ABSTRACT BOOK

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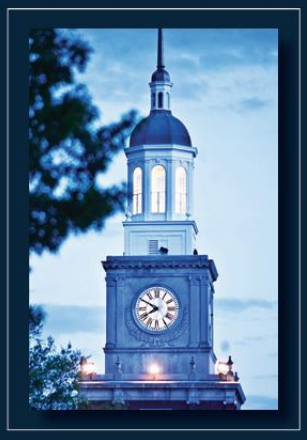

# HOWARD UNIVERSITY RESEARCH SYMPOSIUM

## APRIL 6 - MAY 6, 2026

HOWARD UNIVERSITY

# RESEARCH SYMPOSIUM

## *Abstract Book*

APRIL 6-MAY 6, 2026

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# BIOLOGICAL & BIOMEDICAL SCIENCES

### COMPARISON OF COMMERCIAL ALIGNERS TO DIRECT AND INDIRECT IN-OFFICE DESIGNED AND FABRICATED ALIGNERS

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Objectives: Despite the growing use of both commercial and in-office aligners, there is limited published evidence directly comparing their clinical effectiveness in treating non-extraction cases with moderate crowding. Our aim is to compare the effectiveness of direct and indirect in-office fabricated aligners to conventional commercial clear aligners in resolving moderate crowding. Materials and methods: Retrospective evaluation of 63 consecutive adult patients (38 females, 25 males) with 3-7 mm of crowding treated non-extraction. Patients were treated with Invisalign, in-office thermoformed aligners, or direct 3D-printed LuxCreo aligners. Pre- and post-treatment anterior (3-3) and overall arch crowding (6-6), as well as Little's Irregularity Index (LII), were evaluated. One-way ANOVA, paired t-tests, and mixed-design ANOVA were used, with significance set at $p < 0.05$. Analyses were conducted blindly. Results: No significant differences were observed among the three aligner systems at baseline with respect to gender distribution ($p = 0.24$), age ($p = 0.89$), or treated arch (maxillary vs mandibular, $p = 0.50$). All systems demonstrated significant reductions in 3–3 crowding, 6–6 crowding, and Little's Irregularity Index from pre- to post-treatment ($p < 0.001$). Improvements over time were comparable among systems; however, posttreatment 3–3 crowding was significantly lower with direct 3D-printed aligners. Conclusion: Overall, treatment effectiveness was comparable across all systems. All three aligner systems effectively corrected moderate crowding, showing significant improvements in anterior and arch crowding and LII. The treatment groups were similar in age, gender, and treated arch, enabling valid comparisons of outcomes. However, direct 3D-printed in-office aligners showed lower residual anterior crowding at treatment completion.

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### Phenylketonuria in Egypt: Incidence, Prevalence, and Genetic Context in North Africa and the Arab World

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Background: Phenylketonuria (PKU) is an autosomal recessive metabolic disorder caused by a mutation in the enzymatic metabolism of phenylalanine to tyrosine by phenylalanine hydroxylase (PAH). Although globally rare, several North African and Middle Eastern populations show elevated prevalence rates, suggesting both genetic and sociocultural influences.Objective:To synthesize available epidemiologic and genetic data describing PKU in Egypt, contextualize national incidence and prevalence relative to neighboring Arab and North African countries, and further examine how historical admixture, environmental pressures, and cultural practices influence observed prevalence. Methods:A literature-based synthesis was conducted using peer-reveiwed articles, national screening data, and population-genetic studies focusing on Egypt's PKU clinical burden, demographic structure, PAH variants, and admixture history. Results: PKU prevalence in Egypt is estimated at approximately 1:5,000 live births—among the highest worldwide—compared to 1:10,000–1:24,000 globally. High consanguinity rates and limited newborn screening contribute substantially to this burden. Clinical diagnosis rather than newborn screening constitute the majority of PKU diagnosis, resulting in later diagnosis, delayed treatment, and more severe presenting symptoms. Genetic analyses show both Mediterranean founder mutations and unique Egyptian PAH variants, reflecting Egypt's admixture of African, Arab, and Mediterranean ancestries. Although heterozygote advantage has been proposed as a factor maintaining PKU allele frequency, evidence remains inconclusive. Conclusions: Egypt's PKU epidemiology reflects a convergence of genetic, demographic, and sociocultural factors. Expanding nationwide newborn screening, implementing diligent data collection, and integrating population-genetic research will be essential for early detection, counseling, and understanding evolutionary dynamics of PKU in Egypt, and North Africa.
Keywords: Phenylketonuria; Egypt; North Africa; PAH; heterozygote advantage; consanguinity; newborn screening.

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### Synthesis of analogs of tryptophan using β-subunit of tryptophan synthase for LAT1-mediated drug delivery

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The L-type amino acid transporter 1 (LAT1) plays a crucial role in the transport of essential amino acids and pharmaceuticals across biological barriers such as the blood–brain barrier, making it an attractive target for drug delivery strategies. Tryptophan is a high-affinity natural substrate of LAT1, and the development of noncanonical tryptophan analogs may expand the scope of LAT1-mediated transport. In this study, the substrate tolerance of the β-subunit of tryptophan synthase (TrpB) was evaluated for the enzymatic synthesis of tryptophan analogs using substituted indole and serine. Several analogs, including 7-azatryptophan, 6-azatryptophan, and 5-aminotryptophan, were successfully synthesized under small-scale reaction conditions and confirmed using thin-layer chromatography and proton nuclear magnetic resonance spectroscopy. The synthesis of 7-azatryptophan achieved an initial yield of 87%, while 5-aminotryptophan was obtained in moderate yields following multiple small-scale reactions. In contrast, attempts to synthesize 5-azatryptophan were unsuccessful, likely due to experimental limitations rather than intrinsic enzyme incompatibility. Scale-up reactions generally resulted

in reduced yields, suggesting the presence of substrate inhibition or mass transfer limitations at higher concentrations. Overall, these results demonstrate that TrpB exhibits substantial tolerance toward structurally modified indoles, supporting its potential utility in the biocatalytic production of noncanonical amino acids for LAT1-targeted drug delivery applications.

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**Outcomes of Indwelling Pleural Catheter Placement for Heart Failure-Related Pleural Effusions: A Multicenter Retrospective Study**

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Background: Pleural effusions occur in up to 50 to 80% of patient with heart failure (HF) and the presence of pleural effusions carry approximately 50% 1-year mortality. Indwelling pleural catheters (IPCs) offer palliative fluid drainage for recurrent effusions, with proven benefit in malignant effusions. Evidence for IPCs in HF-related effusions is limited to small studies showing dyspnea relief and acceptable safety. More generalizable outcomes data are needed to guide clinical decision making in this patient population. Research Question: What are the safety and efficacy outcomes of IPC placement for refractory HF-related pleural effusions. Study Design and Methods: We conducted a retrospective cohort study using the TriNetX Research Network. Adults with HF who underwent IPC placement for pleural effusion were identified using ICD-10-CM and procedure codes. Outcomes included IPC-related complications; all-cause mortality up to 1 year; additional pleural interventions; catheter removal; and hospital or emergency department visits within 90 days post-IPC placement. Results: Among 1,007 patients that received IPC, pneumothorax was the most common complication (18.3% by 90 days). Whereas empyema (7.5%) and cellulitis (2.9%) were less frequent. By 90 days post-IPC, only 8.9% required repeat thoracentesis, and 15.5% had their IPC removed. All-cause mortality was 40% by 1 year. In the 90 days post-IPC, 30% had an ED visit (vs 51% pre-IPC) and 72% had a hospitalization (vs 79% pre-IPC). Interpretation: IPCs provided effective palliation with low repeat drainage needs and a signal toward reduced acute care utilization. Complications were generally manageable, and many patients should anticipate prolonged catheter dependence.

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**Lipidomic Profiling of Diapausing Culex pipiens Fed Dietary Sugars Using Ultrahigh-Resolution LC-FT-ICR MS**

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Exploring the molecular and biochemical basis of egg development is fundamental to mosquito reproductive biology. Lipids are the main source of energy and building blocks for developing ovarian follicles. Understanding how diapausing mosquitoes allocate and remodel lipid reserves is crucial to elucidate the metabolic strategies that support overwintering survival. Diapause in Culex pipiens totally depends on extensive lipid accumulation, yet the influence of different dietary sugars on triglyceride (TG) composition during this period remains poorly understood. The samples were analyzed using liquid chromatography coupled to a 14.5 T Fourier Transform Ion Cyclotron Resonance mass spectrometer (LC-FT-ICR MS) operating at 4.8 million resolving power at 200m/z. TG signals were in the 800-900 m/z range, eluting at 31-44 min after injection of the sample. In this study, we characterize the ovarian TG lipidome of diapausing Culex pipiens fed sucrose or fructose diets for 10, 20, 30 days, and glucose diets for 20 and 30 days. We also investigate how these diets affect storage during diapause. TG species were identified using LIPID MAPS database, revealing nine distinct TGs across diets ( TG 48:1, TG 48:2, TG 48:3, TG 49:1, TG 50:2, TG 50:3, TG 52:2, TG 52:3, TG 57:1), with sucrose fed mosquitoes at day 30 exhibiting the highest TG diversity and abundance. These findings show that lipid dynamics in mosquito follicles during oogenesis are driven by a complex set of molecular mechanisms.

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**The Role of Microbial-Derived Short-Chain Fatty Acids in Gastrointestinal Immune Regulation**

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Short-Chain Fatty Acids (SCFAs), including acetate, propionate, butyrate, and valerate, are microbial metabolites produced through the fermentation of dietary fiber in the colon and are critical regulators intestinal homeostasis and immune function. Increasing evidence demonstrates that SCFAs serve as key molecular links between diet, gut microbiota, epithelial barrier integrity, and both innate and adaptive immune responses. This review synthesizes recent findings on the mechanisms by which SCFAs modulate immune cell activity and inflammatory signaling, A structured literature search of PubMed was conducted to identify peer-reviewed studies published between 2020 and 2025 focusing on SCFA- mediated immune regulation, receptor signaling and disease relevance. The literature indicates that SCFAs exert immunomodulatory effects through activation of G-protein-coupled receptors (GPCRs) including GPR109A, GPR41, and GPR43, as well as epigenetic regulation via histone deacetylase inhibition. These mechanisms promote regulatory T-cells differentiation, suppress pro-inflammatory Th17 responses, enhance protective immunoglobulin A production by B cells, and strengthen epithelial barrier function. SCFAs further contribute to immune tolerance, cytokine regulation, and metabolic reprogramming of immune cells, with implications for inflammatory, allergic, and metabolic diseases. As a collective, microbial-derived SCFAs represent central mediators of host–microbiome

symbiosis, balancing immune activation and tolerance. However, much is not known about how microbial signals are integrated into host immune pathways or the impact of microorganisms other than bacteria. Further research is needed to translate these pathways knowledge into therapeutic strategies for inflammatory and immune diseases.

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**Alcohol Withdrawal Seizure Susceptibility Is Associated with a Remodeling of MEK/ERK Signaling in Rat Inferior Colliculus Neurons**

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Alcohol withdrawal is a central feature of alcohol use disorder (AUD) and is often associated with alcohol withdrawal–induced seizures (AWSs). Elevated intracellular $Ca^{2+}$ levels in the inferior colliculus (IC) have been linked to AWSs, suggesting $Ca^{2+}$ dynamics as a molecular link to cellular signaling. Of particular interest is MEK/ERK signaling, which is influenced by alcohol exposure, although its role in AWS pathophysiology remains unclear. Adult male and female Sprague–Dawley rats underwent chronic ethanol intoxication followed by withdrawal, receiving three daily doses of ethanol (5 g/kg, 30% vol/vol) or vehicle at 8-hour intervals for 4 consecutive days. The first cohort was used for molecular studies, with IC tissue collected at three withdrawal time points: 3 h (before AWS susceptibility), 24 h (peak susceptibility), and 48 h (resolution). Total and phosphorylated MEK1/2 and ERK1/2 levels were quantified by Western blotting and normalized to total protein. A second cohort evaluated the effects of the MEK/ERK inhibitor SL327 on acoustically evoked AWSs. Ethanol withdrawal produced time- and sex-dependent alterations in MEK/ERK signaling in the IC. Males showed transient increases in phosphorylated MEK (pMEK) and ERK (pERK) at 24 h, whereas females exhibited more robust, sustained elevations lasting to 48 h. Total MEK and ERK protein levels remained largely unchanged. Acute SL327 administration suppressed acoustically evoked seizures in both sexes, indicating that phosphorylation-dependent activation of the MEK/ERK pathway, rather than changes in protein expression, contributes to AWSs.

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**Formulation of a Niosomal Drug Delivery System for the Treatment of Colorectal Cancer**

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Colorectal cancer (CRC) remains a leading cause of cancer-related deaths in the United States, with an estimated 153,020 new cases and 52,550 deaths in 2024. Effective treatment is often hindered by poor drug delivery to tumor sites, resistance to existing therapies, and toxicity associated with conventional chemotherapeutic agents. This study aims to develop targeted pegylated niosomes encapsulating a hydrophilic and a lipophilic chemotherapeutic drug. Using Design of Experiment software (DOE), optimal niosome formulations were identified and prepared. Niosomes were prepared via the thin-film hydration method and characterized for size, polydispersity index (PDI), morphology, and drug loading. Particle size analysis revealed that blank niosomes ranged from 215 nm to 257 nm, while drug-loaded niosomes measured 251 ±2.20 nm with a polydispersity index (PDI) of 0.293 ±0.01. The formulation's composition, particularly the surfactant-to-cholesterol ratio, significantly influenced vesicle size and PDI. A validated HPLC method ($R^2 \geq 0.999$) confirmed successful drug encapsulation, with the hydrophilic drug exhibiting 50% higher loading efficiency and a faster release rate than the lipophilic drug. Stability studies emphasized the importance of lyophilization for prolonged storage. Cholesterol and Span60 concentrations significantly impacted niosome characteristics. The hydrophilic drug, a BCS Class III compound, exhibited superior loading efficiency compared to the lipophilic drug, a BCS Class I compound, which competed with other lipophilic niosome components. These findings provide valuable insights into optimizing niosomal drug delivery for CRC treatment.

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**Family Structures Across Time: A Generational View from the Utah Population Database**

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The Utah Population Database (UPDB) is a person-centered longitudinal dataset including demographics, familial, and medicinal information for over 11 million individuals with documented activity in Utah. Originally, founded on records such as birth and death certificates, The UPDB has now expanded to incorporate hospital and other health-related encounters which helps for population-based research. This project utilized the UPDB to examine intergenerational changes in family structure specifically focusing on identifying families spanning at least three generations within 10-year birth cohorts. The project aims to determine whether there is a definable breakpoint between historical and modern eras in the dataset and how that transition affects evolving family dynamics. It also explores how family structure varies across time and race, which leads to a deeper understanding of demographic shifts within the state. To do this, the project involves creating queries, algorithms, and datasets within UPDB to identify families who meet the criteria for answering these specific research questions.

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### Isolation and Characterization of Bacteriophage Infitex Infecting Mycobacterium smegmatis

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A bacteriophage is a virus that infects bacteria. Bacteriophage discovery is important because bacteriophages (phages) are potential solutions to solving the problem of bacteria becoming resistant to antibiotics. The objective of the study was to discover new phages that infect bacteria belonging to the genus Mycobacterium and to characterize the qualities of the phage by analyzing its genome. For this research experiment, the host bacteria, Mycobacterium smegmatis mc2155, was utilized and is related to Mycobacterium tuberculosis and Mycobacterium avium. A soil sample was collected at Banneker Recreation Center at the coordinates 38.921786 N, 77.024241W. Isolation steps for a singular phage included purification through plaque assays and serial dilutions. Later, molecular studies were started with extraction and characterization of the DNA. This included restriction enzyme digests using EcoRI, Hind III, and Sal I and then gel electrophoresis. The results of the research process yielded a successful isolation of a purified phage called Infitex's. The homogenous plaque population was 2 mm in diameter and clear, indicating that Infitex is a lytic phage. DNA isolation resulted in a sample with a concentration of 45.7 ng/mL, suitable for downstream analysis including restriction digest with EcoRI, Hind III, and Sal I. The successful isolation and characterization of the lytic bacteriophage, Infitex contributes to the growing understanding of phage diversity and highlights the potential role of bacteriophages as alternative tools in combating antibiotic-resistant bacterial infections.
Keywords: Bacteriophage, Lytic life cycle, Restriction Enzymes, Isolation, Mycobacterium smegmatis

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### Scaffold protein RACK1 Mediated Auxin Signalling Pathways in Model Plant Arabidopsis

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Background and Objective: Auxin is the key plant growth hormone known especially for shoot and root development.This study investigates how the plant RACK1 gene regulates auxin signaling in the roots, shoots, and leaves of Arabidopsis thaliana. It is important to study auxin because of its potent impact on cell division, cell growth, and differentiation. RACK1 is a scaffold protein that regulates auxin signaling pathways and other pathways ranging from developmental processes such as seed germination, flowering and leaf production to immune and stress responses against pathogen and environmental stimuli. Seedlings grown from Arabidopsis auxin responsive reporter gene construct DR5-GFP expressing seeds were transferred to different RACK1 inhibitor plates and then allowed to grow so that the growth (length of roots, number of lateral roots, and overall growth) could be observed. In addition, the fluorescence level and localization of the GFP was monitored to assess the activation/inhibition of auxin signalling pathways. As RACK1 is reported to positively regulate auxin signalling pathways, it is expected that inhibiting RACK1 may reduce the auxin-based GFP fluorescence and auxin-based growth. Preliminary results have shown that the higher the concentration of SD29-14 (RACK1 inhibitor), the lower the development of lateral roots. Further investigation will provide more information on the effects of SD29-14 concentration on auxin signaling. Understanding RACK1 mediated auxin signaling pathways will contribute new information to existing knowledge of plant development and improve agricultural outlook.

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### Effect of GLP-1 Receptor Agonists on Atrial Fibrillation and Mortality in Anabolic Steroid Users: A Retrospective Cohort Study Using Real-World Data

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Anabolic androgenic steroids (AAS) are associated with increased cardiovascular risk, including atrial fibrillation (AF) and premature mortality. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) have demonstrated cardioprotective effects in patients with diabetes and obesity; however, their impact among individuals exposed to AAS remains unknown. Objective: To evaluate whether GLP-1 RA use reduces the incidence of atrial fibrillation and all-cause mortality among adults exposed to anabolic steroids. We conducted a retrospective matched-cohort study using the TriNetX global health research network. Adults aged ≥18 years with documented anabolic steroid exposure were identified and stratified by GLP-1 RA use. Two cohorts were defined: (1) AAS users receiving GLP-1 RA therapy and (2) AAS users without GLP-1 RA exposure. Propensity score matching (1:1) was performed based on demographics and comorbidities, including diabetes, obesity, hypertension, chronic kidney disease, dyslipidemia, and tobacco use. Primary outcomes were incident atrial fibrillation and all-cause mortality. Risk ratios, odds ratios, and Kaplan–Meier survival analyses were calculated.A total of 83,704 patients (41,852 per group) were included after matching. The GLP-1 RA cohort demonstrated lower incidence of AF (4.9% vs 7.6%; RR 0.64; OR 0.63; $p < 0.001$) and all-cause mortality (3.4% vs 8.9%; RR 0.38; OR 0.36; $p < 0.001$). Survival probability was higher in the GLP-1 RA group (HR 0.62; $p < 0.001$). GLP-1 RA use among AAS-exposed individuals is associated with reduced AF and mortality risk, supporting further prospective investigation in this high-risk population.

