black love? What does this say about what Black women should fantasize about or expect for love in their own lives? This study will analyze contemporary romance novels from New York Times best-selling author Talia Hibbert to see what representations of Black love are presented to the masses and what that says about Black women's choices in romantic relationships.

What Explains Low Stock Market Participation Among Black Americans? Evidence from the Survey of Consumer Finances

Presenter's Name: Malik Woullard
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In this paper, I hypothesize that relatively low direct stock market participation among Black Americans is due primarily to poorer economic conditions, compared to white Americans. To provide context, this paper explains the history of Black-White economic gaps. To test the hypothesis, this paper draws on data from the 2019 Survey of Consumer Finances and finds that much of the stock market participation gap is explained by variables representing demographics, finances, risk tolerance, financial literacy, and self-reported financial knowledge.

Translational & Clinical Sciences

Nanotechnology Platform for the Treatment of HER2-Positive Breast Cancer

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Statistical experimental design, fabrication, characterization, and computer optimization of stealth pH-sensitive biodegradable polymeric nanoparticles fabricated by dispersion polymerization for simultaneous delivery of paclitaxel and 17AAG for breast cancer therapy were carried out. pH-sensitive crosslinker and a poly(βcaprolactone macromonomer were synthesized and characterized. Central composite face centered design (CCF) in three independent variables was used for response surface modelling. Seven response variables were evaluated. Computer was used for optimization to select factor combination to minimize the particle size, time (h) for maximum release of paclitaxel and 17-AAG, to maximize paclitaxel and 17-AAG loading efficiency and to maximize paclitaxel and 17-AAG encapsulation efficiency. Following computer optimization, the selected factor combination was used for the fabrication of paclitaxel and 17-AAG loaded nanoparticles for in vivo evaluation. Two breast cancer cell lines (MCF-7 and SKBR-3) were treated with media only, blank nanoparticles, paclitaxel (as a free drug), 17-AAG (free drug), paclitaxel + 17-AAG combination (as free drugs), and paclitaxel + 17-AAG combination loaded in poly-βcaprolactone stealth nanoparticles. Each drug in the combinations was half the concentration of the single free drug. Paclitaxel and 17-AAG were effectively loaded and released from the polymeric nanoparticles. Paclitaxel (free drug), paclitaxel-17AAG combination (free drugs), and dual drug-loaded nanoparticles had similar cytotoxic effects in both cell lines. Paclitaxel and 17-AAG combination resulted in synergistic effect: : paclitaxel in combination with 17-AAG was half its original concentration and yielded similar cytotoxic effect. The dose of paclitaxel was reduced without lowering its therapeutic efficacy.

The Use of Motivational Interviewing in the HIV/AIDS Population to Address Nutrition-Related Health Disparities in Acute Care Settings: A Narrative Review and Case Report

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Introduction: Highly Active Antiretroviral Therapy with personalized medical nutrition therapy (MNT) can positively affect nutritional status of individuals with human immunodeficiency virus or acquired immunodeficiency syndrome (HIV/AIDS). Current literature focuses on adherence to medication. Data on adherence to MNT recommendations, intervention strategies, and barriers to adherence are scarce.

Case description: A 52-year-old African American female admitted with HIV, altered mental status, weight loss, and medical history of hyperlipidemia, bipolar disorder, schizophrenia, gastroesophageal reflux disease (GERD), deep vein thrombosis (DVT), and polysubstance abuse. She reported non-adherence to HIV treatment recommendations despite prior nutrition education, consumed 25 - 50% of meals, reported difficulty chewing, had low hemoglobin, hematocrit, blood glucose, CD4+ of 494, and healthy BMI. The nutrition diagnosis was severe chronic disease or condition-related malnutrition related to diminished intake and limited adherence to nutrition recommendations as evidenced by consumption of <50% of meals per patient and severe weight loss of 37% over 7 months, moderate fat loss (buccal fat pads), and moderate muscle loss (temples).

Discussion: Literature findings of malnutrition and HIV were borne out in our case. A mechanically-altered diet was prescribed with goal of increasing oral intake to >50%. We used motivational interviewing and coordinated care with the social worker. Patient displayed behavior and language consistent with a possible transition from contemplation to preparation stage of change. We monitored percent meal consumption in 24-48 hours and readiness to achieve jointly-developed goals.

Conclusion: Individuals with HIV/AIDS may benefit from counseling techniques (e.g., motivational interviewing) in acute care settings. Further exploration is warranted.

Site specific Drug Delivery for the Treatment of Gliomas

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Glioblastoma (GBM) is the most common and aggressive type of central nervous system tumor, accounting for 48% of all cases. Despite the standard of care therapy, the estimated length of survival for glioblastoma patients remains dismal (only 12 to 18 months) while the recurrence rates remain high (90%). Challenges to the success of treating 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, and resistance to radiotherapy and chemotherapy.

To improve delivery to the GBM tumor site, many strategies have been developed to penetrate the blood brain barrier and improve drug accumulation in the brain. Although these strategies improve drug concentration in the brain parenchyma, they typically use single targets to cross the BBB, lack selectivity for the tumor cells, and remain a major concern; as untargeted delivery of cytotoxic drugs to healthy cells causes neurotoxicity. Inspired by the high target affinity and specificity of peptide drug conjugates, we synthesized and characterized a dual targeted peptide drug conjugate equipped with T7 (HAIYPRH) peptide to target and cross the blood brain barrier via receptor mediated transcytosis and a cysteine cathepsin B cleavable peptide that is site specific to the GBM tumor microenvironment.

In vitro cleavage studies show that the drug was released under conditions that mimic the in vivo tumor microenvironment. These preliminary results suggest that the system could be further developed for the treatment of glioblastoma resulting in improved therapeutic efficacy.