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**A Comparative Machine Learning Approach to Predict 5-HMF Levels in Apple Juice After Thermal Treatment**

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5-hydroxymethylfurfural (5-HMF) is generated during the degradation of sugars under elevated thermal conditions, including cooking, pasteurization, or prolonged storage at high temperatures. It is considered an indicator of food safety, so high levels of it can lead to serious effects on health, such as causing cancer. The objectives of this study were to develop and validate machine-learning models to predict thermally induced 5-HMF formation in 100 commercial apple juice samples at different concentrations. The physicochemical parameters pH, Brix, and EC were assessed. The initial concentration of 5-HMF was measured using a UV-Vis spectrophotometer (UV-1280, Shimadzu) at 284 nm. Thereafter, samples were incubated at 45°C for 3 days, and the final 5-HMF concentrations were quantified. The results showed that the 5-HMF level increased by 233% after thermal treatment, indicating the significant impact of temperature increase on 5-HMF formation. The predictive performance of three machine learning algorithms, linear regression, random forest, and gradient boosting, was compared. Linear regression is the most predictive algorithm. It achieved the highest R-squared (0.9975) and the lowest RMSE (0.0034). The feature importance analysis shows that Brix (33.47%) is the best predictor of 5-HMF production, while pH (4.25%) has the lowest predicted value. This study introduces a novel data-driven machine-learning approach for detecting 5-HMF levels in apple juices and evaluating the effect of EC on 5-HMF formation at different concentrations. This work provides manufacturers with useful tools to predict 5-HMF levels in their products by measuring and monitoring parameters such as pH, Brix, EC, and juice concentration.

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**Starving the Virus: Iron Chelation as Adjuvant Therapy in HIV Treatment**

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HIV relies on host-derived iron for critical replication stages. Elevated iron in PLWH exacerbates oxidative stress and viral persistence. We hypothesize that next-generation Schiff base chelators can selectively sequester iron without disrupting metal homeostasis. Four compounds were tested (L1-L4) using mass spectrometry, NMR, IR spectroscopy, and X-ray crystallography. Cd2+ served as Fe3+ analog for structural studies. L2 forms rigid 1:1 Cd2+ complexes with 2:1 Fe3+ binding, while L4 shows remarkable flexibility (four coexisting complex types) and superior solubility. Metal selectivity confirmed: no Mg2+ binding, favorable Fe3+ coordination. These findings support development of bioavailable, host-targeted antivirals.

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**A Whole-Brain Analysis of Glial-Neuronal Coordination During Sensorimotor Integration**

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How the brain coordinates activity across millions of neurons to produce behavior remains a fundamental question, and while we have become adept at mapping neuronal activities, we still do not fully understand how these distributed networks maintain their precise brain-wide coordination, creating a critical gap that this project addresses. Our approach builds on prior studies demonstrating glial participation in sensory-driven behavior and employs whole-brain calcium imaging in optically transparent larval zebrafish to map neural dynamics in response to visual, auditory, and nociceptive stimuli. To further assess the role of cerebellar output in this coordination, we combine multisensory stimulation with network-state alteration through propofol anesthesia and cell-type-specific ablation of Purkinje cells and, subsequently, cerebellar radial glia using intersectional Cre-lox systems. We expect that sensory stimulus integration will be supported by coordinated whole-brain neuronal networks directed by the cerebellum, and that disruption of either global brain state through anesthesia or targeted cell loss will impair this coordination. Additionally, we anticipate that radial glia calcium dynamics will be essential for maintaining whole brain coordination and that it will predict neuronal population activity. These findings will advance our understanding of glial contributions to neural circuit function and reinforce the idea that radial glia are active regulators of brain-wide coordination. Demonstrating that neuronal-radial glia activities are necessary for robust functional connectivity and precise sensorimotor integration could redefine our understanding of how the cerebellum coordinates distributed networks and could reveal novel cellular targets for treating cerebellum-related conditions such as autism or ataxia.

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**Mechanism Aware Molecular Generation: LLMs Learn to Separate Orthosteric GLP 1 Agonists from PAMs via Structural Signatures**

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Large language models (LLMs) have emerged as powerful generative frameworks in drug discovery; however, their practical potential in molecular generation requires mechanism-conditioned control and reliable uncertainty quantification. We introduce a progressive fine-tuning pipeline based on MolT5-Small (110M parameters) for mechanism-conditioned generation of small-molecule GLP-1 receptor (GLP-1R) agonists, followed by deep ensemble confidence scoring. Our V3 baseline was trained using property-conditioned prompts, providing

essential molecular properties for generating drug-like molecules. V4 extended this framework by employing mechanism-aware prompts to differentiate between Orthosteric GLP-1 agonists and Positive Allosteric Modulators (PAMs). A total of 43,743 SMILES were collected from ChEMBL, including 14,581 labeled (7,074 Orthosteric and 7,507 PAMs) and 29,162 unlabeled molecules.The model achieved 85.5% mechanism accuracy, as measured by a TPSA-based classifier. Notably, TPSA was never provided during training, yet the generated SMILES distribution showed a distinct separation: Orthosteric-like molecules exhibited higher TPSA (94.43 ± 16.42 Å²), whereas PAM-like molecules showed lower TPSA (66.70 ± 12.41 Å²), indicating that the model effectively learned mechanism-specific generation of novel SMILES targeting GLP-1R. KL divergence over ECFP4 fingerprints demonstrated greater structural separation in generated molecules (2.48) compared with the baseline dataset (~0.8). To address inference instability under Monte Carlo Dropout, the V5 model significantly enhancing inference reliability. Finally, a deep ensemble yielded calibrated confidence scores for candidate prioritization. In summary, this work highlights the promise of LLMs as controllable generative engines for receptor-specific drug design. Future efforts will focus on integrating richer biological context such as structural docking constraints and multi-objective ADMET optimization.

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**Exploring Large Language Models for Molecular Design**

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Artificial intelligence (AI) plays a transformative role in medicinal chemistry, drug discovery, and pharmaceutical sciences. Recent advances have integrated machine learning and deep learning models into various applications, including AI-driven de novo molecular design, protein generation, and molecular property prediction. Molecular design using text has emerged as an approach in which AI tools generate molecular structures from descriptive text inputs by translating them into valid molecular representations. Large language models (LLMs) are well-suited for this task due to their strong natural language processing and translation capabilities. LLMs can read the SMILES string, a format that encodes the chemical structure in a linear string of letters. However, their ability to translate the given description into valid SMILES and generate accurate molecules remains underexplored. To address this gap, we systematically explore, evaluate, and benchmark state-of-the-art LLMs for this molecular generation. We first implement in-context learning (ICL), where prompts include random and scaffold-based demonstration examples pairing molecular descriptions with corresponding SMILES strings. We then enhance this approach using a retrieval-augmented in-context learning (RAG-ICL) framework. The enhanced RAG-ICL approach embeds training descriptions using semantic vector representations, builds index for efficient retrieval, and applies chemical re-ranking using Morgan fingerprint Tanimoto similarity. Retrieved examples are then formatted into structured ICL prompts. Our results show that LLMs can generate valid molecular structures, and that RAG-ICL consistently improves performance over standard ICL across both text-based and chemistry-based evaluation metrics with average validity increasing from approximately 0.75 to 0.95 and overall similarity from approximately 0.62 to 0.87.

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**Structural Analysis of Missense Mutations on the Stability of the DISC1 Scaffold Protein**

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DISC1 (disrupted in schizophrenia 1) is a multifunctional scaffold protein that supports neurite outgrowth and cortical development through a wide range of protein interactions. It is a well-established risk factor for multiple psychiatric illnesses, including schizophrenia, bipolar disorder, major depression, and potentially autism spectrum disorders. Although DISC1's interactome has been extensively mapped, an isoform- and region-resolved understanding of which interactions and structural features most strongly disrupt disease-relevant neuronal phenotypes is still lacking. Here, we apply saturated computational mutagenesis, pathogenicity prediction tools, DISC1–NDEL1 complex modeling, and molecular dynamics simulations to evaluate how stabilizing and destabilizing missense mutations influence DISC1 stability and function. To date, saturated mutagenesis has identified the most destabilizing and stabilizing substitutions across DISC1, and pathogenicity predictors have prioritized variants most likely to contribute to disease. The modeled DISC1–NDEL1 complexes provide preliminary insight into how top-ranked stabilizing/destabilizing mutations may alter complex stability, while molecular dynamics simulations are currently underway to further characterize their structural and dynamical consequences. Overall, this work aims to pinpoint DISC1 regions and residues that drive these effects and to test how structural mutations modulate DISC1 stability and function when complexed with key partner proteins such as NDEL1.

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**COI Barcoding of Pheidole tysoni & Tapinoma sessile**

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Ants (Family: Formicidae) are ecologically significant insects that also include species with medically relevant venom. Accurate species-level identification is critical for understanding ecological interactions and assessing allergenic risk. This study evaluates mitochondrial cytochrome c oxidase subunit I (COI) DNA barcoding for distinguishing Pheidole tysoni (n = 7 sequences) and Tapinoma sessile (n = 8 sequences), two ant species differing in venom apparatus and potential sting-related

health impacts. Publicly available COI sequences were obtained from GenBank and BOLD and filtered to include sequences ≥600 bp, derived from adult specimens, and accompanied by verified metadata. Metadata verification involved cross-checking voucher information, collection locality, and publication references. To address low sequence depth, sequences from closely related congeneric taxa (Pheidole morrisi, n = 5; Tapinoma melanocephalum, n = 6) were included as internal controls. Sequences were aligned using MUSCLE in MEGA11, trimmed to a homologous region, and translated to verify the reading frame and exclude nuclear mitochondrial pseudogenes (numts). Pairwise genetic distances were calculated using the Kimura 2-parameter model, and a Maximum Likelihood phylogenetic tree with 1,000 bootstrap replicates was constructed, rooted with Solenopsis invicta. Results indicate that mean interspecific genetic distance was approximately 12.3%, mean intraspecific variation was 0.8%, and bootstrap support for each species clade exceeded 98%, demonstrating statistically robust separation. These findings quantitatively confirm that COI barcoding reliably differentiates P. tysoni and T. sessile, supporting its use in ecological research and providing molecular evidence to monitor ant species with venom capable of eliciting allergic reactions in humans.

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**When Waters Pollute, Microbiomes Shift: Examining the Impact of Environmental Degradation on the Gut Microbiome of a Commonly Consumed Fish in Africa**

Presenter's Name: Olabisi Atofarati
Classification: Graduate Student
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Pollution is rapidly reshaping tropical freshwater ecosystems, yet its consequences for host-associated microbiomes in economically important fish species remain poorly understood. The African catfish Chrysichthys nigrodigitatus, a commercially valuable and widely consumed species across West Africa, plays a critical role in regional fisheries and food security. We investigated how habitat quality restructures its gut microbiome by sampling individuals across a clearly defined pollution gradient spanning relatively pristine to heavily impacted waters. Using high-throughput sequencing, we examined microbial community composition and predicted functional capacity to assess how environmental disturbance alters host-associated microbiomes. Our result showed that fish from polluted habitats harbored markedly distinct microbial assemblages enriched with potentially pathogenic taxa of public health concern, whereas individuals from less-polluted systems supported broader, more compositionally stable communities. Functional profiling revealed enrichment of pathways related to xenobiotic degradation, oxidative stress response, and aromatic compound metabolism in polluted environments, indicating microbiome-level adaptation to contaminant exposure. These findings demonstrate that environmental degradation does not merely alter ecosystem structure but penetrates to the microbial level of a key fisheries species, with potential consequences for host health, disease risk, and public health concern. By explicitly linking pollution intensity to microbiome structure and function, this study positions the gut microbiome as a sensitive and scalable bioindicator of ecosystem integrity and highlights its relevance for fisheries sustainability, food safety, and aquatic conservation in tropical regions.

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**Conserved Pathways: Evaluating the Impact of Microbiota Composition on Metabolic Dysfunction in Drosophila melanogaster**

Presenter's Name: Chelsea Austin
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Fruit flies, Drosophila melanogaster, are premier model organisms in biomedical research due to their significant genetic similarity to humans and their role in discovering mechanisms underlying cancer and metabolic diseases. Many genes involved in human metabolic disorders and neurodegenerative conditions are evolutionarily conserved in the fly, allowing for the study of complex health issues in a simplified system. Beyond their laboratory utility, fruit flies serve as vital decomposers in ecosystems and act as bioindicators of environmental health and resource availability. This meta-analysis investigates how variation in gut microbiome composition influences the development of metabolic dysfunction. By utilizing publicly available genomic data from databases such as GenBank, this study examines the correlation between specific microbial shifts and markers of obesity and type 2 diabetes. This research connects environmental health patterns with biological processes to better understand the mechanisms of metabolic disease in humans.

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**Adapting FEAST for High-Dimensional Microglial Profiling in Alzheimer's and Beyond**

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Microglial phagocytosis is essential for brain homeostasis, and its dysregulation is a hallmark of neurodegenerative diseases like Alzheimer's disease (AD). The FEAST (Flow cytometry-based Engulfment Assay for Specialized Targets) protocol enables brain-wide quantification of this process, but its compatibility with intracellular markers needed for deep phenotyping remains unexplored. This pilot study aims to expand FEAST's utility by evaluating intracellular epitope detectability following fixation and acid-wash and by optimizing pre-analytical sample quality for mass cytometry. Using cortical tissue from wild-type and 5xFAD mice, we focused on two areas. First, we optimized single-cell recovery from fixed tissue. Enzymatic digestion and trituration yielded unexpectedly high cell numbers. To refine sample clarity, a sucrose density gradient (10-30%) was tested, successfully

concentrating cells in the 30% layer with minimal debris, suggesting effective enrichment. A second gradient with higher concentrations is underway to improve resolution. Second, we prepared samples for mass cytometry with antibodies targeting surface markers and intracellular targets, including lysosomal microglial identity, and AD-pathology proteins. Our preliminary results demonstrate robust single-cell recovery, setting the stage for determining which intracellular epitopes survive fixation and acid wash. This will establish the analytical breadth of an expanded FEAST protocol, enabling future studies to assess microglial identity, activation state, and phagocytic cargo to reveal disease-relevant signatures in AD.

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**Mapping Neurotoxic Potential: A Spatial Analysis of Solanum elaeagnifolium and Acetylcholinesterase Inhibition Risk in Human Modified Landscapes**

Presenter's Name: Serena Azandegbe
Classification: Undergraduate Student
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Solanum elaeagnifolium (silverleaf nightshade) is a New Mexico native known for producing solanine, a glycoalkaloid that acts as a potent acetylcholinesterase inhibitor. While clinical toxicity requires significant exposure, mapping its distribution across human modified landscapes provides essential ecological context for potential neurotoxic interactions. This study investigates whether land use type is associated with S. elaeagnifolium occurrence after correcting for the inherent sampling biases of community science data. Research grade iNaturalist observations (2021–2025) were aggregated into a grid. To ensure statistical reliability, grid cells with fewer than 20 total observations were excluded, and data were normalized using total vascular plant density as a proxy for observer effort. Land use categories were defined via NLCD 2021 and USDA CDL 2021, focusing on disturbed agricultural and rangeland classifications. A Chi square goodness of fit test compared effort corrected occurrences to expected frequencies based on available land use. This framework clarifies if S. elaeagnifolium disproportionately occupies disturbed landscapes, establishing a foundation for identifying where human proximity to solanine producing plants is most frequent. By addressing uneven sampling effort, this research demonstrates a robust method for utilizing community science to inform public health and ecological management.

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**Comparative Public Health Implications of Solenopsis invicta: Immunologic Outcomes of Envenomation Versus Mechanical Vector Potential**

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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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The Red Imported Fire Ant (Solenopsis invicta), introduced to the United States in the 1930s, is widely established across the southeastern region and represents a persistent public health concern. This study comparatively evaluates the relative burden of immunologic morbidity resulting from envenomation against the species' proposed role as a mechanical vector of foodborne pathogens. A structured systematic literature review was conducted using PubMed, Ovid, and Sage Journals databases for publications between 1995–2025. Search terms included "Solenopsis invicta," "fire ant venom," "anaphylaxis," "mechanical vector," and "foodborne pathogens." Of 92 articles identified, 37 met predefined inclusion criteria, including peer-reviewed human clinical studies, epidemiological reports, and experimental assessments of pathogen carriage. Case reports without population-level data were excluded. Epidemiological evidence indicates that in heavily infested regions, approximately one-third of individuals experience annual stings. Envenomation produces 1–2 mm sterile pustules mediated by piperidine alkaloids, while 0.5–2% of cases progress to systemic allergic reactions, including life-threatening anaphylaxis. In contrast, although S. invicta has demonstrated the capacity to mechanically harbor foodborne pathogens, documented human transmission events and attributable disease incidence remain comparatively limited and less epidemiologically substantiated. Comparative descriptive analysis suggests that acute immunologic outcomes from envenomation represent the more immediate and quantifiable public health burden. These findings support prioritization of sustainable biological control and targeted mitigation strategies to reduce severe allergic morbidity in endemic regions.

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**Rehabilitation Utilization and Post-Amputation Outcomes Among Patients with Type 2 Diabetes**

Presenter's Name: Kyla Baron
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Objective: To evaluate the association between post-amputation rehabilitation and risk of localized stump infection and phantom limb syndrome following lower limb amputation in adults with type 2 diabetes mellitus (T2DM). Methods: We conducted a retrospective propensity-matched cohort study using TriNetX. Adults with T2DM, circulatory complications, and documented lower limb amputation were included. The rehabilitation cohort received ≥1 rehabilitation CPT code (97110, 97112, 97530); all others served as controls. Patients with prior infection or phantom limb syndrome were excluded. Primary outcomes were localized stump infection and phantom limb syndrome at 30 and 180 days postoperatively. Matching accounted for key comorbidities, including cardiovascular disease, chronic kidney disease, and obesity.
Results: After matching, 54,356 patients were included in each cohort. At 30 days, localized infection occurred in 2.3% of rehabilitation patients versus 1.6% of controls (HR 1.41, 95% CI 1.29–1.54; $p<0.001$), and phantom limb syndrome occurred in 1.2% versus 0.7% (HR 1.69, 95% CI 1.48–1.93; $p<0.001$). At 180 days, infection occurred in 6.4%

versus 4.5% (HR 1.42, 95% CI 1.34–1.50; p<0.001), and phantom limb syndrome in 3.1% versus 1.8% (HR 1.69, 95% CI 1.56–1.83; p<0.001). Conclusion: Post-amputation rehabilitation in patients with T2DM was associated with higher rates of stump infection and phantom limb syndrome. Findings may reflect residual disease severity, increased clinical surveillance, or detection bias; causality cannot be established. Prospective studies are needed to clarify temporality and underlying mechanisms.