Exercise intervention-induced expression of CBS enzyme and SRSF2 splice factor in elderly African American with MCI: Implication for H2S generation and homocysteine removal (GEMS-1 Pilot Study)

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Aging is a heterogenous process characterized by decline in metabolic fitness, accumulation of undesirable metabolic changes, and cellular senescence. The incorporation of lifespan-extending platforms can promote metabolic fitness, delay process of aging and age-related diseases. However, the mechanisms are unclear. Metabolically, proper levels of CBS and CTH enzymes ensure the generation of endogenous H2S, glutathione and taurine (antioxidants), via the metabolism of toxic homocysteine. CBS generated H2S functions as cytoprotective and antioxidant. Conversely, SRSF2 and HNRNPD splice factors (SFs) decrease cellular senescence. Given the decline of H2S and aberrant expression of SFs during aging, we hypothesized that exercise intervention could provide beneficial outcomes by increasing expression of CBS and CTH enzymes; and SRSF2 and HNRNPD SFs in elderly African Americans (AAs) with MCI.

We used TaqMan gene expression assay to investigate mechanistic link between exercise and the aging process by evaluating CBS and CTH enzymes; and SRSF2 and HNRNPD SFs.

Data evaluating CBS and CTH levels at baseline, 3- and 6-month exercise revealed that 3-month exercise intervention doubled the expression of CBS. However, CTH showed no statistically significant change. Similarly, 3-month exercise intervention increased the level of SRSF2 but not HNRNPD.

Our observation provides mechanistic insight through which exercise intervention drives beneficial outcomes by increasing CBS, an enzyme that generates endogenous H2S via metabolizing toxic homocysteine and minimizing toxic buildup. Thus, exercise-induced CBS and SRSF2 expression can enhance metabolic fitness and delay the pace of aging and age-related diseases in elderly AAs MCI participants with potential for clinical translation.

Shifting Outcomes for Cervical Ectopic Pregnancies using Characteristic Transvaginal Ultrasound Findings

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Background: Complications from ectopic pregnancies are the leading cause in mortality in women of reproductive age. Although cervical ectopic pregnancies account for just 1% of all ectopic pregnancies, they are associated with increased rates of morbidity and mortality due to initial misidentification. Currently, there is no updated established extensive diagnostic criteria utilizing transvaginal ultrasound for cervical ectopic pregnancies. Successful management of cervical ectopic pregnancies and prevention of negative outcomes requires an early and accurate diagnostic criteria.

Methods: A detailed systematic review of the world literature was done to identify characteristic findings on transvaginal ultrasound for cervical ectopic pregnancies as well as conditions that present similarly.

Discussion: Literature review indicated that cervical ectopic pregnancies are often initially diagnosed as abortion, early low lying intrauterine pregnancies, and cervical β-HCG producing malignancies due to similar clinical and sonographical findings. Inclusion and exclusion criteria were developed to strengthen the diagnostic power for cervical ectopic pregnancies in comparison to other differential diagnoses. This information was used to develop a diagnostic clinical flow chart to assist physicians in all settings. Subsequently, a particular case at Howard University Hospital of a 37 year old G4P1021(G4P1A2) presenting with a cervical ectopic pregnancy was highlighted and used to demonstrate findings from the literature.

Conclusion: Transvaginal ultrasound diagnostic criteria outlined for cervical ectopic pregnancies and differentiation from other similarly presenting conditions are essential to the preservation of reproductive potential and other favorable outcomes for women of

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Effects of Feldenkrais Awareness Through Movement® practice on self-care learning of OT students at Howard University

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Occupational therapy students often name as motivation for choosing the profession occupational therapy (OT) to "help others". The OT department at Howard University (HU) sets high standards: besides the AOTA and WFOT accredited OT training standards, central elements of the training are the concepts of "use of self", working "client centered" and using a "person-environment-occupation" as well as self-efficacy training. HU is a historic black university (HBCU) and the majority of Howard student population are blacks and underrepresented minority students. Strong self-efficacy and comprehensive self-care are even more important to support health, wellbeing and successful study and work engagement in health care environments where racism and bias are present. HU reminds students to engage in self-care with the tools of mindfulness. The Feldenkrais has been described as a "Western" form of mindful movement with the potential to enhance the ability to discover flexible and adaptable behavior. Research shows broad application in populations interested in improving awareness, health, and ease of function. Offered in group classes and in individual lessons, it uses movement learning to train awareness in the areas of intero- and proprioception in order to increase efficiency and ease and foster self-efficacy skills.

This study aims to determine effects of Feldenkrais Awareness through Movement® practice on self-care learning of OT students at Howard University from a qualitative and quantitative perspective. The proposed poster is an opportunity to learn about the background of the Feldenkrais Awareness Through Movement® approach and a project in action.

Increased Insulin Resistance in Male Hepatic Androgen Receptor Knockout Mice Fed High Fructose Diet

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Insulin resistance is a common hepatic dysfunction amongst individuals suffering from diabetes or obesity and affects 10-25% of the general population. This cellular machinery can be altered when there is a build-up of lipids which impact molecular insulin signaling. Our objective is to determine if chronic intake of fructose by male liver androgen receptor knockout (Liv-ARKO) mice will show cascade alteration resulting in increased resistance to insulin when compared to male Liv-ARKO mice on a control diet. We hypothesized that LivARKO mice on HFrD would show impaired insulin action when compared to control and chow diet mice.

We placed male Liv-ARKO mice on three different diets and performed insulin tolerance tests (ITT), glucose tolerance tests (GTT), and pyruvate tolerance tests (PTT) after 1-2 months of being on diets. To assess differences in insulin action that may arise from increased fructose some mice were given a dose of 0.5 U/kg insulin before being sacrificed to further investigate insulin signaling proteins. Western blots were performed using tissue from liver to measure molecular insulin action, via p-AKT presence.

Male LivARKO mice fed a control diet displayed a 4-fold increase in levels of p-AKT when stimulated by insulin compared to mice not given insulin (basal). Moreover, male LivARKO mice fed a HFrD displayed no insulin stimulated p-AKT. Our results suggest that hepatic insulin action or the ability for insulin to initiate glucose uptake in liver is decreased in male LivARKO mice on HFrD.

In-vivo Range Verification of Clinical Proton Beams for Prostate Cancer

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Proton beam therapy has become increasingly desirable due to its ability to, theoretically, provide a comparatively high dose of radiation to tumors while, simultaneously, limiting the dose delivered to the organs at risk. This is the result of a phenomena known as Bragg Peak. The rectum, being located in the proximity of the target volume, is highly radiosensitive and at risk of toxicity and irreparable damage due to various uncertainties involved throughout the treatment planning. A major source of uncertainty is the conversion of CT information available as HU to proton stopping power ratios as well as the fact that the various tissues in the path of the proton beam are heterogeneous. Biodegradable hydrogel spacers are used to displace the rectal wall from the prostate by 8mm-15mm with the intention to limit dose deposition to the rectum and account for uncertainty. We propose to modify the hydrogel to include a radiation marker which would provide a prompt gamma radiation signal when the proton beam strikes the impregnated gel beyond the tumor. As a preliminary step, computer simulation with Geant4 vs 11 toolkit will be performed to optimize the radiation signal in the gel matrix. In the next step an implantable gel will be produced which can be tested in phantoms and radiation signals will be processed with a high-resolution spectrometer. This work also aims to allow gated proton beam radiotherapy which would reduce normal tissue toxicities and enhance the quality of life of prostate cancer patients.

The Impact of the COVID-19 Lockdown on the Rate of Injuries in the National Basketball Association

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PURPOSE: This study aims to assess the impact of the COVID-19 lockdown on injury rates experienced by athletes of the National Basketball Association (NBA). We hypothesized that there would be a change in the incidence rates of sports-related injuries on return to play post-lockdown.

METHODS: We conducted a retrospective analysis utilizing data retrieved from Pro Sports Transactions Archive to collect information about injuries to players in the NBA over the last 10 years. All injury descriptions in the dataset were stratified by key anatomical locations and the dataset was shortened to the eight most common injury rates. We compared players who played after the COVID-19 NBA suspension to a propensity score generated control group before the suspension. They were matched for age, body mass index, regions of the country, and positions played. The study outcome variable was the injuries stratified into 4 different groups. Demographics for players were collected from Basketball-Reference, in line with publicly available information from the NBA.

RESULTS: We compared 789 players during the post-suspension to 3,945 match-controlled pre-suspension players. The most common injuries were to the knee, ankle, back, hamstring, shoulder, calf, groin, and elbow. Following propensity score matching, the results are: knee (pre-suspension: 29.89%; post-suspension: 36.88%), ankle (pre: 27.10%; post: 26.62%), back (pre: 19.06%, post: 14.45%) (p-value: <0.001).

CONCLUSION: Among the three most common injuries, there was a statistically significant increase in knee injuries and a decrease in the percentage of players who suffered back and ankle injuries post the COVID-19 NBA suspension.

Nutritional Status of Individuals Residing in Correctional Facilities: A Systematic Review and Call to Action

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Introduction: Residing in correctional facilities might exacerbate the prevalence of chronic disease in the United States of America (USA), however relevant literature is sparse. Objectives: The aims of this review were to explore associations between incarceration and nutritional status (weight and chronic diseases) and to identify feasible interventions in correctional facilities. Methods: Using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we conducted a systematic review, searching four databases. We included peer-reviewed articles reporting primary data, in the last ten years, examining weight and chronic disease status of adults experiencing incarceration in the USA.

Studies were coded and assessed for quality using the appropriate study design quality assessment tools. Results: Of the 1,323 articles identified, nine qualified, involving 9,446 participants, 86% were males aged 18-45 years old. Average BMI ranged from 27.9 ± 6.0 kg/m2 - 33.3±6.8 kg/m2. Authors observed positive associations between length of sentence served and weight gain up to 75% of participants and weight loss in 21%. On average, inmates gained 0.37 lbs/week. Three studies found associations between smoking, age of incarceration and presence of chronic diseases. Successful interventions included a calorie reduction of 800 calories/day associated with an average decrease in hemoglobin A1C (%) from 7.3% to 6.9%.

Conclusions: Limited literature suggests an association between incarceration and compromised nutritional status. Intervention strategies might be feasible in this environment. Heightened stakeholder involvement is warranted to explore and stem the deleterious effects of incarceration on nutritional status.

Combination of Physics-based Simulation and Machine Learning to Assess the Effect of SARS-CoV-2 Mutations on Remdesivir

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Computer-aided drug design (CADD) techniques are being used in efforts to identify potential therapeutic agents for repurposing to combat the COVID-19 pandemic. However, even with well-established targets, binding, activation and cell entry information of the virus, established computational methods for lead target identification, large databases of potential drug candidates for repurposing, and available crystallized protein target structures, SARS-CoV-2 remains extremely virulent, deadly, and elusive. RNA viruses like SARS-CoV-2, are known to have a high mutation rate which contributes to its elusive character. Herein, we report on our efforts to use machine learning and free energy simulations by Single Amino Acid Mutation based change in Binding free Energy (SAAMBE) method in AMBER suite, to evaluate natural mutations of the RdRp polymerase of SARS-CoV-2, a known target to which the drug Remdesivir binds. We are aiming to: (1) identify patterns of variation/mutation on 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. Knowledge of mutations at target binding sites of SARS-CoV-2 and how drug binding is affected would be significant in identifying lead compounds for further testing and optimization as pharmacological agents for COVID-19 with a lesser likelihood of developing drug resistance.