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**Geriatric Sepsis: Pharmacist-Led Strategies to Reduce Risk and Improve Outcomes**

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Background: Sepsis is a leading cause of morbidity and mortality, with older adults at particularly high risk due to age-related physiologic, biologic, clinical, and pharmacologic changes. Objective: This review examines factors contributing to increased susceptibility to sepsis and poorer outcomes in geriatric patients, with emphasis on the preventive and therapeutic role of pharmacists. Methods: A systematic literature review was conducted using PubMed to identify peer-reviewed publications from the past 25 years. Search strategies focused on biologic, physiologic, clinical, and pharmacologic factors influencing sepsis risk and management in older adults. Titles and abstracts were screened for relevance, and full-text articles were reviewed when inclusion criteria were met. Data extraction emphasized immune dysfunction, comorbidities, antimicrobial dosing considerations, medication-related risks, and clinical outcomes. Findings: Age-related immunosenescence impairs host defense through reduced T-cell activity and diminished neutrophil chemotaxis. Older adults demonstrate blunted inflammatory responses, resulting in atypical infection presentations, delayed diagnosis, and delayed treatment. Reduced organ reserve and common comorbidities, including diabetes, chronic kidney disease, heart failure, and chronic obstructive pulmonary disease, further increase vulnerability. Polypharmacy, frequent healthcare exposure, malnutrition, and frailty contribute to infection risk and impaired recovery, while altered pharmacokinetics heighten antimicrobial toxicity.
Role of Pharmacists: Pharmacists play a critical role in sepsis prevention and management by optimizing medication regimens, identifying immunosuppressive and high-risk therapies, ensuring appropriate antimicrobial selection and dosing, monitoring for adverse effects, and educating patients and caregivers on infection prevention strategies.
Conclusion: Targeted pharmacist involvement is essential to reduce sepsis incidence, promote early detection, and improve therapeutic outcomes in geriatric patients.

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**Phenotypic Plasticity and Urban Adaptation of Sciurus carolinensis in the Anthropogenic Landscape of Washington, D.C.**

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The eastern gray squirrel (Sciurus carolinensis) is among the most widespread and ecologically significant mammalian species in urban environments, including the Washington, D.C. metropolitan region and the Howard University campus. As a diurnal species, S. carolinensis is highly visible and has demonstrated notable behavioral plasticity in response to sustained human activity, including flexible foraging strategies and adaptive nesting behaviors. This species occupies diverse urban habitats, including parks, residential neighborhoods, and remnant woodlands. They are known for consuming nuts, seeds, fruits, and occasionally invertebrates. Through scatter-hoarding behavior, it contributes substantially to seed dispersal and urban forest regeneration. Genetic research indicates that urbanization influences gene flow across S. carolinensis populations, as infrastructure fragmentation and increased tree canopy create both opportunities and barriers to dispersal. Phenotypic traits, including short generation times, arboreal locomotion, and high behavioral flexibility, are associated with the species' urban success. In cities with abundant ornamental plantings and supplemental feeding, S. carolinensis populations expand rapidly, at times competitively displacing native Sciurus species. Collectively, research on S. carolinensis in the D.C. area advances understanding of mammalian adaptation to anthropogenic environments, offering a replicable model for examining ecological roles, population dynamics, and human-wildlife interactions in one of North America's most intensively urbanized landscapes.

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**SB100X transposase mediated transgene delivery in cardiac myocytes in vitro and in vivo**

Presenter's Name: Fikru Bedada
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Co-authors: Daniel Carlson, Scott Fahrenkrug, Joseph Metzger

Background: Viral-based cardiac-gene therapies have demonstrated significant progress. However, high costs, safety concerns, and complex manufacturing remain a challenge. Currently, the testing of non-viral, Sleeping Beauty (SB100X) system in cardiac tissue is limited. Specifically, investigating a non-viral alternative offering safe, efficient, stable gene integration in RNVCMs and RNVCMs-reconstituted cardiac constructs in vitro and vivo represents a unique study. Here, we demonstrate the efficacy of SB100X-mediated, non-viral gene delivery in cardiac tissue, both in vitro and in vivo. Method: Transposon plasmids (encoding eGFP, mCherry or Luciferase) reporters were co-transfected with or without the SB100X transposase expression plasmid into rapidly

dividing HEK cells, RNVCMs and RNVCMs-reconstituted cardiac constructs in vitro. Similarly, RNVCMs-reconstituted cardiac constructs were co-transfected and transplanted into Nude mice. Both in vitro and in vivo studies were monitored for 15-120 days. Result: Data demonstrates sustained fluorescent reporter gene expression in HEK cells (across three passages), RNVCM cultures (90 days) and consistent luciferase expression in 15-day cultured 3D engineered cardiac constructs using luciferase imaging in vitro. Additionally, we validated consistent luciferase expressions in 15 day transplanted cardiac constructs in mice. Finally, Southern blotting confirmed stable plasmid integration whereas transplanted-reconstructed cardiac constructs maintain functional viability, including beating, structural sarcomere alignment for up to 120 days.Conclusion: Our study corroborates the efficacy of non-viral, SB100X system for stable, long-term genetic modification in cardiac tissue without compromising functional viability. Importantly, testing RNVCM-based 3D reconstituted constructs both in vitro and in vivo represents a pioneering approach, driving significant advancements in cardiac research and gene therapy.

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**Effects of pH on HIV-1 trapping by Porcine Gastric Mucin (PGM II)**

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*Presentation Type: Oral Presentation*
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Mucin plays a critical role in the trapping of HIV-1, a process heavily influenced by pH and surface mannose sugars. HIV-1 particles exist as crosslinked complexes due to a high density of surface Mannose sugars. While these complexes remain mobile at neutral pH, they are subject to dispersal or restriction depending on the glycoprotein environment. PGM II undergoes surface conformational changes in a low pH environment. However, the quantitative relationship between environmental pH and HIV-1 immobilization remains undefined across physiologically relevant conditions (pH 2.0-7.4). This study specifically focuses on how mannose-mediated crosslinking responds across a pH range. There is a significant knowledge gap that remains regarding how changes in pH levels alter the trapping of HIV-1 by PGM II. The goal of this research is to establish a definitive trend of how pH fluctuations drive the entrapment or dispersion of HIV-1, via mannose-specific pathways. It will provide a clearer physiological understanding of viral mobility within mucosal environments. This study utilizes Dynamic Light Scattering (DLS) and magnetic bead isolation to characterize changes in the hydrodynamic radius (R_h) and size distribution. Our protocol evaluates the entrapment of HIV-1 by PGM II in the presence of gp120 antibodies by employing magnetic beads to isolate specific complexes from the supernatant. To ensure clinical relevance, this study incorporates cell culture models to provide a concise physiological context for these biophysical observations.

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**Racial Disparities in Repeat Cesarean Section after TOLAC: A TriNetX propensity-matched retrospective cohort study**

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Introduction: Racial disparities persist in maternal health, with Black and Hispanic pregnant patients more likely to undergo cesarean sections (CS). After a prior CS, many patients are candidates for vaginal birth, which is preferred due to increased maternal complications associated with multiple CSs. This study compares the risk of repeat CS after a trial of labor after cesarean (TOLAC) among Black, Hispanic, and White patients to better understand racial disparities in maternal outcomes. Methods: A retrospective cohort study was conducted using the TriNetX Global Network. Pregnant women aged 18–50 were included. Cohort 1 consisted of 1,025,023 Black pregnant patients and cohort 2 included 4,373,212 non-Black pregnant patients. Subgroup analyses compared Black patients to White and Hispanic patients. The primary outcome was CS after TOLAC between November 19, 2005, and November 14, 2025. Statistical analyses included risk analysis and Kaplan-Meier survival analysis. Results: After matching, Black pregnant patients had nearly double the risk of repeat CS after TOLAC (0.003) compared to patients of other races (0.002) (risk ratio [RR] 1.83, 95% CI 1.721–1.949). Compared to White patients, the RR increased to 2.14 (95% CI 2.002–2.282). In contrast, comparison with Hispanic/Latino patients showed similar risk (RR 0.977, 95% CI 0.902–1.057).
Conclusion: Black pregnant patients had a significantly higher risk of repeat CS after TOLAC compared to women of other races, particularly White patients, while risk was similar between Black and Hispanic patients. These findings underscore the need to address racial disparities to ensure equitable maternal care.

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**Seasonal Variation in Spotted Lanternfly Sightings: Implications for Ecosystem Stability and Crop Health**

Presenter's Name: Nylah Bennett
Classification: Undergraduate Student
School/College: Arts & Sciences
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This study investigates how seasonal weather patterns in Washington, DC influence monthly population trends of the spotted lanternfly (Lycorma delicatula), an invasive species of growing environmental and agricultural concern. The research examines whether warmer temperatures correspond to increases in lanternfly sightings and whether colder conditions contribute to population declines. It was hypothesized that sightings would rise in spring, peak in summer, decline through autumn, and reach their lowest levels in winter. Data were collected

through outdoor observations and analysis of public sighting records from iNaturalist.com, with emphasis on Washington, DC and comparative observations across the United States. Monthly sighting frequency served as an estimate of relative population size and seasonal distribution. Preliminary findings indicate that sightings are minimal during winter months, increase steadily in spring, peak during summer, and decline in autumn, supporting the hypothesis that warmer temperatures promote higher lanternfly activity and visibility. These seasonal patterns highlight the strong influence of temperature on lanternfly behavior and population dynamics. Understanding these trends is essential for predicting peak infestation periods and informing timely management strategies. Because the spotted lanternfly poses a significant threat to crops and native plants, seasonal forecasting contributes to protecting ecosystem stability and safeguarding agricultural health. Improved awareness of temperature-linked population shifts can support early intervention efforts and reduce the ecological and economic impacts associated with this invasive species.

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**Characterizing Population-Specific Genetic Variants in Susceptibility to Anaphylaxis within the All of Us Research Program**

Presenter's Name: Jordan Benson
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Background: Anaphylaxis is a severe, life-threatening allergic reaction. While environmental triggers are well-documented, the genetic basis of anaphylaxis susceptibility remains poorly understood, particularly across diverse populations. In this study, we characterized demographic and genomic features of anaphylaxis using the All of Us Research Program database. Methods: We analyzed whole-genome sequencing (WGS) data from the cohort of anaphylaxis patients. Participants were identified via SNOMED codes and stratified by genetic ancestry. We analyzed 3,298 variants across 15 high-interest anaphylaxis genes using Python and BigQuery. To distinguish true ancestry-specific markers from statistical noise, we adjusted for population structure using principal component analysis (PCA), specifically identifying PC7 as a key ancestry-related vector. Results: The cohort (mean age 56.3 years) was predominantly female (75.1%) and of white race (56%), followed by black (15.6%) race. We identified 3,313 variants with robust ancestry-specific allele frequencies ($p < 0.05$). Black race-enriched variants (n=1,745) were most prevalent in HLA-DRB1, HLA-DQB1, and KIT. Notably, FCER1A (high-affinity IgE receptor) showed the strongest enrichment in black patients (OR=198–215, $p < 10^{-13}$). Conversely, white race-enriched variants (n=1,568) were led by C5 (complement component 5), which showed the highest frequency in that population (OR=78–300, $p < 10^{-22}$). Discussion: Our results reveal significant ancestry-specific genetic heterogeneity in anaphylaxis susceptibility. The significant enrichment of FCER1A in black patients and C5 in white patients suggests that different biological pathways such as IgE-mediated versus complement may be more active across different ancestries. These findings provide a genomic basis for population-specific risk stratification and precision management of anaphylaxis.

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**Metabolic Imaging Biomarkers in Inflammatory Myofibroblastic Tumors: From Diagnosis to Prognosis**

Presenter's Name: Kaylah Benton
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Inflammatory myofibroblastic tumor (IMT) is a rare, typically benign neoplasm comprised of myofibroblastic cells and inflammatory cells, with a variable and unpredictable clinical course. While generally non-malignant, IMTs may recur locally or behave aggressively. This retrospective study reviewed 20 pediatric IMT cases over a 10-year period at the Children's Hospital of Philadelphia to evaluate the role of FDG-PET/MR imaging as a diagnostic and prognostic biomarker. Data collected included demographics, tumor location, histopathology, mutation status, and metabolic activity measured as SUVmax on 18FDG PET scans. The majority of patients (n=20, 75%) had anaplastic lymphoma kinase (ALK) mutations and received targeted therapy with ALK inhibitors, with no observed recurrence during follow-up. Surgical resection was performed in 65% of cases, reflecting its role as a mainstay of treatment. Lung IMTs demonstrated higher metabolic activity on PET scans measured as SUVmax compared to other anatomical sites, suggesting higher potential aggressiveness. Importantly, a negative FDG-PET scan after therapy correlated with a complete metabolic response and an 3 year event-free survival in a subset of 7 patients. These findings highlight the potential of FDG-PET metrics to inform diagnosis, therapeutic response, and recurrence risk in pediatric IMTs. Future studies with larger, multicenter cohorts and standardized treatment protocols are warranted to validate metabolic imaging as a predictive biomarker and to refine management strategies for this rare entity.

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**Establishing a cellular model to assess molecular and synaptic changes associated with autism spectrum disorder**

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Background: Autism spectrum disorder (ASD) is a serious neurodevelopmental disorder significantly affecting the quality of life. The cause and treatment remain elusive although alterations in the formation of excitatory (glutamatergic) and inhibitory (GABAergic) synapses as well as imbalances in excitatory-inhibitory synaptic transmission and exposure to some drugs (such as valproate) have been implicated. Thus, further elucidation of these synaptic abnormalities might provide novel targets in prevention and/or treatment of this devastating disorder. The aim of this study is to provide a robust cellular model, particularly a glutamatergic type, to evaluate some of these parameters. Methods: We utilized SHSY-5Y cells, an immortalized cell line derived from human

neuroblastoma, to differentiate them into glutamatergic-like neurons. We applied a relatively high concentrations of B27 (5%), a serum-free, nutrient-rich supplement widely used for this purpose, for 12 days followed by evaluation of the neurite outgrowth and synaptic markers specific to neurons in general, and glutamatergic ones, in particular. We applied Brightfield microscopy, and Western blot analyses. Results: Morphological observations included substantial lengthening of neurites and molecular changes such as increases in expression of highly specific glutamatergic postsynaptic proteins, Neuroligin-1 and postsynaptic density protein 95 (PSD-95), consistent with a dendritic outgrowth. Conclusion: This technique provides a simple but reliable method to generate glutamatergic-like neuronal cells as a valuable tool in drug development and discovery. We will be utilizing such differentiated cells to evaluate the effects of drugs implicated in ASD as well as compounds that could prevent such changes as potential novel intervention in ASD.

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**Impact of High-Fructose and High-Fat Diets on Hypothalamic Insulin Signaling in Hepatic PKCε Heterozygous Male Mice**

Presenter's Name: Julia Biantey
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School/College: Graduate School
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High-fat diets (HFD) are associated with metabolic complications and obesity. However, increasing evidence shows that high fructose significantly contributes to metabolic complications, including insulin resistance. Insulin resistance is strongly associated with metabolic syndrome and affects thousands of people globally. Hepatic Protein Kinase C epsilon (PKCε) modulates systemic insulin signaling, and its deletion may influence hypothalamic insulin responses, particularly under basal and insulin-stimulated conditions, allowing us to test whether HFD or high-fructose diets (HFrD) differentially affect these pathways. We hypothesize that hepatic deletion of PKCε in male mice on a HFrD and an HFD will enhance insulin signaling under insulin-stimulated conditions. Methods: Male heterozygous LivPKCε (PKCεfl/Δ) mice were randomized to control, high-fructose, or high-fat diets for 1 month (n=2–4/group). A subset received insulin (0.5 U/kg) before sacrifice, and hypothalamic tissue was analyzed by blinded western blot for Actin, phosphorylated AKT (p-AKT), AKT, phosphorylated Insulin Receptor (p-IR), and IR. Experiments were replicated to strengthen rigor. Results: Total IR ($p<0.05$), total AKT ($p<0.05$) and pAKT ($p<0.05$) were downregulated in the HFD group compared to the control. Despite this, insulin stimulated p-IR/IR elevation in control mice ($p<0.05$). In contrast, AKT was upregulated in the HFrD group compared to the male control mice, especially under insulin conditions. Notably, the HFrD group showed a marked increase in p-IR/IR compared with control male mice ($p<0.05$), particularly under insulin-stimulated conditions. IR/Actin was upregulated in the HFrD male mice, stronger under insulin conditions.

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**Targeted Capsaicin Delivery Promotes Weight Control and Thermogenic Browning**

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Co-authors: Navoda Arumadura, Kwinci Britt, Olufemi Fayale, Nur Mita, Jayachandra Ramapuram

Background: Obesity drives metabolic dysfunction, including type 2 diabetes, dyslipidemia, hypertension, and cardiovascular disease, typically arising when energy intake exceeds expenditure. Current therapeutic options remain limited. Capsaicin, a transient receptor potential vanilloid 1 (TRPV1) agonist, has shown promise in promoting white adipose tissue beiging and activating brown adipose tissue (BAT) thermogenesis via upregulation of uncoupling protein-1 (UCP-1). However, its clinical utility is restricted due to its pungency and poor oral bioavailability. Methods: We investigated site-specific delivery of capsaicin using an in-situ forming implant (ISFI) gel targeted to BAT in high-fat diet-fed obese mice. Body weight, fat accumulation in liver and other organs, and thermogenic protein expression, including UCP-1 and sirtuin-1, were evaluated. Mechanistic studies assessed TRPV1-mediated calcium influx and AMP-activated protein kinase (AMPK)-dependent phosphorylation of sirtuin-1.
Results: The capsaicin-loaded ISFI demonstrated a near-complete sustained release (99.68 ± 1.82%) over five months in vitro, with a limited initial burst release (7.97 ± 1.29%). Release kinetics best fit the Korsmeyer–Peppas model, indicating a combination of diffusion- and polymer degradation-controlled release. Sustained capsaicin delivery enhanced BAT thermogenesis, resulting in a 40% reduction in weight gain versus placebo without affecting food intake. At study completion, target tissues were isolated and will be analyzed for thermogenic protein expression and signaling pathway activation. Conclusion: Site-specific ISFI capsaicin delivery effectively mitigated diet-induced weight gain. Ongoing biochemical characterization will clarify whether this strategy enhances BAT thermogenesis, energy expenditure, and metabolic function through TRPV1-calcium-AMPK-sirtuin-1 signaling, supporting its potential as a safe, translational anti-obesity therapy.