Over-Expressing hsf-1 in Glia Negatively Affects Reproductive Function in C. elegans

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One effect of the aging process is the misfolding of proteins, which occurs because of the decrease in chaperones. Chaperones are responsible for assisting proteins in folding correctly. When proteins misfold, organisms become more vulnerable to proteotoxic stress and tissue damage. This vulnerability can lead to neurodegenerative diseases, such as Parkinson's and Alzheimer's. However, it is not known how protein misfolding responses in the non-neuronal cells of the brain, glia, can affect reproductive function. Recent work from the Dillin lab illustrates an independent role of glia in signaling to the periphery to produce protective stress responses. Over-expression of heat shock factor 1 (HSF-1), which regulates cytosolic protein folding in C. elegans glia, leads to an increase in heat shock response (HSR) chaperones and a subsequent increase in lifespan and resistance to heat stress. This study aims to identify how glia create a whole-organism response that increases lifespan while damaging reproductive health. We have identified a role for small clear vesicles, which are mediated by the protein UNC-13, implying that the signal may be a neurotransmitter. Using egg-lay experiments and brood size assays, we aim to better understand the role this putative neurotransmitter plays in the reproductive health and lifespan of C. elegans. I show that when over-expressing hsf-1 in glia, worms show an increase in sterility with incomplete penetrance. A lifespan experiment was performed and concluded that sterility is not correlated with extended lifespan. These results demonstrate that protecting protein homeostasis in a parent jeopardizes the investment in progeny.

Among patients with infective endocarditis, does the specificity and sensitivity of TTE and TEE change between right and left cardiac valves?

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Research Question/Title: Among patients with infective endocarditis, does the specificity and sensitivity of TTE and TEE change between right and left cardiac valves?

Introduction: Transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) are imaging tools that are heavily relied on to diagnose, evaluate and manage patients with infective endocarditis (IE) and are included in the Duke criteria.The aims of this study are (1) to compare the sensitivity and specificity of TTE and TEE when assessing suspected right sided heart infective endocarditis or left sided heart infective endocarditis and (2) we hope to determine whether Duke criteria will have greater sensitivity and specificity for right sided heart infective endocarditis compared to left sided heart endocarditis.

Methods: Patients with clinical features of infective endocarditis who received echocardiographic imaging at HUH will be considered. Of this group, participants will be subdivided between left or right sided lesions based on clinical presentation. The presence or absence of positive echocardiographic findings will be recorded for each group. Confirmed IE with formatted Duke Criteria that excludes imaging findings and/or positive biopsy results from valvular lesions will be considered gold standard for diagnosis of IE. Echocardiographic imaging compared to gold standard results will be used to evaluate sensitivity and specificity of IE.

Data Analysis & Results: As we analyze our data, we seek to answer the following formulated questions: Is there a statistical difference in right-sided versus left-sided endocarditis? Is this data confirmed clinically or via imaging modalities (i.e. TEE versus TTE)? How many patients are clinically (according to Dukes criteria.

Development of small molecule NLRP3 inhibitors for neurodegenerative dieases

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With approximately 50 million patients worldwide, Alzheimer's disease and related dementias (ADRD) is the most common neurodegenerative disease globally. African Americans are twice as likely as non-Hispanic Caucasians to develop Alzheimer's disease (AD). Discovery of potent, effective therapeutics for AD treatment remains an urgent and unmet challenge. Microglial inflammation plays a crucial role in VCID pathogenesis. VCID is characterized by a chronic state of inflammation due to the overactivation of the innate immune system. Nucleotide binding domain, Leucine rich repeat pyrin domain containing protein-3 (NLRP3) inflammasome has emerged as a druggable target for the management of VCID. The NLRP3 inflammasome is activated in response to a wide array of pathogen- and danger-associated molecular patterns (PAMPs and DAMPs respectively). NLRP3 activation leads to the release of pro-inflammatory cytokines, such as, interleukin-1b (IL-1b) and IL-18, causing neuronal pyroptosis and death. Disruption of NLRP3 signaling via small molecules, such as, MCC950, minimized the release of inflammatory cytokines and has shown beneficial effects in neuroinflammation-associated disease states. Our collaborative research has identified a small molecule, AMS-17, that minimized the NLRP3 activation in N9 microglia both in vitro and in vivo. AMS-17 is a computationally-designed, natural product-inspired sulfonylurea compound. AMS-17 was well-tolerated by the microglial cell line and did not affect the viability of N9 microglia. The presentation will highlight our efforts of improving the structure of AMS-17 to improve its NLRP3 activity.

Democratizing Artificial Intelligence: Empowering College Curriculums and the Next Generation Workforce with Deep Learning Technologies

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We will utilize a deep learning algorithm to construct and productionize a machine learning pipeline project that uses artificial intelligence (AI) to optimize the verification of medication orders and medication therapy management. The data generated from the creation of this project will serve as learning modalities to constitute data science programs at Howard University College of Pharmacy. Our goal is to create practical AI/ML-powered software that will set standards for integration into the workflow of community pharmacy settings. Furthermore, we plan to expand the conceptual elements of data science into learning curriculums and evaluate its impact on recruitment and engagement.

Students will be evenly tasked with either recording mock dispensing activities with varied settings for construction of the project model or visually annotating the collected datasets that will then be algorithmically productionized through deep learning algorithms. Students will also be survey evaluated in regards to their general interest of STEM career fields.

We will report the mean reduction in medication errors from select production ventures and expect that the implementation of the project model reduces errors relative to medication orders, as well as the results of student evaluations relative to their interest in data science and expect that participation in this project increased their interest in the career field. Intergroup analysis will be performed with Chi Square tests for nominal scale outcomes.

This innovative technology could have major impacts in the community pharmacy setting and could also transform the learning experience for minority students within STEM career fields.