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**Localization of NKCC1 Co-transporter expression in APOE mice: Preliminary Analysis**

Presenter's Name: Gabrielle Bolton
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*Presentation Type: Poster Presentation*
Faculty Advisor: Jahn O'Neil
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Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by memory loss, cognitive decline, neuronal hyperactivity, and disrupted inhibitory GABA signaling, particularly in the hippocampus. We investigated whether expression of the Na-K-Cl cotransporter 1 (NKCC1), a chloride importer involved in neuronal

development, synaptic plasticity, and excitatory–inhibitory balance, differs between APOE3 and APOE4 mouse models exposed to low-salt (0.1% NaCl) and high-salt (4% NaCl) diets. Brain tissue from 5–7-month-old mice was sectioned and analyzed using NKCC1 immunostaining with H&E counterstaining to compare cortical and hippocampal expression, alongside behavioral assessments of distance traveled, primary latency, and primary errors. APOE4 mice on a low-salt diet showed reduced primary latency and errors, indicating improved spatial learning and memory. In contrast, high-salt conditions increased latency and errors and were associated with greater NKCC1 expression across examined regions. These findings suggest that elevated NKCC1 expression may contribute to cognitive impairment in APOE4-related AD pathology, while reduced salt intake may provide protective behavioral effects, though larger studies are needed to confirm these relationships.

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**Dietary Exposure Monosodium Glutamate Induces Non-B DNA structure Associated with Genomic Instability in Human Gastric Epithelial cells**

Presenter's Name: Trinity Borno
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Gastrointestinal cancers, including those of the stomach and colon, are increasingly diagnosed in younger individuals and disproportionately affect racial and ethnic minorities in the United States. Dietary exposures represent a significant risk factor, and evidence suggests that certain food additives can induce oxidative stress and DNA damage, promoting chronic gastrointestinal inflammation and disease. Previous work from the Kidane laboratory and others has shown that impaired repair of oxidative DNA damage, particularly through loss of the base excision repair protein XRCC1, sensitizes gastrointestinal epithelial cells to genotoxic injury and inflammation. Monosodium glutamate (MSG), one of the most widely consumed food additives, has been linked to metabolic disturbances and is recognized as an inducer of oxidative stress. Although MSG is considered generally recognized as safe by FDA at typical dietary intake levels, its effects in genetically susceptible individuals with compromised DNA repair remain poorly understood. We hypothesize that MSG induces damage and non-B DNA structure that synergizes with DNA repair deficiency (XRCC1 deficiency) to promote inflammatory responses. To investigate this hypothesis, we tested whether MSG exposure induces oxidative DNA damage and replication-transcription conflict in human gastric epithelial cells. Preliminary studies demonstrate that MSG treatment results in increased γH2AX foci, indicating elevated double strand break signaling, and enhanced S9.6 staining. These findings support the premise that MSG amplifies genotoxic stress in gastrointestinal cells and may heighten disease risk. This research aims to elucidate how dietary factors interact with vulnerabilities to promote gastrointestinal disease and improve understanding of cancer susceptibility in at risk populations.

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**Advancement of Bacteriophage Discovery: Analysis of ReidMinds**

Presenter's Name: Brianna Boye
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Antibiotic resistance has turned out to be one of the biggest health challenges in the world, and it is driving biomedical research to find an alternative to drugs that prove to be ineffective. One potential alternative is bacteriophages, viruses that infect bacteria. They can attack bacteria strains that are hard to combat with antibiotics. This project is aimed at encouraging phage therapy by studying the diversity of active bacteriophages within the Howard University. Precisely, it focused on isolating phages from campus that can infect host, Mycobacterium smegmatis mc²155. ReidMinds was isolated from the soil collected on university grounds at 38.92472° N, 77.021° W. After the sample processing, direct isolation was used to isolate ReidMinds and it was then subjected to multiple rounds of purification to ensure a single phage morphology. The phage was amplified to create lysate to be utilized in the experiment and genomic DNA was extracted successfully. The DNA obtained had a concentration level of 17.9 µg, and this made it possible to continue with molecular steps. A restriction enzyme digest was also performed as an early DNA characterization, using EcoRI, Hind III, and SalI to cut the DNA. Overall, this work reinforces why phage discovery matters. A single new phage adds to what is known, strengthens phage collections, and generates material that can later be sequenced, annotated and compared to other phages. Studies like this assists in building the foundation needed for developing phage-based tools which can assist in the effort to manage antibiotic-resistant infections.

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**Loss of PPAR-α Exacerbates Nocturnal Hypertension and Impairs Circadian Blood Pressure Regulation During Angiotensin II–Induced Hypertension**

Presenter's Name: Zora Brantley
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Peroxisome proliferator–activated receptor-α (PPAR-α) plays a critical role in metabolic and cardiovascular regulation; however, its contribution to circadian blood pressure (BP) control during Angiotensin II–induced (Ang II) hypertension remains incompletely defined. We compared day and night hemodynamic parameters in PPAR-α wild-type (WT; n = 3) and PPAR-α knockout (KO; n = 3) mice using radiotelemetry. Day values were calculated from 15:00–17:58 and 06:00–10:00, and night values from 18:00–05:58. KO mice exhibited significantly elevated systolic BP, mean arterial pressure (MAP), diastolic pressure, pulse pressure, and

heart rate compared with WT during both day and night periods. Group mean daytime systolic BP was 116 ± 20 mmHg in WT versus 154 ± 4 mmHg in KO mice, increasing at night to 130 ± 22 mmHg in WT and 169 ± 3 mmHg in KO animals. Similarly, daytime MAP was 109 ± 19 mmHg in WT versus 143 ± 4 mmHg in KO, rising at night to 121 ± 20 mmHg and 157 ± 3 mmHg, respectively. Pulse pressure was also greater in KO mice (Day: 19.0 ± 0.7 vs 11.8 ± 2.6 mmHg; Night: 21.9 ± 1.0 vs 14.1 ± 2.8 mmHg). KO mice demonstrated exaggerated nocturnal increases in heart rate and activity. Circadian dipping was preserved in WT mice but attenuated in KO animals, particularly for MAP and pulse pressure. These findings indicate that loss of PPAR-α promotes sustained Ang II hypertension, widened pulse pressure, supporting a key role for PPAR-α in maintaining circadian cardiovascular homeostasis.

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**The Future of Artificial Intelligence in Specialty Dentistry: The Benefits, Challenges and Considerations of the Use of AI in Endodontics**

Presenter's Name: Kwadwo Brenya
Classification: Professional Student
School/College: Dentistry
*Presentation Type: Poster Presentation*
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AI can be valuable in aiding endodontic procedures by analyzing dental imaging to accurately detect periapical lesions with active infections, identify complex root anatomy, quickly determine a correct working length measurements, predict any potential complications and ultimately improve treatment planning. This article explores the role of AI in endodontic treatment, how AI affects the prognosis, successful dental outcomes and the challenges faced by dental providers once this platform is further integrated into practice.

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**Molecular and Clinical Perspectives on GIST in Older Adults: Enhancing Detection and Treatment through Pharmacist Engagement**

Presenter's Name: Kwinci Britt
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School/College: Pharmacy
*Presentation Type: Poster Presentation*
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Background: Gastrointestinal stromal tumors (GISTs) are rare mesenchymal neoplasms of the gastrointestinal tract arising from interstitial cells of Cajal. Representing the most common gastrointestinal mesenchymal tumors and are primarily driven by activating mutations in KIT (~70–85%) or PDGFRA (~5–10%). GIST incidence is increasing globally, with the geriatric population (≥65 years) showing a peak incidence between 70–79 years. Black patients experience higher mortality compared to other ethnic groups, highlighting disparities in access to timely diagnosis and treatment. Early-stage GISTs are discovered incidentally for unrelated conditions. Methods: A comprehensive literature survey of publications indexed in PubMed from 1990 to present was conducted. Studies describing the epidemiology, molecular characteristics, racial disparities, clinical presentation, and management strategies of GIST were included to synthesize knowledge and highlight gaps in early detection and care. Results: GIST incidence is 10–15 per million annually. Tumors expressing KIT (CD117) and DOG1 confirm diagnosis, while PDGFRA mutations support diagnosis in KIT-negative tumors. Early detection is challenging due to submucosal growth and limited sensitivity of circulating tumor DNA (ctDNA) for small lesions. Routine CT imaging or ctDNA screening for asymptomatic older adults is not recommended; and abdominal surgery in older adults carries significant risks. Conclusion: GISTs in older adults are frequently asymptomatic, with rising incidence and higher mortality among Black patients. While ctDNA remains valuable for monitoring advanced disease, population-level screening is not justified. PharmD-led initiatives in education, awareness, and pharmacologic management can enhance early recognition, optimize therapy, and reduce disparities in outcomes in the geriatric population.

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**Temperature-Driven Population Changes in Aedes aegypti: Implications for Vector-Borne Disease Risk in the United States (2020-2025)**

Presenter's Name: Azari Brooks
Classification: Undergraduate Student
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Aedes aegypti, commonly known as the Yellow Fever Mosquito, transmits deadly vector-borne diseases including yellow fever, dengue fever, Zika virus, and chikungunya to over 390 million people annually. These diseases cause significant mortality and economic burden in tropical and subtropical regions worldwide. This study will examine whether temperature changes in the US drive population increases in Aedes aegypti. Using citizen science data from iNaturalist and the Global Biodiversity Information Facility (GBIF), Aedes aegypti population trends from 2020-2025 will be measured. Climate data from NOAA will be incorporated to examine relationships between temperature, rainfall, and mosquito observations. Years with higher mosquito activity correlate with increased dengue, Zika, and yellow fever outbreaks. Understanding these patterns allows public health officials to predict high-risk periods and allocate resources for vector control and disease prevention. This research provides essential baseline data for monitoring how environmental changes affect disease vector distributions.

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**Edge Effects in a Warming Climate: Community-Science Insights into the Expansion of Ixodes scapularis and Lyme Disease Risk**

Presenter's Name: Camille Broughton
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The Eastern Black-legged Tick (Ixodes scapularis), or deer tick, serves as the primary vector for Borrelia burgdorferi, the causative agent of Lyme disease in North America. As anthropogenic climate change alters regional temperature and humidity profiles, the geographic range and population density of this species have expanded significantly, particularly across the Eastern United States. This research utilizes a "big data" approach to public health entomology by analyzing approximately 42,000 community-science observations sourced from iNaturalist between 2021 and 2026. Focusing on the Washington, D.C. corridor, this study investigates the correlation between rising average annual temperatures, increased forest fragmentation, and tick density within urban-fringe ecosystems. We hypothesize that the "edge effects" created by fragmentation provide ideal micro-climates and host availability for I. scapularis larvae and nymphs. Preliminary geospatial analysis suggests that warmer overwintering conditions and reduced biodiversity in fragmented habitats are positively associated with higher observation frequencies. By integrating longitudinal climate data with community-derived biological observations, this study provides a high-resolution view of vector migration. These findings underscore the escalating risk of zoonotic disease transmission in peri-urban communities and demonstrate the utility of community science in monitoring vector populations. Ultimately, this research emphasizes the urgent need for adaptive public health strategies as environmental conditions continue to shift, providing a framework for future predictive modeling of Lyme disease hotspots in the Mid-Atlantic region.

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**Ozone Pollution and Monarch Butterfly Decline in the Mid-Atlantic Region**

Presenter's Name: Makayla Brown
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Monarch butterflies (Danaus plexippus) are a migratory species whose shifting population distribution serves as a measurable indicator of ecosystem health. Over the past five years, increasing air pollution has been proposed as a driver of altered migration patterns, yet the specific relationship between pollutant exposure and observed butterfly distribution remains understudied in the Mid-Atlantic region. This project investigates the correlation between ground-level ozone ($O_3$) concentrations and monarch butterfly observation frequency across the Washington D.C. metropolitan and broader Mid-Atlantic corridor from 2020–2025. Biodiversity occurrence data will be sourced from iNaturalist and filtered to remove duplicate entries and correct for observer effort bias. Ozone concentration data will be obtained from the EPA Air Quality System (AQS) database. Spearman's rank correlation analysis in R will be used to test the null hypothesis that there is no significant relationship between annual mean $O_3$ levels and monarch butterfly observation counts in the study region. Secondary analysis will contextualize these findings within existing PubMed literature on ozone exposure and human respiratory health, establishing monarch butterflies as a sentinel species for broader environmental health monitoring. It is expected that increasing ozone concentrations will correlate negatively with butterfly observation frequency. Ultimately, this research demonstrates the value of using publicly available biodiversity and air quality databases to assess the health of both ecosystems and human populations, offering a replicable, low-resource framework applicable to other regions and pollutant types.

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**Interactions of Two Neurotransmitter Systems in the Main Olfactory Bulb: Metabotropic Glutamate Receptors and Cannabinoid Receptors**

Presenter's Name: Edward Brown
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Metabotropic glutamate receptors (mGluRs) have been implicated in several neurological diseases such as stroke, epilepsy, schizophrenia, Parkinson's and Huntington's disease. Endogenously released cannabinoids (endocannabinoids) have been shown to regulate neuronal activity. Here, we aimed to better understand how these two neurotransmitter systems, mGluRs and cannabinoid receptors, interact. Our previous data showed that exposing the olfactory bulb network to cannabinoid receptor antagonist, AM251, or mGluR antagonist, LY367385 alone, resulted in a decrease of mitral cell firing. Based on this data, our hypothesis was that exposure of mitral cells to both AM251 and LY367385 together would result in mitral cell firing to decrease even further. Patch-clamp electrophysiology was used to record from mitral cells. We found that the combined application of LY367385 and AM251 resulted in increased mitral cell firing. To determine whether this was due to glutamate or GABA, mitral cells were treated with the same protocol, but in addition Gabazine, a GABA-A receptor antagonist, was added. In the next phase, APV and CNQX (ionotropic glutamate receptor blockers) were added. In the presence of AM251, LY367385, and Gabazine, mitral cell firing increased. However, in the presence of AM251, LY367385, APV, and CNQX mitral cell firing decreased. Based on these findings, we concluded that the increased firing of mitral cells in response to a combination of AM251 and LY367385 was a glutamate-induced effect. By better understanding how the metabotropic glutamatergic receptor system and endocannabinoid receptor system interact, we will gain insight into how to enhance neuroprotective measures in combating mGluR-related neurodegenerative diseases.

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**Comprehensive Computational Profiling of MSH3 Missense Mutations and Stability Effects in Cancers and Neurodegenerative Disorders**

Presenter's Name: Nosimot Buhari
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Background/Objectives: MSH3 encodes a key component of the DNA mismatch repair (MMR) system, essential for maintaining genomic stability. Mutations in MSH3 have been associated with colorectal cancer (CRC), particularly within microsatellite instability and adenomatous polyposis syndromes. Beyond its oncogenic associations, MSH3 dysfunction has been linked to neurodegenerative disorders, such as Huntington's disease where impaired repair promotes trinucleotide repeat expansion. Despite its clinical relevance, the structural and pathogenic impact of MSH3 missense mutations remains insufficiently characterized. Methods: Using the predicted AlphaFold structure, we conducted a saturated mutagenesis analysis of 21,603 MSH3 missense mutations. Folding energy changes (ΔΔG) were computed with FoldX, and pathogenicity was evaluated using Meta-SNP and AlphaMissense predictors. Clinically significant variants were cross-referenced from ClinVar, COSMIC, HGMD, and gnomAD databases. Results: Approximately 57.2% of variants destabilized MSH3 (ΔΔG > 0.5 kcal/mol), whereas 10.9% were stabilizing (ΔΔG < −0.5 kcal/mol). Notably, mutations G389W, G572W, G978W, G978Y, and G572Y introduced steric clashes that disrupted β-sheet packing, indicating conformational instability. Conversely, variations such as P64F, P64W, P64D, P6D, and P64R increased protein stability. Correlation analyses revealed partial agreement between predicted stability changes and pathogenicity scores, suggesting both structural and non-structural mechanisms underpinning disease risk. Conclusions: This comprehensive mutational analysis demonstrates that MSH3 structural destabilization aligns with predicted pathogenicity. Keywords: DNA mismatch repair; missense mutations; cancer; saturated computational mutagenesis; protein stability

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**Investigating the role of Iba 1 protein in adult microglia during the neuroprotective phase of ischemic stroke**

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Ischemic stroke results from reduced or transient loss of blood flow to the brain, leading toneuronal death. Currently, there is limited to no treatment options for stroke. Stroketriggers a complex inflammatory response involving microglia, the brain's resident immunecells. Microglia are activated within minutes following a stroke. Ionized calcium-bindingadapter molecule 1 (Iba1), encoded by the Aif1 gene, is an intracellular, proinflammatoryprotein in microglia and macrophages and widely used as a microglial marker. Iba1 playscritical roles in membrane ruffling and phagocytosis in macrophages in vitro and facilitatesproduction of IL-6 and TNFa. Using germline Iba1-deficient mice, our laboratory has shownthat Iba1 is required for microglial branching complexity, and ATP-directed motility and forexcitatory synaptic growth in the normal postnatal brain. However, its specificcontributions to neuroprotection or neuroinflammation following stroke during adulthoodremain unclear. This study investigates whether microglial-specific loss of Iba1 specificallyduring the adult stage, improves or worsens stroke outcomes. Using the photothromboticlesion model in control (TMEM119-CreERT2/+ or Aif1Flox/Flox) and Iba1 conditional knockout(TMEM119CreERT2/+; Aif1Flox/Flox) mice treated with tamoxifen at 2.5 months, we assessedinfarct size at 24 hours post-injury, via serial tissue sectioning and Nissl staining. Immunohistochemistry and fluorescent microscopy were used to assess microglialsurvival, and when combined with Sholl analysis allowed quantification of changes in theirbranching complexity. Our findings will provide insight into Iba1's role in microglialactivation post-stroke and advance our understanding of how microglial proinflammatoryproteins contribute to neuroprotection, potentially informing therapeutic strategiestargeting microglial function.