Case Report of a Sigmoid Mass and Ovarian Cyst

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Introduction: We present a case of a 61 year old AAF who presented with a 3 month history of abdominal "gas pains", which subsides after flatus or bowel movement. At last visit 1 month prior to ED, was told she had anemia and a Hb of 6.2, and was given iron tablets at that time. She also reported over 30 lbs (13.6 kg) of unintentional weight loss in the last month. Physical exam was largely benign other than slight TTP of RLQ without rebound or guarding present. On admission, vitals were significant for HTN and febrile to 100.4. Patient was found to have Hb of Hgb 5.7 and pRBCs given on admission.

Imaging Findings and Further Evaluation: CT scan of Abdomen/Pelvis with contrast revealed a large 8 cm rectosigmoid mass concerning for features of malignancy, and a large homogenous right septated ovarian cyst. Tumor Panel significant for elevated CEA. Colonoscopy with biopsy confirmed sigmoid adenocarcinoma, with endoscopic obstruction. Transvaginal ultrasound findings suggested ovarian cyst was nonmalignant. MRI indicated tumor invasion into uterus, and patient was ultimately transferred for neoadjuvant chemotherapy and evaluation for sigmoid resection and hysterectomy.

Discussion: Ovarian masses have a broad differential which includes several benign and some malignant causes, including ovarian cancer. We present a case where transvaginal ultrasonography in conjunction with CA-125 was used to calculate Risk of Malignancy Index I (RMI), a scoring system previously reported to screen for earlier detection of ovarian malignancy.

Identifying Potential Patient Barriers to African American participation in Hidradenitis Suppurativa Clinical Trials

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Background: Hidradenitis suppurativa (HS) is a dermatological condition that presents in the axilla, groin, and other intertriginous areas as painful nodules and sinus tracts due to inflammation of the hair follicle.1 The exact prevalence of HS varies, with reports ranging from 0.3-4% and with African Americans particularly affected.2-4 The latter point is of particular interest as phase II & III HS clinical trials have a demographic of majority White participants,5 even though HS clinical trial sites are located in zip codes with moderate (12.6 – 49.9%) to high (over 50%) African American populations. Understanding the barriers to African American participation in HS clinical trials is necessary for increasing participation; therefore, studies investigating such limitations are warranted.

Methods: According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a primary literature review was conducted on PubMed and Web of Science databases in September 2020. The search words utilized included: "African American," "hidradenitis suppurativa," "clinical trials," "barriers," "research," "minority," "participation," "underserved population," "medical studies," and "perception." Only articles published after 2011 with original, quantitative and/or qualitative data on African American, adult participation in clinical trials within the United States were included. After a full text review was conducted to determine the inclusion of an article, barriers were extracted and computed by occurrence.

Results: Amongst the 38 studies which met the inclusion criteria, numerous and similarly noted patient barriers to African American participation in clinical trials were discussed. The most significant ones being: mistrust of medical research (28 out of 38

Genetic Determinants of Type 2 Diabetes Mellitus in Adults of African Ancestry: Identification of the Associated Factors

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Genetic Determinants of Type 2 Diabetes Mellitus in Adults of African Ancestry: Identification of the Associated Factors

Objectives: Investigate the association of Type 2 Diabetes Mellitus (T2DM) genetic nutritional phenotype traits and comorbidities (such as peripheral vascular disease, PVD) in adults of AA.

Methods: Quantitative assessment of secondary data in the Type 2 Diabetes Knowledge Portal comprising nutritional phenotypic traits related to T2DM (peripheral vascular disease, hemoglobin A1C, triglycerides, low-density lipoprotein, fasting glucose, fasting insulin) and genetic associations (risk allele, minor allele frequencies, reference single nucleotide polymorphisms, candidate genes, chromosomal regions, variant coordinates, and sequence variation impacts) related to Type 2 Diabetes Mellitus among adults of African ancestry with or without T2DM to understand hereditary disease risk.

Results:
H1 Results: T2DM candidate genes ADCYAP1R1, BDNF, CD36, HDAC4, NOS3, PON1, TCF7L2, TGFB1 and chromosomal regions 2, 7, 10, 11, 18: χ^2 (126, n = 5,877) = 1228.713, p < .001.

H2a Results: T2DM ACGT risk alleles and nutritional phenotypic traits: χ^2 (20, n = 62) = 43.052, p = .002.

H2b Results: T2DM chromosomal regions 2, 7, 10, 11, 19 and nutritional phenotypic traits: χ^2 (20, n = 62) = 106.969, p < .001.

H2c Results: T2DM sequence variant impacts (intergenic, intron, missense, and synonymous) and nutritional phenotypic traits: χ^2 (15, n = 62) = 60.470, p < .001.

Conclusions: Hereditary disease risks for T2DM are distinct in adults of African ancestry with or without T2DM diagnosis based on nutritional phenotypes and genetic associations.

Development of a Brusatol Conjugate for Targeted Prostate Cancer Therapy

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Brusatol has been reported to be a potent global protein synthesis inhibitor and nuclear factor erythroid 2–related factor 2 (Nrf2) inhibitor that holds great promise as a novel chemotherapeutic agent with multiple anticancer pathways. As a consequence of its mechanisms of action, it is non-selective and has a short - lived effect on Nrf2. These limit its therapeutic applications. The goal of this study is to synthesize and characterize a prostate specific membrane antigen (PSMA) targeted brusatol conjugate for site-specific delivery to prostate cancer.

The PSMA-targeted brusatol conjugate was synthesized in a series of steps. First, the PSMA targeting ligand (Glu-NH-CO-NH-Lys) was synthesized. In a second step, brusatol 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 using exogenous Cathepsin B activated with 30Mm DTT/15Mm EDTA to the conjugate in solution. The resultant solution was incubated at 37°C and aliquots of the solution were taken at predetermined times. High resolution ESI-MS data confirmed the synthesis of the brusatol conjugate and HPLC data show conjugate cleavage in vitro. Further work is ongoing to test the efficacy of the conjugate in vitro using prostate cancer cell lines.

A rare case of isolated pulmonic valve endocarditis in a patient with sickle cell disease

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Background: Infective Endocarditis (IE) is the infection of an endocardial surface, the inner lining of the heart, or of an indwelling cardiac device. Isolated pulmonic valve endocarditis is rare and accounts for <2% of patients with IE. PV endocarditis in a patient with sickle cell disease is even rarer with no report of this kind being published in the literature before 2015.

Case Description: We describe a case of an isolated pulmonic valve mass, found incidentally on transthoracic echocardiogram, in a 40-year-old male who was admitted to the Howard University Hospital due to a pain crisis secondary to established sickle cell disease. His clinical course was complicated by pain crises, febrile episodes, exposure to

Candida auris, and oxygen desaturation on room air. Surgery was forfeited due to the small size of the vegetation. The patient was stabilized and discharged on blood thinners, antibiotics, and home oxygen.

Discussion: The rarity of pulmonic valve endocarditis contributes to its misdiagnosis and delays in intervention. This case highlights the use of cardiac computed tomography and transesophageal echocardiogram, in the diagnosis of pulmonic valve endocarditis. Additional consideration must be given to the lack of symptoms of infective endocarditis and negative culture growth in our patient. Furthermore, given that the patient's medical history remained significant for only sickle cell disease, we beg the question of if the homozygous sickle cell mutation may be a predisposing factor for the establishment of pulmonic valve endocarditis.

The Effectiveness of Home-Based Virtual Reality on improving Upper Extremity Function in Stroke Patients, A Scoping Review.

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Stroke is one of the leading causes of death in the United States. Virtual reality (VR) is a novel emerging treatment method that is being used for stroke rehabilitation in various clinical settings. This scoping review will analyze existing studies which will review if home based virtual reality therapy is effective in increasing upper extremity function in stroke patients. The inclusion criteria for this scoping review includes the following: literature from 2017-2022, home based therapy, virtual reality, recent stroke diagnosis (within past two years), adults of all ages, English speaking, and level I, II, and III evidence. Studies that will be excluded may consist of the following: patient is cognitively impaired, patients with hemiplegia, VR based therapy provided in settings that are not the home (inpatient, outpatient) and case studies. This scoping review will give insight on the use of VR in a home setting and its effectiveness on improving upper extremity function by reviewing data from prior studies.

Optimizing Screening and Testing for Gonorrhea and Chlamydia in People with or at Risk of HIV Using Extragenital Site Self-Collected Swabs

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Sexually transmitted infection (STI) incidences of gonorrhea (GC), chlamydia (CT), and syphilis are increasing nationally. Because of increased viral suppression rates of people with HIV (undetectable=untransmissible) in the United States (U.S.) and increased use of HIV pre-exposure prophylaxis for people at risk of HIV, condom use has decreased and STI rates have risen. In a 3-year (2018-2021) study, nine federally funded HIV clinics in three U.S. jurisdictions (Washington, D.C., Florida, Louisiana) implemented interventions to increase routine bacterial STI screening, testing, and treatment. Each clinic implemented four interventions: an audio computer-assisted self-interview (ACASI) sexual history, patient self-collection of CT/GC nucleic acid amplification test (NAAT) specimens at urogenital and extragenital sites based on sexual history risk, gender and sexual minority welcoming measures in the clinic, and provider training. De-identified data of consenting participants for this study from the three D.C. clinics was analyzed. Nineteen (6.5%) of the 294 participants tested positive for GC and/or CT at least once during the study period. Of these 19 participants, 47% reported no STI-related symptoms at the time of being tested and would have otherwise been missed without screening and testing. Of the 294 D.C. participants, 69% reported strongly agreeing or agreeing to the statement "I am comfortable swabbing my own throat [or rectal swab] for chlamydia and gonorrhea." Routine sexual history screening and patient self-collection of CT/GC NAAT specimens at necessary extragenital sites were found to be beneficial and acceptable to patients and providers in addressing bacterial STIs in these clinics.

History of Neurosurgery at Howard University Hospital: the nation's only historically black academic institution that practices neurological surgery

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Howard University Hospital (HUH) has been a pillar for healthcare delivery to the Black community, an underserved sector of Washington D.C., since its founding in 1862. Neurological surgery, one of the many areas of service provided, was established by trailblazer, Dr. Clarence Greene who was appointed the division's first chief in 1949. Because of the color of his skin, Dr. Greene had to complete his neurosurgical training at the Montreal Neurological Institute as he was refused the opportunity to train in the United States. He went on to become the first African-American to be board certified in Neurological Surgery in 1953. Dr. Greene trained one resident, Dr. Jesse Barber, who succeeded him as

Chief of Neurosurgery. Over the course of 22 years, Dr. Barber truly embodied HUH's mission to serve the underserved, by advocating for health equity and offering free care to low-income patients. Under his tutelage, numerous African-American medical students went on to train in Neurological Surgery. Following Dr. Barber's retirement, Dr. Gary Dennis served as division chief for 23 years continuing the legacy of subserving a disparate population. The current Chief, Dr. Damirez Fossett has served in this role since 2010. Under his guidance, the division has championed academic growth and development. Five students have matched into neurosurgery, a neurosurgery-specific lecture series and journal club has been implemented, and an American Association of Neurological Surgeons student chapter has been established. Future directions include developing a residency program and a fellowship for training international students.

Functional Recovery in Brown-Sequard Plus Syndrome: A case report

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Introduction: Brown-Sequard syndrome (BSS) is a rare neurological condition characterized by both hemiplegia and hemianesthesia. It occurs as the sequelae to a hemi-transection of the spinal cord, and constitutes an incomplete spinal cord injury. We report a case of BSS that resulted from a stab wound to the thoracic spine.