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**Discovering Mycobacteriophage NiaNia**

Presenter's Name: Nia Butler
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Bacteriophages are viruses that infect bacteria, and represent a potential alternative to antibiotics in combating drug-resistant bacterial infections. Antibiotic resistance of bacteria is especially harmful in cases of pathogenic bacteria such as M. tuberculosis and M. leprae, which belong to the same genus as Mycobacterium smegmatis mc2155, the host cell for the mycobacteriophages being studied in the Phages Lab at Howard University. As harmful bacteria such as the aforementioned develop antibiotic resistance, medical treatments to their infections become futile, emphasizing the need for alternative treatments.In pursuit of this, bacteriophage particles were isolated from an environmental sample collected at the coordinates of 38.92225°N 77.021872°W at Howard University using enrichment and plaque purification techniques. The resulting phage displayed small (<0.1 cm in diameter) and clear plaques, consistent with a lytic lifecycle. After isolation, a high titer lysate (1.7x1010 pfu/mL) was collected for DNA extraction, resulting in a DNA sample eligible for genome sequencing. The genetic fingerprint of this phage was also characterized using restriction enzyme digests and agarose gel electrophoresis. Restriction enzyme digest analysis using EcoRI and ClaI confirmed the presence of their recognition sites within the genetic material. Genome sequencing indicated NiaNia as identical to PallasAthena; however distinct plaque morphologies and gel electrophoresis results suggest a sequencing error. Sequencing will be repeated to ensure correct identification and characterization of phage NiaNia. This identification, together with further bioinformatic analysis, will serve as valuable resources to the global study of bacteriophages.

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**Dose-Dependent Effects of Gbx2 on Cardiovascular Development in Hypomorphic Mutant Embryos**

Presenter's Name: Kendall Buycks
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*Presentation Type: Poster Presentation*
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The homeobox transcription factor Gbx2 is essential for normal embryonic development. Null mutants exhibit severe central nervous system and cardiovascular malformations, underscoring its critical role in early patterning. In contrast, Gbx2^neo/neo^ embryos retain approximately 6–10% of wild-type expression and display a milder central nervous system phenotype. However, whether cardiovascular defects are similarly attenuated in these hypomorphic mutants remains unknown. This study investigates whether reduced Gbx2 expression results in a dose-dependent modulation of cardiovascular phenotypes. Embryos were collected at defined developmental stages and subjected to histological analysis following paraffin embedding and hematoxylin and eosin staining. Cardiac morphology, outflow tract alignment, septation, and great vessel organization were systematically evaluated and compared across wild-type, null, and neo/neo genotypes. Preliminary observations suggest that while gross cardiovascular architecture forms in Gbx2^neo/neo^ embryos, subtle defects in outflow tract patterning and vascular organization may persist. These findings indicate that partial Gbx2 expression may be sufficient to mitigate the most severe structural abnormalities observed in null mutants but may not fully restore normal cardiovascular morphogenesis. Defining the dose-dependent requirements of Gbx2 in heart development will clarify its role in tissue patterning and may provide mechanistic insight into how transcription factor thresholds regulate embryonic organogenesis. This material is based upon work supported by the National Science Foundation under Grant No. 2000005. The content is solely the responsibility of the authors and does not necessarily reflect the official views of the NSF.

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**Analyzing Antibiotic Effects on Growth of Bacteria Isolated from the Oral Cavity**

Presenter's Name: Ethan Carr
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*Presentation Type: Poster Presentation*
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The microbial world is dynamic, a result of the constant evolution in bacteria. Certain bacteria have the potential to be pathogenic, causing disease in humans. The oral cavity is home to over 500 bacterial species, many of which are pathogenic. Antibiotics have been used as a tool to contain and eliminate targeted bacteria. Quantifying the effects of antibiotics on dangerous bacteria is imperative for advancing defense against them. A saliva sample was aseptically collected. Bacteria were isolated on 25% Tryptic Soy Broth with agar. The morphologies of the isolated bacteria were characterized using Gram staining. The bacterial isolates were identified using BIOLOG Gen III microplates, which revealed bacteria belonging to the Neisseria, Streptococcus, and Carnobacterium genera. The bacteria were screened using antibiotic disks to identify susceptibility to streptomycin, ciprofloxacin, kanamycin, erythromycin, tetracycline, and ceftaroline on 25%, 50%, and 100% TSB with agar. Minimal Inhibitory Concentration strips were used to determine the concentration of antibiotic that would inhibit bacterial growth on susceptible isolates. All bacteria exhibited varying levels of susceptibility. To test the effect of streptomycin at concentrations below its MIC, streptomycin was added to 25% TSB with agar at a concentration 90% of its MIC for each isolate to study the effects on bacterial physiology. The results indicate varying levels of susceptibility where an increase in TSB concentration either did not affect susceptibility (e.g., ciprofloxacin or ceftaroline), resulted in a reduced susceptibility (e.g., streptomycin or kanamycin), or resulted in an increased susceptibility (e.g., erythromycin or tetracycline).

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**One Protein, Two Disorders: Beta-Amyloid, The Molecular Crossroad of Down Syndrome and Alzheimer's Disease**

Presenter's Name: Kendall Ceasar
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Beta-amyloid (Aβ), a peptide derived from the amyloid precursor protein (APP), plays a central role in the overlapping neuropathology of Down syndrome (DS) and Alzheimer's disease (AD). The APP gene resides on chromosome 21 and is overexpressed in DS due to trisomy 21, resulting in increased production and early accumulation of Aβ peptides. This overproduction promotes amyloid deposition, tau hyperphosphorylation, neurodegeneration, and progressive neuronal loss, hallmark features of AD pathology. Neuropathological changes associated with AD emerge strikingly early in individuals with DS, with amyloid plaque formation reported in adolescence or early adulthood and dementia developing in subsequent decades. This presentation examines the shared molecular mechanisms linking DS and AD, emphasizing Aβ-driven pathology as a unifying pathogenic pathway. Particular focus is placed on chronic neuroinflammation, mitochondrial dysfunction, and the potential contribution of comorbid conditions, such as periodontitis, in amplifying neurodegenerative processes. A critical unresolved question concerns the origin of inflammatory cytokines detected in AD brain tissue: whether they derive from peripheral immune activation (including macrophage-mediated periodontal inflammation with possible systemic dissemination) or are produced locally within the central nervous system by activated microglia and glial cells. Clarifying this convergence may advance early diagnostic biomarker discovery and inform therapeutic strategies targeting APP/Aβ-related mechanisms, thereby bridging developmental and age-related neurodegeneration through a shared molecular framework.

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**Retinal Degeneration in the STZ-Induced Diabetic Model**
Presenter's Name: Be-ming Chang
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School/College: Medicine
*Presentation Type: Poster Presentation*
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Diabetic retinopathy (DR) is a neurovascular complication driven by sustained hyperglycemia. We evaluated retinal structural changes in a streptozotocin (STZ)-induced diabetic model on C57BL/6 mice to examine early and late-stage alterations associated with chronic diabetes. Retinal thickness was assessed across early and late time points within a 1–24 week period following STZ injection and compared with age-matched controls. Retinal layer thickness were measured from hematoxylin and eosin (H&E)-stained sections using brightfield microscopy on the Zeiss Axioscan 7 scanner at 20x magnification. At the early stage (1 week), no significant differences in overall retinal thickness were observed between STZ-induced and control groups, indicating relative structural preservation after 1 week of hyperglycemia. In contrast, at the late stage (24 weeks), STZ-induced mice exhibited marked retinal thinning compared with controls. Histological analysis suggests that thinning predominantly involves inner retinal layers, consistent with established mechanisms of diabetic neurodegeneration. Sustained hyperglycemia promotes apoptosis of retinal ganglion cells, synaptic dysfunction within retinal neural circuits, and microvascular impairment leading to chronic hypoxia and tissue atrophy. Additionally, glial dysregulation may compromise metabolic and structural support within the retina, further contributing to neurodegenerative changes. Together, these findings demonstrate late-stage retinal degeneration associated with chronic hyperglycemia in the STZ-induced diabetic model and highlight the structural consequences of prolonged diabetic injury.

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**A Retrospective Case-Matched Controlled Study Proposal Exploring the Risk of Asthma and Its Association with Nasal Fossa Measurements**
Presenter's Name: Tinashe Chapfika johnson
Classification: Professional Student
School/College: Dentistry
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Objective: To investigate the relationship between nasal fossa width and asthma diagnosis in pediatric orthodontic patients, and to explore whether transverse skeletal dimensions correlate with asthma severity. Methods: This IRB-approved (Howard University IRB-2025-1924; Exempt 45 CFR 46.101[b][4]) retrospective study used de-identified electronic health records from the Howard University College of Dentistry Axium database (2010–2024). Pediatric patients (<18 years) with documented asthma and medication-based severity data were eligible. Pre-treatment panoramic radiographs were assessed for quality, and nasal fossa width at the inferior turbinate was measured using Dolphin Imaging software, calibrated to the 11 mm mesiodistal width of the permanent mandibular first molar. Associations between nasal fossa width and asthma severity were evaluated with Pearson correlation and simple linear regression. Results: Of 100 eligible records, 21 patients (21%) had usable pre-treatment radiographs. Mean nasal fossa width was 25.4 ± 1.5 mm. A moderate inverse correlation was observed between nasal fossa width and asthma severity ($r \approx -0.40$; $p \approx 0.07$), with severity accounting for 16% of width variance ($R^2 \approx 0.16$). Post-treatment assessment of orthopedic expansion effects was limited by insufficient radiographs. Conclusion: Narrower nasal fossa width may reflect increased asthma severity in pediatric orthodontic patients. These exploratory findings suggest transverse nasal skeletal dimensions could serve as a structural phenotype associated with asthma. Prospective studies using CBCT airway assessment and pulmonary function testing are warranted.

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**Fertility defects observed in homozygous and heterozygous genetic mutations of ETR-1 and CED engulfment pathway genes**
Presenter's Name: Regine Charles
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Anna Allen
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Apoptosis, or programmed cell death, is the process by which an organism identifies and eliminates cells that are damaged or unnecessary. In C. elegans, physiological germline apoptosis occurs during oogenesis in adult hermaphrodites, and ~50% of all germ cells undergo apoptosis. Animals that cannot undergo germline apoptosis have been reported to have reduced fertility. Apoptosis consists of three phases: Specification, Killing, and the Execution phase. During Execution, 3 partially redundant engulfment pathways act to engulf and remove apoptotic corpses. Many CED (cell death) mutants play a role in engulfment, and we were interested in quantifying the effect of 10 CED mutants on fertility when either in homozygous or heterozygous states. The majority of strains, when homozygous, exhibit reduced progeny, and significant improvement in brood size was observed for many mutant strains when heterozygous. This information provides a reference for further investigation, where each individual CED mutant strain will be crossed with a gene that has a newly identified role in engulfment, etr-1. We will be investigating whether double trans-heterozygous mutants of an etr-1 mutants [etr-1(lq61) or etr-1(lq133)] with a ced mutant, display unique phenotypes. The phenotype of these crosses will be observed to determine whether the phenotype is worsened in that form, therefore, providing valuable information about which engulfment pathway etr-1 acts in. Future directions include investigating the role and pathway of etr-1 in germ cell apoptosis and engulfment.

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**Modeling the Structure of SCO-spondin with AlphaFold**
Presenter's Name: Muhammad Chawla
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Philip Kurian
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Recent advances in computational protein structure prediction (PSP) offer valuable alternatives to traditional, experimental structure-determination methods, such as X-ray crystallography and cryogenic-electron microscopy (cryo-EM), which are resource-intensive and often require 2-4 orders of magnitude more time to complete. A major leap forward in overcoming these challenges was achieved with the development of AlphaFold, a deep learning-based protein folding framework created by DeepMind. In 2020, AlphaFold2 demonstrated unprecedented accuracy at the 14th Critical Assessment of protein Structure Prediction (CASP14), developing "the first, to our knowledge, computational approach capable of predicting protein structures to near-experimental accuracy in a majority of cases". This accuracy was as close as 0.96Å r.m.s.d._95 (root-mean-squared deviation of predicted Cα atoms from Cα of the backbone, excluding the 5% most divergent residues) was reported. Such accuracy, even for targets with no available templates, underlines its transformative potential for modeling difficult-to-characterize proteins. One such protein, SCO-spondin, is a large glycoprotein expressed by the subcommissural organ (SCO) during vertebrate development, where it is critical for the formation of the Reissner fiber. It has also been implicated in neurodevelopment and cerebrospinal fluid (CSF) regulation. SCO-spondin is composed of over 5000 amino acids and contains a diverse set of structural motifs. In our work, we evaluate AlphaFold's ability to model the full-length structure of SCO-spondin. Predictions from AlphaFold2 and AlphaFold3 were assessed using root-mean-square deviation (RMSD), sliding-window analysis of predicted Local Distance Difference Test (pLDDT) scores, and structural alignment to known von Willebrand factor-like (vWF) domains.

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**Effects of Viral Aggregation State on Mucin Trapping and Infectivity**
Presenter's Name: Naol Cheru
Classification: Graduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Preethi Chandran
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Co-authors: Preethi Chandran

Viruses encounter mucins at entryways into the body. Mucins form a gel that can bind virions and slow or prevent them from reaching the epithelial cells which have virus receptors. Viruses like influenza and Vesicular stomatitis virus (VSV) have surface sugars known as complex N-glycans. These surface sugars will be the outermost component of the virus to encounter mucins. We found that complex N glycans also determine if the virus are aggregated or dispersed or bound with other components. Aggregation, for instance, can change particle mobility, size, and diffusion, and it can also change how much glycoprotein surface is available to contact mucins. The aim of this study is to determine is to determine how the state of the virus induced by complex N glycans can alter mucin trapping and infectivity. Lentivirus with VSV envelop proteins are used as a model virus. Dynamic light scattering (DLS) was used to identify three solution-controlled physical states of VSV: a serum-dispersed state, a $Ca^{2}$□-dependent aggregation state, and an aggregated state. These states were tested in mucin interaction assays, where dispersed VSV showed stronger mucin trapping and aggregated VSV showed reduced trapping. Infectivity was t quantified in a 96-well luminescence assay and was highest for the aggregated state. Overall, solution-driven changes in VSV aggregation altered mucin trapping and measured infectivity, showing that aggregation state is a critical variable in mucosal infection assays.

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**Seasonal Patterns in Global Common Bottlenose Dolphin (Tursiops truncatus) Sightings: A Citizen Science Analysis**
Presenter's Name: Olivia Chin
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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Citizen science platforms provide valuable ecological data for observing wildlife distribution patterns. This study investigates whether the transition from spring to summer correlates with an increase in verified global sightings of the Common Bottlenose Dolphin (Tursiops truncatus). It is hypothesized that sighting frequency will increase from May through July, as warmer temperatures and heightened human coastal activity drive greater observation rates. Data will be drawn from iNaturalist's publicly available, research-grade verified observation records for the months of May, June, and July 2025. Monthly sighting totals will be compiled and visualized using bar graphs to enable clear comparative analysis. Results are expected to show a progressive increase in sightings peaking in summer months. While citizen science data carries limitations such as observer bias and uneven geographic effort, iNaturalist's verification system improves reliability. These findings contribute to understanding seasonal dolphin behavior and may support regional marine conservation planning.

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**Temporal Trends of Danaus Plexippus in Urban Environments: A citizen-science analysis in Washington D.C.**
Presenter's Name: Amiyah Christopher
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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This study analyzed trends in Monarch butterfly observations in Washington D.C. to explore how the science data of civilians is used to test ecological hypotheses. By monitoring these butterflies, it gave us some insight on potential population changes in urban areas. In this case, the urban environment is Washington D.C.. We asked whether or not the monarch's presence has changed over the last few years. We

hypothesized that if Monarch presence is decreasing in urban areas, then the number of recorded observations would be lower in more recent years than in others. The observation data was received from iNaturalist using its API, and was analyzed in R Studios. We filtered the records by geographic location and year. Any entries that had missing data were removed. Annual counts of monarch butterfly observations were calculated and shown by using bar graphs. The bar graphs helped us compare trends over time. The final results indicated that the number of Monarch butterflies in Washington D.C., was lower in recent years than in previous, which would suggest a decline in recorded activity. A key limitation is that iNaturalist data reflects on humans reporting data, rather than direct population measurements. Observation numbers could be influenced by participation rates, efforts of the observer, or reporting bias. Although we have these limitations, this study does a great job at showing how citizen-science platforms such as iNaturalist can be used to detect ecological trends and generate hypotheses about how species can change in urban environments.

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**Post-Processing Pipeline for Diffusion Basis Spectrum Imaging: Enhancing the Precision of Multi-Component Imaging Biomarkers for Brain Pathology**

Presenter's Name: Hsiang-jou Chuang
Classification: Post Doc/Resident/Fellow/Research Associate
School/College: Medicine
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Diffusion Basis Spectrum Imaging (DBSI), an advanced MRI technique, decomposes diffusion signals into multiple anisotropic and isotropic tensors, allowing for the differentiation of fiber density from surrounding inflammation. Traditional acquisition and processing workflows often produce datasets affected by geometric artifacts, which limit the capacity to resolve complex neuroinflammatory and white matter pathological features. To restore these compromised images, we implemented a standardized post-processing pipeline prioritizing geometric integrity, signal optimization, and quantitative precision. The pipeline first ensures accurate tensor estimation by realigning spatial dimensions across 27 gradient directions and 25 slices, preserving critical orientation metadata. Raw images are then denoised using TORTOISE, followed by an iterative, model-based correction scheme to simultaneously compensate for subject motion and eddy current distortions. Qualitative assessment in DSI Studio demonstrated significantly improved spatial coherence in direction-encoded color maps, ensuring precise fiber orientation. For quantitative analysis, Diffusion Histology Imaging (DHI) parametric maps are generated by partitioning the diffusivity spectrum with thresholds of 0.3–3.0 $\mu m^2/ms$. This approach successfully derives four distinct fractions—fiber, restricted, hindered, and free water—to establish robust pathological biomarkers. Collectively, this comprehensive pipeline provides a validated framework to quantify axonal density, cellular infiltration, and edema with high precision. By resolving these distinct fractions, the results demonstrate superior sensitivity in differentiating neuroinflammatory features from structural white matter damage, offering a standardized solution for evaluating tissue integrity in experimental models.