Case report: A 64-year-old African-American male presented to Howard University Hospital with complaints of back pain and loss of left lower extremity motor function. Neurological examination revealed hemiparesis along the L2 through S1 nerve distributions in the left lower extremity and hypoesthesia along the L2 through S1 dermatomal distributions in the right lower extremity. Imaging disclosed a foreign body extending from the subfascial muscle layer through the T6-T7 disc space. The patient's condition was treated operatively with removal of a knife blade; the handle of which had been broken off at the surface of the skin. Post-operatively, the patient's motor symptoms improved while his sensory symptoms worsened prior to discharge to an acute rehabilitation center. He was lost to follow-up for about 6 months and returned with a debilitating spastic paraparesis.

Conclusion: The presenting symptoms of BSS are not always uniform, and thus may constitute a Brown-Sequard Plus syndrome (BSPS). Surgical intervention is rare, however, it may occasionally be necessary in the setting of penetrating trauma. Long term functional recovery for BSS as documented in the literature is variable, but attainable, if the patient undergoes aggressive physical therapy and rehabilitation. The functional outcome of BSPS may not be so favourable.

Sleep Habits Associated with Telomere Length in Young African American Adult

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OBJECTIVE: Poor quality sleep has been associated with many health issues and can lead to long term biological changes, including shorter telomere length (TL). While several studies have investigated the relationship TL and sleep, they have not been well characterized in Young African American Adults (YAAA). This study seeks to determine if sleep habits have effects on TL in YAAA.

METHOD: We analyzed 98 saliva samples of YAAA men (48) and women (50) 18-25 years old in Washington DC. Average TL was measured by a quantitative PCR assay.

RESULTS: Correlational analysis of saliva samples of the 98 saliva samples found that in more hours of sleep ($r=-.232$, $p<0.05$) and better sleep quality ($r=.209$, $p<0.05$) were associated with longer TL. Restless sleep ($r=-.219$, $p<0.05$) and trouble staying awake during daily activities ($r=-.204$, $p<0.05$) were negatively associated with TL.

For females, having more hours of sleep was the only sleep factors affecting TL. Having more hours of sleep was associated with longer telomeres ($r=.292$, $p<0.05$). For males, trouble falling or staying asleep ($r=-.344$, $p<0.05$), restless sleep ($r=-.473$, $p<0.01$), waking up prematurely ($r=-.304$, $p<0.05$), disrupted sleep due to bad dreams ($r=-.358$, $p<0.05$), and trouble sleeping related to pain ($r=-.390$, $p<0.01$) were negatively associated with TL. Having better quality sleep was correlated with longer telomeres in the males ($r=.357$, $p<0.05$).

CONCLUSIONS: Our study adds to growing literature relating sleep habits with TL. While previous studies have been conducted among older age groups, this might be a first study among (YAAA).

Hand and Wrist Injuries in Golfers: A Systematic Review of Literature

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Introduction: Hand and wrist injuries are common in both amateur and professional golfers. The golf swing is an inherently complex athletic activity with wide variability, in accordance with different skill levels. Understanding swing biomechanics can provide an understanding of the pathophysiology of these injuries, assisting in diagnosis and treatment. This manuscript, written in conjunction with a PGA professional, reviews the pathophysiology, diagnosis, and treatment of common injuries. The aim of this study is to increase understanding of these injuries and provide guidance for managing practitioners.

Methods: PubMed, Google Scholar, and SagePub were utilized in order to identify different wrist and hand injuries in golfers. Studies evaluated included surveys of injury statistics, case reports, anatomical studies, and papers describing golf swing biomechanics.

Results: We identified 35 papers regarding golf hand and wrist injuries. Three described swing biomechanics and the strains placed on the upper extremity. Five discussed different injuries sustained by professional versus amateur golfers. The remaining 27 papers described anatomy, treatment, and diagnosis of 10 different injuries.

Conclusions: It is important to broaden the awareness and understanding of hand and wrist golf injuries. Amateur golfers undergo more acute injuries secondary to their poor swing mechanics, while professionals suffer from overuse syndrome. Through educating physicians with concise resources such as these, re-injury can largely be prevented in this patient population by promoting refined swing mechanics and practice habits. With proper diagnosis, treatment and patient education, most amateur and professional golfers can fully return to play leading to improved quality of life.

Comparing survivorship and revision rate following unicompartmental arthroplasty with computer navigation and robotic systems vs conventional manual approach: A Literature Review

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Introduction: This study focuses on unicompartmental knee arthroplasty (UKA) and the comparison of modern systems, such as computer navigation and robotics, to the conventional approach. To date, little is known about the comparison of these revision rates in UKA. Therefore, our aim is to update the literature and discover if modern technology has influenced our standard of care.

Methods: Over 20 articles from PubMed and Google Scholar were utilized in order to identify common causes of revisions for UKA in robotic and computer-assisted surveys. Data regarding total-knee arthroplasty (TKA) was also used in order to compare survivorship against UKA.

Results: There is a gap in the literature for long-term survivorship and revision rates for robotic UKA in the United States. Short-term studies demonstrate that robotic UKA result in higher survivorship compared to conventional. Multiple multicenter studies showed that short-term 2 year survivorship for a robotic UKA was ~98%. In international studies, robotic-assisted UKA showed fewer complications compared to conventional. Additionally, revision rates were unchanged when comparing the two in these studies.

Conclusion: This study is significant because it highlights the need for further investigation into the long term revision and survivorship rate of computer and robotic assisted UKA when compared to conventional approaches. Multiple studies have demonstrated that Robotic UKA showed higher short term survivorship rate when compared to conventional UKA. As it stands, there is still inconsistency with treatment approaches among orthopedic surgeons. Therefore, future studies should be dedicated towards evaluating the long-term revision and survivorship rate of robotic UKAs.