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**Evaluation of the Antimicrobial Efficacy of a Novel African Plant Extract, Plant X multi-drug-resistant bacteria (MDR): An In Vitro Study**

Presenter's Name: Andrea Clarke
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Ayele Gugssa, Temesgen Andargie, Crystal McIntosh, Dawn Smith, Nyree Dawson, Brittany Harris, Xinbin Gu, Clarence Lee

Aim: To evaluate the antibacterial potential and antibiofilm effects of a novel African plant extract against multiple drug-resistant bacteria, namely Enterococcus faecalis, Enterococcus faecium, and Staphylococcus aureus. Materials and Methods: A collection of the leaves of a medicinal African Plant (plant X) was screened for its antimicrobial and antibiofilm activity against Enterococcus faecalis (ATCC 29212), Enterococcus faecalis (ATCC 51299), Enterococcus faecium (ATCC 51559), and Methicillin-Resistant Staphylococcus aureus/ MRSA (ATCC 44330). The plant leaves were dried at 25°C, crushed with a mortar and pestle, and ground in a blender. The powdered leaves were then sequentially extracted with a series of solvents for 8 hours. The plant extracts were evaporated using a SpeedVac, and the dried extracts were collected and stored at -20°C until ready for use. Results: Only the petroleum ether (PE) fraction of Plant X extract showed high antimicrobial activity against all the ATCC strains tested. The MIC/MBC values of plant X were determined to be 50/50 /50 µg/ml for E. faecalis ATCC 29212, 50/60 ug/ml for E. faecalis ATCC 51299, 60/70 ug/ml for E. faecium ATCC 51559, and 120/130 ug/ml for MRSA. Conclusion: Plant X demonstrated significant antimicrobial activity against all selected bacterial isolates relevant to a wide range of clinically significant infections, including oral health, skin, and wound infections, sepsis, and more. The study suggests that Plant X may be used in combination with antibiotics to treat human infections.

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**Evaluating mannose-coated nanoparticles for delivery of gene and protein delivery to Immune Cells**

Presenter's Name: Tyrese Cole
Classification: Graduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Preethi Chandran
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Co-authors: Preethi Chandran, Jack Borrok, Sadiye Rieder

Targeted delivery of gene and protein to immune cells is desirable for modern immunotherapy needs. The non-adherent nature of immune cells result in low uptake and their sensitivity to common chemical transfection reagents such as polyethylenimine and lipid nanoparticles frequently result in high cytotoxicity, particularly in primary cells. To address these limitations, alternative targeted delivery strategies have been investigated. Mannose-coated delivery systems have been explored to enhance uptake through mannose receptor–mediated endocytosis in specific immune cells that have mannose receptors. This

study investigates the uptake and gene expression of mannose-coated nanoshells developed in the BAN laboratory at Howard University. These nanoparticles incorporate surface-displayed mannose and enable delivery of protein and gfp-DNA cargo. Our hypothesis is that only cells with mannose receptor, which tend to be a specific subset of immune cells, take in mannose nanoshells and express the DNA in it. Uptake and expression of DNA delivered via the mannose nanoshells were evaluated in representative immune cell lines and in differentiated cells from patient-derived peripheral blood mononuclear cells ,and compared with delivery by non-mannosylated Lipofectamine and PEI particles. FACS was used to assess the presence of mannose receptors on cells. Ongoing studies suggest a difference in the uptake of cultured and PBMC-derived immune cells that can be correlated to the presence of mannose receptors on the cells. Collectively, these results provide insight into receptor-mediated targeting mechanisms and support the use of mannose-coated nanoshells as an effective and low-toxicity delivery platform for immune cells.

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**Investigating RNA thermoregulatory structures in Langat Virus using DMS-MaPseq**

Presenter's Name: Aminah Coleman
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Silvi Rouskin
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Langat virus (LGTV) is a naturally attenuated strain of tick-borne encephalitis virus (TBEV), a flavivirus spread by the bite of infected ticks. Severe TBEV infections can cause encephalitis or meningitis, and rising global temperatures are increasing tick-borne disease prevalence. However, the molecular mechanisms that enable successful host tropism between insect and mammalian cells remain unclear. Flavivirus genomes are composed of RNA, which can fold into dynamic secondary structures that play critical roles in viral replication and gene expression. This raises the possibility that specific structures within the viral untranslated regions (UTRs) act as thermosensitive switches, enabling adaptation between insect and mammalian hosts. We hypothesize that RNA thermoswitches in the 5′ and 3′ UTRs of the LGTV genome contribute to mediating host tropism. RNA structure of the virus was probed in cells at 37°C using dimethyl sulfate–mutational profiling and sequencing (DMS-MaPseq), a chemical technique used to analyze RNA secondary structures. The resulting data were used to generate a structure model for the 3′ UTR of the virus, which resembles structures proposed for other flaviviruses. The 3′ UTR structures could indicate the presence of exoribonuclease-resistant RNAs (xrRNAs), which protect the viral genome from degradation. These findings establish a baseline 3′ UTR structure at 37°C for future thermoswitch comparison. Understanding how host tropism is mediated through potential RNA thermoswitches can lead to targeted therapies against emergent flaviviruses.

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**The Effects of Mildronate on Renal Glomerular Endothelial Injury in Sickle Cell Disease Mice**

Presenter's Name: Tori-ann Collier
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Sergei Nekhai, Asrar Ahmad, Papa Hoyeck, Marina Jerebstova, Clemilson Berto-Junior

Background: Sickle cell disease (SCD) is an inherited hemoglobin disorder associated with a mutation in the beta-globin gene. Renal disease is the most common complication of SCD. Renal injury in SCD arises from chronic red blood cell sickling and hemolysis, leading to endothelial injury. Currently, there is no treatment for SCD-associated endothelial renal injury. Mildronate is an anti-ischemic and anti-inflammatory agent; however, Mildronate's effects on renal endothelial injury in SCD have not been studied. Here, we used a sickle cell disease mouse model to investigate the effects of Midronate on glomerular endothelial injury in the kidney. Hypothesis: Mildronate treatment will reduce renal glomerular endothelial injury in SCD mice. Methods:.SCD and control mice were injected intraperitoneally with mildronate (400 mg/kg) or saline for 10 days (n=4 per group). Paraffin-embedded kidney sections were labeled with anti-vWF antibodies. Images were generated and quantified using ImageJ. Statistical analysis was performed in GraphPad Prism. ANOVA and Student's t-tests were performed, $p<0.05$ was considered statistically significant. Results: SCD mice exhibited a significantly larger area of vWF staining compared with control mice. Mildronate treatment significantly reduced the total area of vWF staining in SCD mice, with no significant changes in the area observed in control mice. Conclusion: In SCD mice, endothelial injury is significantly higher than in controls. Mildronate reduces endothelial injury in SCD mice. Future studies will assess the effectiveness of Mildronate treatment on renal function.

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**Incidence of Spinal and Intracranial Abscesses in Patients with Sickle Cell Disease: A 20-Year Retrospective Analysis**

Presenter's Name: Bryce Collier
Classification: Professional Student
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Co-authors: Ladariah Boone, Jasmine Anderson, Olaoluwa Christopher Tofade, Kishore Owusu, Dalyla Woods, Taylor SparksFaul

Sickle cell disease (SCD) is a chronic hematologic condition that predisposes patients to a range of infections due to functional asplenia, chronic inflammation, and immune dysregulation. Spinal and intracranial abscesses, including spinal epidural abscess (SEA), represent neurologic emergencies. This study evaluates the incidence and prevalence of abscesses and granulomas among SCD patients compared with those in the general population. We conducted a retrospective incidence and

prevalence analysis using the TriNetX Global Collaborative Network from 2005 to 2025. The SCD cohort included 294,449 patients identified by ICD-10 code D57. Outcomes of interest—intracranial and intraspinal abscesses or granulomas—were defined using ICD-10 codes G06 and G07. The incidence proportion of abscesses in SCD patients was 0.12%, more than double that of the general population (0.051%). Incidence rates increased with age, peaking at 1.07% in the 70–74 age group within the SCD cohort. Males had a higher incidence than females in both groups. Racial stratification showed a slightly higher incidence in White and Asian SCD patients, though Black patients comprised the majority of the cohort. SCD patients experience significantly higher rates of spinal and intracranial abscesses compared to the general population, particularly in older age groups and among males. These findings suggest the need for heightened clinical vigilance and early diagnostic evaluation in SCD patients presenting with neurologic symptoms suggestive of SEA.

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**Increasing Observations of the Spotted Lanternfly (Lycorma delicatula) in Washington, DC (2020–2025)**

Presenter's Name: Caitlyn Collymore
Classification: Undergraduate Student
School/College: Arts & Sciences
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The invasive Spotted Lanternfly, Lycorma delicatula, has spread quickly across the eastern United States and has become a concern for local ecosystems and agriculture. This study looked at whether the number of Spotted Lanternfly sightings in Washington, DC increased from 2020 to 2025 using publicly available data from iNaturalist. Observation data were collected using the iNaturalist API in R and filtered to include only records with valid dates and locations within DC. The number of observations was totaled for each year to identify trends over time. Results showed a steady increase in sightings over the six-year period, with the highest number reported in 2025. This pattern suggests that the species is continuing to spread in the area, although increased public awareness and reporting may also explain part of the rise. Because the Spotted Lanternfly feeds on grapevines, fruit trees, and hardwood trees, its continued growth could impact local agriculture and ecosystems. Monitoring its spread provides valuable insight for management strategies and highlights the broader environmental and economic implications of invasive species in urban environments.

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**Examining the Effects of Nicotine Products Containing WS-23 Using a Rodent Model**

Presenter's Name: Olivia Colquhoun
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Julia Lagomarsino, Christie Fowler

The use of flavored and mentholated e-cigarettes has made nicotine addiction one of the most prevalent forms of addiction among youth. Flavor additives enhance product appeal by masking nicotine's aversive properties, heightening dependence and long-term health risks. In anticipation of regulatory bans on menthol, tobacco companies have introduced synthetic cooling agents such as WS-23, a TRMP8 receptor agonist that produces intense cooling effects without menthol's characteristic taste or odor. However, the role of this synthetic cooling agent on nicotine dependence remains poorly characterized. To investigate these issues, we examined the somatic and affective withdrawal symptoms in a rodent model. To understand dependence and anxiety-like behaviors, we modeled chronic nicotine addiction using an aerosolized vapor exposure chamber where mice were exposed to 3 hours of nicotine vapor alone or with 1.5% WS-23 for a consecutive 8-day period. Withdrawal was assessed using an Elevated Plus Maze to understand anxiety and a withdrawal scoring criteria was used to analyze physical dependence. In addition, volitional preference was studied using operant chambers for self-administration. The results demonstrated that WS-23 resulted in no difference in rewards for self-administration and somatic withdrawal scoring. However, mice exposed to nicotine vapor with 1.5% WS-23 had less anxiety-like behavior independent of physical withdrawal symptoms. These findings indicate that although WS-23 does not heighten physical dependence symptoms, it plays a role in nicotine addiction and withdrawal. Therefore, it is important to further investigate WS-23 products to fully understand the potential abuse liability of these synthetic substances on nicotine addiction.

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**Determination of the role of dPGC-1/Spargel in female fertility and oogenesis in Drosophila**

Presenter's Name: Melissa Constantin
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*Presentation Type: Oral Presentation*
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Co-authors: Swagota Roy, Atanu Duttaroy

Spargel (Srl) gene in Drosophila is the single homolog of the Peroxisome proliferator-activated receptor-coactivator-1 (PGC-1) gene in vertebrates, a transcriptional coactivator involved in energy homeostasis. We further study the role of Spargel in Drosophila fertility, having established that Spargel is vital to Drosophila oogenesis and fertility. Female fertility is heavily influenced by the availability of yeast, an essential nutrient in fly food. In the absence of yeast, egg chamber growth and stem cell production are negatively affected, and oogenesis resumes only after yeast is reintroduced to the flies. To date, we have found that overexpressing Spargel in the ovaries, along with yeast nutrients, results in increased ovary size with a corresponding increase in the number of mature eggs. Egg-laying experiments have confirmed that Srl OE flies lay a significantly higher number of eggs than control females raised under high-nutrient conditions. Quantification of changes in the whole proteome between WT and Overexpression Drosophila Ovaries using DIA label-free quantification LC-MS/MS showed Significant Downregulation of = 694 proteins: Significant Upregulation of 811, and No changes = 4828 proteins. We will present the LC-MS data and

confirm via qPCR. Finally, we will correlate the biological relevance of this data on female fertility.

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**GLP-1 Agonists and Outcomes in Total Hip Arthroplasty: A Systematic Review**

Presenter's Name: Bobbi Cooke
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School/College: Medicine
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The rising prevalence of obesity has contributed to an increased burden of orthopedic complications, including higher risks of infection, thromboembolism, and revision surgery following total hip arthroplasty (THA). Glucagon-like peptide-1 receptor agonists (GLP-1 RAs), initially developed for type 2 diabetes, have recently been evaluated for their impact on THA outcomes. Emerging evidence suggests that GLP-1 RAs may reduce postoperative complications such as prosthetic joint infection, readmissions, and revisions, particularly among patients with obesity and diabetes. This systematic review synthesizes the current evidence, highlights areas of consensus and variability, and identifies directions for future research relevant to orthopedic practice. A systematic review of PubMed and Google Scholar was conducted August 2025, for primary articles published between August 2015 to 2025 using the terms: GLP-1 receptor, Glucagon-Like Peptide 1, agonist, semaglutide, liraglutide, dulaglutide, total hip arthroplasty, hip replacement, complications, infection, revision, outcomes, complications, infection, revision. Thirty-nine records were identified and eleven studies met the inclusion criteria. Across these studies, perioperative GLP-1 RA use in THA was consistently safe. Several analyses demonstrated no increase in infection, revision, or periprosthetic fracture rates, while others showed reduced rates of readmission, prosthetic joint infection, or acute blood loss anemia. Current literature suggests GLP-1 receptor agonists are safe in the perioperative period of THA and may improve outcomes postoperatively. Further investigation is warranted to clarify benefits in high-risk populations such as patients with morbid obesity and both diabetic and nondiabetic cohorts.

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**Altered Trigeminal Ganglion and Nerve Division Morphology at E18.5 in Gbx2 Hypomorphic Mutants**

Presenter's Name: Paola Correa-alfonzo
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School/College: Medicine
*Presentation Type: Poster Presentation*
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CHARGE syndrome is associated with feeding deficits implicating dysfunction of the mandibular division of the trigeminal nerve (CNV3). Reduced expression of Gbx2 disrupts mid–hindbrain boundary patterning and neural crest cell development. Gbx2^neo/neo^ mice, which retain only 6–10% of wild-type expression, exhibit perinatal lethality due to failure to suckle, yet the structural basis of trigeminal dysfunction remains incompletely defined. This study focuses on late-stage embryonic development (E18.5) to directly compare trigeminal ganglion (TG) organization and nerve branching patterns between wild-type and Gbx2^neo/neo^ embryos. Histological analysis, whole-mount imaging, and neuronal marker expression were used to assess ganglion size, cellular organization, axonal density, and projection trajectories of the ophthalmic (V1), maxillary (V2), and mandibular (V3) divisions. At E18.5, wild-type embryos exhibit a well-organized TG with clearly segregated divisions and robust peripheral projections. In contrast, Gbx2^neo/neo^ mutants display reduced ganglion compactness, altered neuronal distribution, and disorganized axonal fasciculation. While all three divisions are present, CNV3 shows aberrant branching patterns and altered trajectory relative to target tissues. These findings demonstrate that reduced Gbx2 expression does not eliminate trigeminal divisions but disrupts their structural organization and connectivity. This work provides anatomical evidence linking Gbx2 dosage to late-stage trigeminal maturation and offers mechanistic insight into feeding impairments observed in CHARGE-associated phenotypes. This material is based upon work supported by the National Science Foundation under Grant No. 2000005. The content is solely the responsibility of the authors and does not necessarily reflect the official views of the NSF.

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**Lipid Droplets as a Mechanism for Dengue Virus Replication: Analysis of Subcellular Interactions and Metabolic Reprogramming**

Presenter's Name: Kaci Craft
Classification: Graduate Student
School/College: Medicine
*Presentation Type: Oral Presentation*
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Dengue virus (DENV) remains a major global health burden, with four antigenically distinct serotypes (DENV-1–4) capable of causing severe disease and lacking broadly effective antiviral therapy. Although DENV replication requires extensive host cell remodeling, conserved metabolic dependencies shared across serotypes remain poorly defined. Lipid droplets (LDs) are dynamic organelles that regulate lipid storage and cellular energy homeostasis and have emerged as potential platforms for flaviviral replication. However, whether all DENV serotypes exploit LD metabolism through shared mechanisms is unknown. Here, we define conserved, serotype-independent mechanisms by which DENV hijacks host LD metabolism to support replication. Human epithelial and primate-derived cell models were infected with DENV-1, -2, -3, or -4 under standardized conditions. LD abundance and spatial organization were quantified by immunofluorescence microscopy and image analysis. Viral protein expression and host metabolic signaling were assessed by Western blotting and RT-qPCR. Subcellular fractionation evaluated viral protein association with LDs and mitochondria, and extracellular flux analysis measured changes in oxidative phosphorylation and glycolysis during infection. Infection with all four serotypes induced consistent LD

remodeling, altered expression of LD-associated metabolic enzymes, and activation of energy-sensing pathways. These conserved metabolic shifts correlated with increased mitochondrial respiratory dependence. Pharmacologic disruption of LD metabolism or associated signaling pathways reduced viral protein expression across serotypes, supporting a functional requirement for LD-driven bioenergetics in the DENV life cycle. Collectively, these findings identify a conserved LD-centered metabolic strategy and establish host lipid metabolism as a serotype-independent antiviral target.

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**Ecological Drivers of Lyme Disease: Assessing Deer-Tick Co-Occurrence Using Citizen Science Data**

Presenter's Name: Morgan Cunningham
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Arianna Young

White-tailed deer (Odocoileus virginianus) are a ubiquitous species in North America. Their high reproductive potential leads to rapid population growth, which has profound implications for public health. White-tailed deer are critically important to the survival of the blacklegged tick (Ixodes scapularis), which is the main vector of Lyme disease in the United States. The deer serve as their primary reproductive host. While deer blood kills the Lyme-causing bacterium (Borrelia burgdorferi) and deer do not transmit it themselves, they consequently contribute to the population of the ticks that do infect humans. This has led to the white-tailed deer being a central figure in human medicine. This study utilizes citizen science data from iNaturalist to assess whether suburban environments, characterized by high habitat fragmentation, exhibit a stronger correlation between deer density and human Lyme disease cases than rural areas. By filtering iNaturalist observations for co-occurrences of ticks and deer, this research identifies spatial trends along the U.S. East Coast. Findings indicate that suburban regions in the Northeast show a significantly higher concentration of deer-tick interactions compared to rural landscapes with similar deer populations. Likewise, the results align with the Lyme disease maps showing a higher concentration of cases on the northeast coast and with CDC epidemiological maps, suggesting that the "edge effects" of suburban sprawl facilitate higher transmission risks by funneling host-seeking vectors into frequent contact with human populations.