The Black Girls Matter Research Study

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The past decade has seen increasing interest (African American Policy Forum, (2017); National Black Women Law Project, Morris, 2017) in the developmental trajectory of Black girls which reveal they receive disproportionate rates of harsh discipline in schools around the county, including those which still inflict physical discipline and harsh criminalization. Punitive punishments force Black girls into the juvenile justice system and fail to adequately address their mental health issues. In many cases, the Pushout phenomenon (Morris, 2015) is attributable to a systemic wide disregard of the long-term effects of toxic stress in Black girls' environments (Center for American Progress, 2019) as well as the effects of untreated trauma.

The Black Girls Matter Research Study aims to provide a more comprehensive phenomenological approach to the investigation of the educational experiences of Black girls. The qualitative examination of Black girls' educational experiences will be contextualized by the themes of adultification, invisibility, hyper-visibility, and the construct of misogynoir. Specifically, the Black Girls Matter Lab will seek to: 1) develop a model which explicates how Black girls are systematically excluded from the process of schooling, including the role of historically race-based trauma, persistent toxic stress, structural systemic racism, and implicit bias and 2) present the qualitative data we have collected from African American college women as they recall their educational experiences as well as the extent to which they experienced forms of minimalization and/or the Pushout phenomena (Morris, 2015) 3.) offer recommendations for systemic ways of rectifying the Pushout phenomena (Morris, 2015).

MUBD-SARS-CoV-2: The Benchmarking data sets for drug screening approaches targeted against COVID-19

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Novel SARS-CoV-2, the causative agent of COVID-19, is a positive sense, enveloped, single stranded RNA beta-coronavirus belonging to the family Coronaviridae. The World Health Organization declared COVID-19 a pandemic in March 2020. There has been increased focus on drug discovery to treat this debilitating disease. The US FDA granted the Emergency Use Authorization for Remdesivir, Paxlovid, and Molnupiravir to be used for appropriate populations. Benchmarking data sets have been widely used in modern drug discovery to identify drug-like compounds for treatment of diseases. In order to assist ongoing drug discovery efforts, we have created SARS-CoV-2 specific maximal unbiased benchmarking data sets (MUBD) using known actives from the ChEMBL database, which has been carefully curated, and a source compound dataset of ZINC12 compounds. This was accomplished utilizing our own proprietary software tool, i.e.MUBD-DecoyMaker 2.0. Leveraging the Rapid Overlay of Chemical Structures (ROCS) application within the OpenEye scientific software, we next aimed to create shape-based query molecules to be validated by the aforementioned SARS-CoV-2 specific maximal unbiased benchmarking data sets. ROCS performs the shape comparison based on concepts of similarity and dissimilarity while aligning molecules by overlaying the center mass of molecules to determine similarity between the two molecules. Our query molecules are composed of active compounds which are to be aligned based on 3D shape superposition methodology and scored accordingly. Those are extremely valuable in the drug discovery process as structure activity relationships can be explored, while searching databases to discover novel compounds and drugs for repurposing.

Cultural orientation and health perceptions of African Americans men and women

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Wade Boykin and his students constructed the Mainstream Orientation Questionnaire (MOQ) to quantify the extent to which African American adults endorse traditional Western values. The present study explored the relationship between scores on the MOQ scale and perceptions of health in an African American community sample. The participants were 213 volunteers (mean age 44 years) who were drawn from clinics within an urban East Coast hospital. Fifty-one percent of the participants were women. The volunteers completed the MOQ and the SF36 health status check list. For the full sample, MOQ scores were inversely associated with perceptions of general health ($r = -.164$, $p = .03$). Moderated regression analysis using Hayes's Process macro employed MOQ scores to predict general health perceptions with gender serving as a moderator variable. This analysis revealed that the interaction between gender and MOQ scores predicted general health perceptions ($B = .098$, $p = .046$). Post hoc analyses showed that increases in MOQ scores were associated with perceptions of poorer general health in women ($B = -.116$, $p = .003$) but health perceptions were not associated with MOQ scores for men (B -.01. NS). The modest association between health perceptions and cultural orientation encourages the search for underlying mediating variables. Health-related behaviors and social support resources may differ as a function of cultural orientation. The findings suggest embracing Western cultural values and ethos has a deleterious effect on health perceptions especially of African American women.

Antitumor Efficacy of EGFR-targeted Recombinant Immunotoxin in human head and neck squamous cell carcinoma

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Over 90% of head and neck squamous cell carcinoma (HNSCC) overexpresses epidermal growth factor receptor (EGFR). However, the EGFR-targeted monotherapy response rate only achieves 10-30% in HNSCC. Recombinant immunotoxin (RIT) often consists of an antibody targeting a tumor antigen and a toxin (e.g., diphtheria toxin [DT]) that kills cancer cells. We produced a humanized RIT designated as hDT806 targeting overexpressed EGFR and investigated its effects in HNSCC. Distinct from the EGFR-targeted tyrosine kinase inhibitor erlotinib or antibody cetuximab, hDT806 effectively suppressed cell proliferation in four HNSCC lines tested (JHU-011, -013, -022, and -029). In JHU-029 mouse xenograft models, hDT806 substantially reduced tumor growth. hDT806 decreased EGFR protein levels and disrupted the EGFR signaling downstream effectors, including MAPK/ERK1/2 and AKT, while increased proapoptotic proteins, such as p53, caspase-9, caspase-3, and the cleaved PAPR. The hDT806-induced apoptosis of HNSCC cells was corroborated by flow cytometric analysis. Furthermore, hDT806 resulted in a drastic inhibition in RNA polymerase II carboxy-terminal domain phosphorylation critical for transcription and a significant increase in βH2A.X level, a DNA damage marker. Thus, the direct disruption of EGFR signaling, transcription inhibition, DNA damage as well as apoptosis induced by hDT806 may contribute to its antitumor efficacy in HNSCC.

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