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**Spatiotemporal Patterns of Ambrosia artemisiifolia and Allergenic Pollen Exposure Risk in the DMV: A Citizen Science Approach**

Presenter's Name: Deasia Davis
Classification: Undergraduate Student
School/College: Arts & Sciences
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Ecologically widespread and immunologically consequential, common ragweed (Ambrosia artemisiifolia) represents one of North America's most significant drivers of seasonal allergic rhinitis. Drawing on 74,604 iNaturalist observations recorded over five years, this study investigates environmental exposure patterns associated with ragweed's allergenic pollen across the DMV region (Maryland, Virginia, and Washington D.C.), defined by state and district boundaries. Central to this project is the following research question: How does the seasonal timing and geographic distribution of Ambrosia artemisiifolia observations relate to potential periods of increased allergy exposure risk in the DMV? Filtered and analyzed entirely in R, observational data will be modeled using a negative binomial generalized linear model (GLM) to account for variability in count data. Weekly active observer counts will be incorporated as an offset term to correct for iNaturalist sampling effort bias which is a known limitation of citizen science datasets. Kernel density estimation (KDE), implemented via the spatstat package, will assess spatial clustering of occurrences. Cross-referencing with National Allergy Bureau pollen count records will evaluate correspondence between citizen science observation peaks and documented pollen loads. Late summer and early fall are expected to yield the highest observation frequency, concentrated within urbanized and disturbed habitats. Rigorously analyzed, citizen science biodiversity data can serve as a scalable, low-cost proxy for tracking respiratory health risk and informing preventative public health strategies.

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**Visualizing Mitochondrial Quality Control and ER–Mitochondria Contact Sites Using Cryo-ET and Fluorescent Tagging**

Presenter's Name: Chanae Davis
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Cryo-electron tomography (cryo-ET) is a powerful technique for investigating protein structure and localization within cells. This study focused on two systems: mitochondrial protein quality control in yeast and calcium signaling at endoplasmic reticulum (ER)–mitochondria contact sites in mammalian cells. In yeast, CIS1 acts as a recruiter that directs the AAA-ATPase MSP1 to the TOM complex, facilitating the removal of mis-localized tail-anchored (TA) proteins from the outer mitochondrial membrane under import stress. To study CIS1 localization, an EGFP tag was introduced via homologous recombination, followed by CCCP treatment to induce mitochondrial stress in yeast. Further, cells were stained with DAPI and Mito-Tracker Deep Red and analyzed by fluorescence microscopy. In the second part of the study, we investigated components of the ER–mitochondria calcium signaling complex in mammalian cells, which includes the inositol 1,4,5-trisphosphate receptor (IP3R) on the ER, glucose-regulated protein 75 (GRP75) as a tethering factor, and voltage-dependent anion channel 1 (VDAC1) on the outer mitochondrial membrane. Tagging GRP75 with the red fluorescent protein Scarlet represents a promising strategy to enable visualization of ER–mitochondria contact sites via fluorescence microscopy.

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**Functional Characterization of small RNAs in Staphylococcus Aureus that may Regulate Drug Resistance**

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Staphylococcus aureus is a gram-positive bacteria and dangerous human pathogen. Measures aimed at controlling these infections become unsuccessful because S. aureus is very effective at developing resistance to antibiotics that are deployed to control its spread in the body and within the population, with Methicillin Resistant S. aureus (MRSA) being a common example. Increasing our understanding the mechanisms controlling S. aureus drug resistance will help us control the spread of multi-drug resistant S. aureus infection. A specific small RNA that we have identified is RsaI, a small RNA identified in specific strains of Staphylococcus aureus. While its precise function remains undetermined, it is hypothesized that RsaI may play a role in inhibiting the norB pathway, which encodes an antibiotic efflux pump associated with drug resistance in S. aureus strains, and inhibiting femA, a protein relevant for methicillin resistance. We are now executing genetic studies to determine if this sRNA regulates S. aureus drug resistance genes. If our hypothesis is true, we will have identified a novel regulatory mechanism influencing multi-drug resistance in S. aureus. We are further characterizing this small RNA along with others to further understand the mechanisms of drug resistance in S. Aureus.

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**Bariatric Surgery and Neurologic Diagnoses in Adults With Obesity: A TriNetX Retrospective Cohort Study**

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Background/objective: Obesity, the gut-brain axis, and bariatric surgery have been implicated to modify neurologic risk; however, population-scale evidence remains limited. This study compared the incidence of Alzheimer's disease (AD), Parkinson's disease (PD), and multiple sclerosis (MS), and epilepsy among adults with obesity exposed to bariatric surgery versus unexposed counterparts. Methods: The TriNetX database was used to assign adults (≥18 years) with obesity to a surgical cohort (Roux-en-Y gastric bypass or sleeve gastrectomy) or a non-surgical cohort. Cohorts were matched 1:1 using propensity scores based on demographic and clinical covariates. Risk ratios and hazard ratios with 95% confidence intervals were estimated for incident neurologic diagnoses, including a composite outcome (AD, PD, MS, or epilepsy). Results: Among matched patients (n = 388,400 per cohort), the composite neurologic outcome occurred in 0.6% of bariatric surgery patients versus 0.9% of non-surgical patients (RR 0.68; $p < 0.001$). Bariatric surgery was also associated with a lower risk of Alzheimer's disease (0.09% vs 0.14%; RR 0.64; $p < 0.001$), Parkinson's disease (0.11% vs 0.13%; RR 0.80; $p = 0.023$), multiple sclerosis (0.07% vs 0.10%; RR 0.73; $p < 0.001$), and epilepsy (0.34% vs 0.54%; RR 0.64; $p < 0.001$).Conclusion: Among adults with obesity, bariatric surgery was associated with a significantly lower recorded incidence of AD, PD, MS, and epilepsy compared with matched non-surgical controls. Residual confounding limits causal inference, and further studies are needed to confirm causality.

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**Exploring and Discovering Chad16**

Presenter's Name: Channing Delagall
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As global bacterial resistance to traditional antimicrobials rises, bacteriophages, the viruses that specifically infect and lyse bacterial cells, have re-emerged as promising alternatives to antibiotics. During the Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science (SEA-PHAGES) program, which aims to expand our understanding of phage diversity, phage Chad16 was successfully isolated from a soil sample via enriched isolation. Following isolation, the phage was purified through phage purification, amplified by making a webbed plate from a lysate, and its genomic DNA extracted for further analysis through processes like restriction enzyme digest and gel electrophoresis. When plated on the host Mycobacterium smegmatis $mc^2155$, Chad16 produced plaques of approximately 10 millimeters in diameter, with high clarity. The clear plaque morphology observed suggests a purely lytic life cycle. DNA extraction resulted in a relatively low concentration of 29.3 ng/uL. The gel electrophoresis resulted in very faint bands, and restriction enzyme digestion resulted in distinct, but hard-to-observe patterns. Future work will involve genomic sequencing and bioinformatic analysis to determine Chad16's cluster affiliation and identify specific genes responsible for its lytic efficiency. These phenotypic characteristics suggest that Chad16 is a lytic phage, which is a critical trait for phages considered for phage therapy, making it a potential candidate for future therapeutic research. The successful isolation and characterization of Chad16 contribute to the growing database of mycobacteriophage information, offering further insight into the genetic diversity of viruses infecting M. smegmatis.

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**Handedness in plant development and adaptation**

Presenter's Name: Grace Delpit
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Handedness is a universal phenomenon that defines many living organisms' growth, development, evolution, and climate adaptation. Ranging from dominance in humans to the tusks of narwals and climbing plants, handedness is everywhere in nature. Compared to any other biological system, plants provide a developmentally trackable and genetically decipherable model to understand the handedness, also referred to as chirality. In this study, we investigated how handedness occurs at the cellular level and whether handedness is an adaptive mechanism for plants. We have observed that Arabidopsis thaliana root twists towards the right-hand direction while growing in the presence of toxic metal, lead (Pb). Among many toxic metals, lead (Pb) pollution is the major consequence of the Industrial Revolution. For instance, lead (Pb) is used in water pipes, coins, cooking pans, food cans, batteries, gasoline, shields for X-rays, paint, and cosmetics. Plants act as a pivotal source to uptake lead (Pb) from soil and water, and incorporate it into our food chain. Our results indicated that lead (Pb) causes twisting at the cellular level. Surprisingly, the Pb-induced twisting happens only at the outermost cell layer (epidermis), whereas other internal cell layers remain the same (cortex, endodermis, and stele cells). Furthermore, our cell biology studies suggest that Pb-induced epidermal cell twisting happens due to the altered angle of microtubules. These findings are impactful because they further our understanding of the cellular mechanism of handedness, which will be widely applicable across the tree of life and translatable to sustainable agricultural practices in the future.

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**An Investigation of the Relationship Between Woolly Bear Caterpillar (Pyrrharctia Isabella) Activity and Seasonal Dermatitis Trends**

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The larva of the Pyrrharctia isabella (Woolly Bear caterpillar) poses a significant public health risk due to its unique life cycle and cultural significance in the Northeastern states of the U.S. The Pyrrharctia isabella overwinters leading to a high-detectability "wandering" phase post hibernation, emerging in the spring and the pre-hibernation migration in the autumn. While perceived as harmless, the caterpillar setae (bristles) act as physical irritants that can cause contact dermatitis in humans. Due to Northeastern folklore, predicting the severity of the coming winter based on the body color; encouraging human contact, creating a recurring, seasonal public health risk specifically a "behavioral trigger" for exposure that remains poorly quantified in traditional clinical surveillance. This study will investigate the correlation between seasonal biological activity and public health outcomes in the Northeastern U.S. We will focus on the relationship between the phenological peaks of the Pyrrharctia isabella and the frequency of dermatitis reports. We will use iNaturlist; for Pyrrharctia isabella observations and Google trends; for search volume for "caterpillar rash". We will use Spearman Correlation to see the strength of the relationship and use Cross-Correlation Function to identify the time lag between caterpillar abundance and search volume. We intend to find strong positive correlations between the bimodal caterpillar peaks and search volume, likely exhibiting a one-week temporal lag. Ultimately, this research demonstrates that monitoring insect phenology through digital platforms offers a scalable, cost-free biosurveillance tool for local health departments to improve hospitals and the public awareness regarding seasonal bug-related dermatitis.

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**Primary Versus Metastatic Tumors of the Liver in an African-American Population: A Ten-Year Retrospective Analysis (2014-2024)**

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Background: Hepatocellular carcinoma (HCC) and metastatic liver tumors are major drivers of cancer mortality, yet their clinical patterns in African American (AA) populations remain underreported. AIM: To compare demographic and clinicopathologic features of primary HCC and metastatic liver tumors in a predominantly AA urban cohort. Methods: We retrospectively analyzed 98 histologically confirmed liver malignancies (2014–2024), including 26 HCC and 71 metastatic cases, using $\chi^2$, Fisher's exact, and t-tests ($p<0.05$). Results: The cohort had a mean age of 71.8 ± 10.2 years; 92% were AA and 59% male. Common comorbidities included HTN(65%), DM(24%), and CKD(9%). Nearly half were overweight. Laboratory abnormalities were prevalent. Among metastatic tumors, the leading primary sites were colorectal (30%),pancreatic (19%), lung(16%), and breast (13%). Of 90 patients with treatment data, 59.2% received chemotherapy. Compared with metastatic tumors, primary HCC was more common in males (77% vs 53%), with Hepatitis C (54% vs 19%), CKD (21% vs 5%), and illicit drug use (33% vs 12%). HCC lesions were more often right-lobe located (77% vs 54%) and larger (7.7 vs 4.5 cm; p=0.002). Primary HCC showed a mean survival of 2,909 days (95% CI: 2,248-3,570), nearly twice that of secondary tumors (1,666 days; 95% CI: 992-2,340). Median survival was not reached for primary HCC, while metastatic tumors had a median of 645 days. Kaplan-Meier curves demonstrated significantly longer survival for primary HCC (log-rank p=0.025).Conclusion: Primary HCC showed larger right-lobe tumors and limited targeted or immunotherapy access, reflecting persistent disparities in detection and treatment within underserved AA populations.

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**Osteoporosis and Risk of Instrumentation Failure After Lumbar Fusion: A Large Propensity-Matched Cohort Study**

Presenter's Name: Colin Dickens
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Osteoporosis is increasingly prevalent among patients undergoing lumbar spinal fusion and may compromise fixation stability and postoperative recovery; however, large-scale comparative data evaluating its impact on hardware failure and revision surgery remain limited. This study aimed to assess the risk of instrumentation failure, revision surgery, and postoperative infection in osteoporotic versus non-osteoporotic patients undergoing lumbar spinal fusion with instrumentation. A retrospective cohort study was conducted using the TriNetX Global Collaborative Network. Adults aged ≥50 years whounderwent lumbar spinal fusion with instrumentation were identified using CPT codes for fusion and instrumentation. Patients with osteoporosis (ICD-10: M81.0, M81.6) were compared with matched controls without osteoporosis. Propensity score matching (1:1) was performed for age, sex, and major comorbidities, yielding balanced cohorts of approximately 22,000 patients each. Primary outcomes included instrumentation failure, revision surgery, and postoperative infection over a follow-up period ofup to five years. Relative risks and Kaplan–Meier survival analyses were calculated, with $p < 0.001$ considered statistically significant. Osteoporotic patients demonstrated significantly higher risks across all outcomes compared with matched controls, including instrumentation failure (6.3% vs. 3.5%, RR 1.8, $p < 0.001$), revision surgery (4.9% vs. 3.3%, RR 1.5, $p < 0.001$), and postoperative infection (10.5% vs. 7.9%,RR 1.3, $p < 0.001$). Kaplan–Meier analysis confirmed reduced event-free survival in the osteoporotic cohort. Osteoporosis independently increases the risk of hardware failure, revision surgery, and infection following lumbar fusion. Preoperative bone health optimization and fixation strategies tailored to bone quality may improve outcomes in this high-risk population.

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**Prevalence of Rubber Dam Use Among Pediatric Dental Providers for Vital Pulp Therapy**

Presenter's Name: Micah Dickerson
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This study examined factors influencing the use of rubber dam versus alternative isolation systems during vital pulp therapy (VPT) among dental providers. Specifically, the study evaluated whether training experiences, demographic characteristics, and clinical practice backgrounds were associated with current isolation preferences and how frequently providers adhere to guideline-recommended rubber dam use.

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**Habitat-Associated Variation in Blue Jay (Cyanocitta cristata) Occurrence Across Urban, Suburban, and Rural Environments: A Five-Year, Public-Data Analysis**

Presenter's Name: Micayla Dupree
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Abstract:*Cyanocitta cristata* (blue jay) populations are presumed to respond to habitat structure and anthropogenic disturbance across urban, rural gradients. This study leverages publicly available citizen-science observations and land cover data to quantify habitat-associated patterns in blue jay occurrence over five years (Year 1–Year 5) within a defined study region. Observations are obtained from iNaturalist, filtered for data quality (geographic accuracy, date, observation type) and consistent geographic coverage. Habitat classification follows standardized land cover categories (urban, suburban, rural) derived from the National Land Cover Database (NLCD) and validated against contemporary municipal datasets. The primary objective is to test whether blue jay presence/abundance differs among habitat classes and to examine temporal trends within each habitat category, controlling for year and potential observer effort proxies.

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**Association Between Neuraxial Labor Analgesia and Postpartum Hemorrhage**

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Postpartum hemorrhage (PPH) is a leading cause of maternal morbidity and mortality worldwide, disproportionately affecting women of color. Although neuraxial labor analgesia is commonly used during vaginal delivery, its association with bleeding risk remains unclear. To evaluate the association between neuraxial labor analgesia and PPH following vaginal delivery, we conducted a large propensity score–matched multicenter cohort study. Using the TriNetX Global Collaborative Network, females aged 15–50 years who underwent vaginal delivery were identified. The exposure cohort received neuraxial anesthesia within 1 day of delivery, and the control cohort did not. The primary outcome was PPH within 42 days postpartum. Relative risk (RR) with 95% confidence intervals was calculated among propensity score–matched patients. Propensity score matching yielded 106,573 patients per cohort. Cohorts were matched for age, race, obesity, pre-existing hypertension, diabetes, multigravidity, placental disorders, and polyhydramnios. After excluding those with prior hemorrhage, 99,870 patients remained in the neuraxial group and 102,203 in the control group. PPH risk was significantly lower in the neuraxial group (3,465/99,870; 3.5%) compared to controls (3,947/102,203; 3.9%). The risk ratio was 0.898 (95% CI 0.859–0.940),

and the hazard ratio was 0.893 (95% CI 0.853–0.935; p<0.001). Survival probability at 42 days was 96.46% versus 96.05% (p<0.001). Neuraxial labor anesthesia was associated with a modest reduction in postpartum hemorrhage within 42 days of vaginal delivery. Despite a small absolute risk difference, its widespread use suggests potential population-level impact. Prospective studies are needed to confirm causality and assess high-risk subgroups.

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**Childbirth, Trauma, and Neuroprotection: Mode of Delivery and Postpartum PTSD Risk**

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Background: Although childbirth has historically been life-threatening, rates of postpartum post-traumatic stress disorder (PTSD) remain low compared to other traumatic events. Pregnancy-related elevations in estrogen, progesterone, oxytocin, and neurosteroids may modulate fear, memory, and emotional processing, providing protection against trauma-related psychopathology. Mode of delivery may influence this biologic effect. Methods:We performed a retrospective cohort study using the TriNetX Global Collaborative Network. Women aged 18–45 who delivered vaginally or by cesarean between 2005 and 2025 were included, excluding those with prior psychiatric diagnoses. Cohorts were balanced 1:1 using propensity score matching. PTSD (ICD-10 F43.1) diagnosed between 30 and 365 days postpartum was the primary outcome. Results: After matching, 354,765 women were included in each group. The incidence of PTSD was very low in both cohorts: 294 cases (0.08%) after vaginal delivery and 390 cases (0.11%) after cesarean. Vaginal delivery was associated with a 25% lower risk (Risk Ratio 0.75, 95% CI 0.65–0.88, p<0.001) and a 26% lower hazard (Hazard Ratio 0.74, 95% CI 0.64–0.86). Kaplan–Meier analysis confirmed small but significant survival differences. Among patients diagnosed with PTSD, the mean number of encounters was slightly higher in the vaginal group (4.3 vs. 3.3, p=0.045). Conclusions: Despite the historically traumatic nature of childbirth, postpartum PTSD remains rare. Cesarean delivery was associated with a modestly higher risk, suggesting that delivery mode may influence the neurobiological protection conferred during pregnancy. Future studies should explore mechanisms underlying this association to guide preventive strategies.

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**Hormonal Effects On Remineralization of Enamel**

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Background: The relationship between endocrine function and oral health outcomes—including gingival status, periodontal health, and enamel mineral dynamics, particularly under conditions of hormonal imbalance, remains incompletely characterized. Objective: This study evaluates the impact of hormonal fluctuations on oral tissues by assessing observable changes in mineral density, gingival presentation, and bone integrity. Methods: Scanning Electronic Microscopic imaging documented enamel alterations and polymer base enamel application surface changes. Hormonal levels were quantified, and crystalline structures associated with remineralization were analyzed.Results: Preliminary findings suggest an association between hormonal fluctuations and progressive enamel demineralization. Significance: These findings may inform future diagnostic and preventive strategies related to hormonal variability and oral health.

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**Investigating the mechanism of non-canonical inflammasome response to cytosolic LPS**

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Gram-negative bacteria are recognized by innate immune cells such as macrophages due to lipopolysaccharide (LPS) on their cell wall that activate cysteine protease enzymes called caspases and are processed by the non-canonical inflammasome pathway. Specifically, caspases 4 and 5 in humans and 11 in mice lead to the formation of an oligomerized protein complex called an inflammasome which results in programmed cell death involving pore formation on the cell membrane using the protein gasdermin-D (GSDMD) and cytokine release such as IL-18 to alert nearby immune cells of a bacterial infection. We hypothesized intercellular LPS stimulates the formation and activation of the non-canonical inflammasome that can be visually seen through the formation of "specks". HEK293T cells were transfected with tagged caspases 4, 5, and 1, and each caspase oligomerized to form a speck inside of the cell which was visualized using fluorescence microscopy. We further quantified inflammasome response to intracellular LPS in macrophages by measuring IL-18 release using ELISA and Western blots to view protein production. In the future, we plan to infect innate immune cells with whole bacteria to stimulate cell death in an infection setting. Since caspase 4 and 5 are present in humans, understanding the relationship between the non- canonical pathway and bacterial infections would lead to an increase in successful treatments for Gram- negative bacterial infections such as sepsis infections.

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**Polypeptide Polymorphism of the Sh ble Gene: Alternative Translation Initiation or Proteolytic Processing?**

Presenter's Name: Kobii Forney
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Horizontal gene transfer drives bacterial evolution by enabling acquisition of new traits. How host cells assimilate newly acquired genes remains incompletely understood. We investigated early steps of assimilation by analyzing expression of the Sh ble gene (zeomycin/phleomycin resistance) in a non-native genetic context. To test whether the sequence could support expression under these conditions, we constructed a fusion: the β-lactamase coding region was introduced with a frameshift but remained in-frame with the zeomycin resistance gene. AlphaFold modeling predicted an unstructured N-terminal region and a structured C-terminal Zeo domain. The plasmid conferred resistance to zeomycin but sensitive to ampicillin. Western blot (WB) analysis did not detect a full-length product but revealed four zeomycin-reactive isoforms forming a ladder with ~3–4 kDa spacing. We hypothesized that these isoforms resulted from either alternative translation initiation or proteolytic processing. Based on apparent molecular weights, targeted deletions were introduced. The original bands disappeared; however, new higher-molecular-weight species emerged. To directly test alternative initiation, we generated a control construct containing a single-nucleotide deletion immediately downstream of the start codon, restoring functional β-lactamase while shifting the bleomycin gene into an alternative frame. This construct retained the same nucleotide sequences predicted to support alternative initiation. WB showed complete disappearance of the zeomycin-derived isoforms. These results strongly suggest that the observed polypeptide polymorphism arises from proteolytic processing of the fusion protein by bacterial proteases rather than alternative translation initiation. Ongoing work in protease-deficient strains will test this hypothesis.

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**Understanding Maternal Vaccine Uptake During the Antepartum Period**

Presenter's Name: Mya Gardner
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Problem: Suboptimal levels in maternal vaccine rates in the United States may negatively impact the health of mothers and infants, who do not yet meet the age requirements of certain vaccines against infectious diseases. •Methodology: PubMed and Scopus were the chosen databases and selected because of the availability of the sources. Specific research terms for each database were created. The eligible criteria included study populations being of pregnant or postpartum women, published in English in the last 10 years, research conducted in the United States, availability of a full-free text version, and the study was conducted through an observational study or a randomized controlled study. 283 study titles were assessed for eligibility and 226 studies were excluded based off titles not meeting eligibility criteria. 57 study abstracts were then reviewed and only 30 articles qualified for a full-text review. •Results: After the full-text review, only four were used for data analysis. Two studies evaluated the factors and demographics based on maternal vaccination and two studies evaluated the impact of educational programming on maternal vaccine uptake. Maternal vaccine consideration was highest amongst participants who heard information and recommendations from obstetric providers, and women of minority racial and ethnic backgrounds had lower rates of maternal vaccine uptake. Conclusion: Women are more receptive to maternal vaccines during the antepartum period when information or recommendations are coming from their obstetric providers. Therefore, OBGYNs should actively be recommending and providing information to their patients about the importance of maternal vaccines.

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**Ragweed Pollen Count and Its Association with Hospital Readmission Rates and Mentally Unhealthy Days Among Chronic Asthma Patients in the DMV Region**

Presenter's Name: Nicholas Gay jr
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The pollen count of Ambrosia artemisiifolia (common ragweed) and allergy-asthma related complications within the DMV area are being examined as potential drivers of increased hospital readmission rates, and how these rates interact with reported increases in mentally unhealthy days among chronic asthma patients in the same region is being investigated. Many researchers have studied the connection between common ragweed and allergy-asthma related complications; however, the true impact of the plant's proximity to residential communities has not been fully established. It is predicted that during peak ragweed pollen seasons, hospital readmission rates and reported mentally unhealthy days among chronic asthma patients in the DMV region will be significantly elevated compared to non-peak seasons. To address this gap, publicly available data sources including CDC PLACES, AirNow air quality records, and EPA pollen monitoring datasets are being utilized to analyze the relationship between community-level air quality and quality of life outcomes. These findings are expected to demonstrate that ragweed pollen proximity meaningfully impacts the mental and physical health of allergy-asthma susceptible populations, ultimately helping families and communities better prepare for the seasonal health burdens imposed by ragweed exposure.

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**Urban Footprints: Effects of Habitat Fragmentation on Ant Diversity**

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*Presentation Type: Poster Presentation*
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Ants (Family: Formicidae) are key contributors to ecosystem function through soil turnover, nutrient cycling, seed dispersal, and trophic regulation. Urbanization reshapes landscapes via impervious surfaces, vegetation loss, and patch isolation, potentially altering ant community structure and reducing biodiversity. This study investigates how habitat fragmentation along an urbanization gradient influences ant species richness and community composition in North American urban, suburban, and relatively natural green spaces. Publicly available ant occurrence and community survey data will be compiled from online

biodiversity platforms (e.g., iNaturalist, antmaps.org) and peer-reviewed urban ecology studies, with sites classified into highly urban, suburban, and less disturbed habitats. For each site, species richness and Shannon diversity will be calculated, and basic habitat attributes such as impervious surface cover and vegetation extent will be summarized when available. Ant community composition will be quantified using dissimilarity metrics to visualize differences among habitat categories. Generalized linear models will be applied to evaluate relationships between diversity metrics and urbanization variables. Analysis will test for differences in community composition across habitat types. Visualizations of species richness and diversity index results along the urbanization gradient will be used to assess biotic homogenization and dominance by disturbance-tolerant taxa. By synthesizing existing North American datasets, this project provides a focused assessment of how human land use and habitat fragmentation shape ant diversity, with implications for urban ecological planning and conservation strategies that support invertebrate biodiversity and the ecosystem services ants provide.

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**Geographic Hotspots of Solenopsis invicta Observations from 2021 to 2026 Using Citizen Science Data**

Presenter's Name: Mannat Gill
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The red imported fire ant (Solenopsis invicta) is a globally invasive species with well documented ecological impacts and medically significant stings. Large scale citizen science platforms provide extensive occurrence data that, when critically evaluated, can inform invasive species surveillance. This study analyzes 23,748 verifiable S. invicta records submitted to iNaturalist and accessed through the Global Biodiversity Information Facility between February 2021 and February 2026 to identify global reporting hotspots and evaluate distribution patterns. Occurrence records were retrieved through the GBIF application programming interface, filtered by date and coordinate validity, and aggregated by country. To mitigate uneven reporting effort across regions, S. invicta counts were scaled by total iNaturalist submissions per country during the same timeframe, generating an adjusted reporting proportion. Hotspots were defined as countries ranking highest by adjusted proportion and those exceeding the ninety fifth percentile of global adjusted values. Spatial patterns were visualized using ggplot2 and leaflet, and associations between adjusted reporting rates and regional climate or human population metrics were evaluated using Spearman rank correlation. Adjusted reporting hotspots are expected to concentrate in warm subtropical regions with established invasive populations and high levels of human activity. Results are interpreted in the context of documented establishment history and published regional medical literature on sting burden, without treating citizen science observations as a direct proxy for incidence. This study demonstrates the analytical value and structural limitations of citizen science data for global scale invasive species monitoring.

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**Embryonic Age Distribution in the Viviparous Shiner Perch (Cymatogaster aggregata)**

Presenter's Name: Jordan Graves
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*Presentation Type: Poster Presentation*
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The shiner perch, Cymatogaster aggregata, is a viviparous teleost distributed along the Pacific Coast from Baja California to Alaska. Females of this species are capable of storing sperm within the ovary, raising the question of whether embryos within a single reproductive cycle represent a single fertilization event or multiple temporally distinct events. Specimens were collected at defined seasonal time points, and ovaries were extracted, fixed, paraffin embedded, and serially sectioned. Sections were stained using Azan or hematoxylin and eosin (H&E) to allow detailed histological evaluation. Microscopic analysis revealed the presence of embryos within ovarian tissue. Developmental stage was assessed based on morphological criteria observable in section, including degree of organogenesis, axial elongation, tissue differentiation, and relative size.Comparative analysis of embryos within individual ovaries demonstrated whether developmental stages were uniform or variable within the same female. The presence of distinct developmental stages within a single ovary would support asynchronous fertilization, whereas uniform staging would suggest temporally coordinated fertilization despite sperm storage capability.This study provides histological evidence contributing to the understanding of reproductive timing and developmental synchrony in viviparous teleosts and clarifies the functional implications of sperm storage in marine fish reproduction.

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**HBCU Physicians Thoughts on AI Integration for Minoritised Communities**

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The rapid integration of artificial intelligence (AI) across industries has significantly influenced modern medicine. Healthcare systems are increasingly adopting AI-powered tools, including clinical documentation assistants and patient-facing applications designed to simulate aspects of physician encounters. While the potential for improved efficiency and reduced administrative burden is evident, the implementation of AI in healthcare is not without complexity. AI systems generate clinical outputs by synthesizing large volumes of medical data and research. However, because these systems are trained on existing datasets, they may perpetuate or amplify embedded biases. In healthcare settings serving historically marginalized populations, such biases could have significant implications for equity, quality of care, and patient trust. Physicians practicing in community-based institutions that primarily serve minoritized populations often possess strong cultural competency skills and deep connections to their communities—factors that are

essential to delivering effective and equitable care. Although AI may enhance workflow and streamline documentation, its broader impact on clinical practice, patient relationships, and health disparities remains uncertain. This study will survey physicians at Howard University Hospital, a community hospital in Washington, DC that serves a predominantly minoritized patient population, to assess their perspectives on the evolving role of AI in medicine. The study aims to explore physicians' expectations regarding AI's integration into clinical practice and its potential effects on patient care in similarly situated healthcare settings.

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**A Qualitative Exploration of Black Undergraduate Students' Acceptance of Biological Evolution at a Historically Black College and University**

Presenter's Name: Tyler Guest
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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Research on evolution acceptance has largely centered predominantly white populations, leaving the experiences of Black students, more specifically those attending historically Black colleges and universities (HBCUs) overshadowed and understudied. This research gap carries significance given the historical teachings of evolution and its weaponization to legitimize racist ideologies, an act that may consistently affect Black communities' preconceived notions about evolutionary science. This study examined the intersections among religious affiliations, cultural identity, and science education background in shaping the acceptance of evolution among Black Undergraduates at an HBCU. We conducted a qualitative study utilizing around 20 semi-structured interviews with Black undergraduate students pursuing majors and minors in natural and health-based sciences at Howard University. Recordings from interviews were then transcribed and then put under thematic coding analysis. Research is still underway and mostly in the above stage, but preliminary analyses showcased that students' acceptance of evolution is a dynamic and nonlinear process rather than having a straightforward answer. We found that participants in the first initial questions describe having an internal conflict between their religious beliefs and evolutionary concepts. Reconciliation patterns are associated with increased scientific exposure. Awareness of evolution's racist historical rhetoric evoked caution and skepticism, while also adding deeper reflection and deliberate engagement. This study broadens current analysis on understanding evolution acceptance by focusing on Black students' voices and highlighting the role of historical and cultural factors often absent from the literature. It demonstrates the profound effect of faith, culture, and curriculum design within biology education.

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**The Effect of High Fat Diet on Pituitary Insulin Signaling in Hepatic PKCε Heterozygous Male Mice**

Presenter's Name: Marian Guzman
Classification: Staff
School/College: Medicine
*Presentation Type: Poster Presentation*
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Background: PKCε is a key enzyme involved in insulin resistance by interfering with insulin signaling pathways. DAG accumulation in hepatocytes activates PKCε, which may impair insulin receptor (IR) function. Hepatic insulin signaling can influence systemic and pituitary insulin responses via circulating factors. However, the role of PKCε in mediating HFD-induced insulin signaling defects outside the liver is unclear. Methods: Male liver-specific PKCε heterozygous C57BL6 mice 60-days old and littermate controls were fed a control diet or HFD for 4 weeks. Mice were fasted and then injected intraperitoneally with 0.5 U/kg insulin or saline. Pituitary tissue was harvested 10 minutes post-injection. Blinded Western blotting was used to measure phosphorylation of insulin signaling intermediaries.Results: HFD induces insulin resistance by impairing the AKT pathway. Pituitary tissue did not retain significantly higher levels of p-AKT ($p = .7673$) and p-FOXO1 ($p = .3178$) after insulin stimulation on the control diet. However, they showed significantly higher levels of p-AKT ($p = .0287$) and p-FOXO1 ($p = .0159$) on HFD. Insulin-stimulated p-IR was also not better preserved in either diet. These findings indicate that partial hepatic PKCε deletion does not preserve insulin receptor phosphorylation or downstream signaling in the pituitary under either diet. Conclusion: These data suggest that hepatic PKCε modulation alone is insufficient to alter pituitary insulin signaling under HFD stress. Nonetheless, literature demonstrates that hepatic PKCε does alter insulin signaling in other tissues. Thus, targeting PKCε may still represent a therapeutic strategy. Future studies will explore tissues and sex differences on PKCε-related mechanisms further.

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**Effects of Vitamin D Levels, Obesity, Hypertension, and Elevated Inflammatory Markers on Mortality and Hospital Stay of COVID-19 Patients**

Presenter's Name: Sayeeda Habib
Classification: Graduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Thomas Fungwe
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Introduction: COVID-19 outcomes vary widely, highlighting the need to identify predictors of mortality and hospital length of stay (LOS). The clinical significance of vitamin D deficiency, obesity, hypertension, and inflammatory biomarkers remains uncertain in hospitalized populations. Hypothesis: Inflammatory biomarkers are more strongly associated with in-hospital mortality and prolonged LOS than vitamin D status, obesity, or cardiometabolic comorbidities. Objective: To evaluate associations between vitamin D levels, body mass index (BMI), hypertension,

inflammatory markers, and clinical outcomes among adults hospitalized with COVID-19.Methods: A retrospective cross-sectional analysis was conducted using medical records from 317 patients with confirmed COVID-19. Data included demographics, comorbidities, serum vitamin D, and laboratory markers such as C-reactive protein (CRP), procalcitonin, D-dimer, ferritin, and troponin. Outcomes were in-hospital mortality and LOS. Statistical analyses included group comparisons, correlation tests, multivariable linear regression for log-transformed LOS, and logistic regression for mortality.Results: Thirty-five patients (11.0%) died and 282 (89.0%) were discharged alive. Age, sex, BMI, vitamin D levels, hypertension, and diabetes were not significantly associated with mortality. Elevated CRP and procalcitonin were strongly associated with death, with CRP remaining an independent predictor after adjustment. Procalcitonin showed a moderate positive correlation with LOS, while D-dimer demonstrated a weaker but significant association. In adjusted models, increasing age independently predicted longer hospitalization. Conclusion: Inflammatory biomarkers, particularly CRP and procalcitonin, are key predictors of mortality in hospitalized COVID-19 patients, while age independently predicts prolonged LOS. Vitamin D status, obesity, and hypertension were not independently associated with adverse outcomes.

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**The Impact of Height on Long-Term Knee Injury Risk in Athletes: A 20-Year Matched Cohort Study**

Presenter's Name: Jared Hall
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
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Background: Knee injuries are a leading cause of morbidity in athletes. While age, sex, and body mass index are established risk factors, the role of height as a potential biomechanical contributor remains underexplored. This study evaluated the association between height and long-term knee injury risk in a large athletic population. Methods: We conducted a retrospective cohort study using the TriNetX Global Collaborative Network (143 healthcare organizations). Athletes were stratified into average height (66–72 inches) and tall (73–78 inches) cohorts. After 1:1 propensity score matching for age, sex, obesity, underweight status, and corticosteroid use, 44,590 athletes were included in each group. The primary outcome was a composite of knee injuries over 20 years. Risk metrics, Kaplan–Meier survival analysis, and Cox proportional hazards modeling were performed. Results: Tall athletes demonstrated a higher 20-year incidence of knee injury compared to average-height athletes (8.0% vs. 6.9%; risk difference 1.0%, $p < 0.001$). The hazard ratio was 1.14 (inverse of 0.878), indicating a 12% increased risk of injury over time among taller athletes. Kaplan–Meier analysis showed reduced injury-free survival in the tall cohort (log-rank $p < 0.001$). The number of recurrent injury instances did not differ significantly between groups ($p = 0.068$). Conclusion: Height is a modest but statistically significant risk factor for long-term knee injury in athletes. These findings support incorporating anthropometric considerations into injury risk stratification and targeted prevention strategies in athletic populations.

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**Endocrine Disruption and Dentistry: A study on BPA Exposure and Prevention**

Presenter's Name: Malik Hamilton
Classification: Professional Student
School/College: Dentistry
*Presentation Type: Poster Presentation*
Faculty Advisor: Bridgette Rhodes
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Introduction: The widespread prevalence of Bisphenol A (BPA) in consumer and medical products, specifically resin-based dental materials, presents significant health concerns due to its endocrine-disrupting properties. This study investigates BPA exposure within the dental field, focusing on its potential release from composites, sealants, and orthodontic bonding agents. Methods and Findings:A comprehensive literature search was conducted using PubMed to analyze urinary BPA (uBPA) concentrations before and after dental treatments. Research indicates that BPA concentrations in saliva and urine can spike acutely following procedures, with some studies showing statistically significant increases of over 40% 24 hours post-treatment. These levels may remain elevated for up to 16 weeks. BPA's hormonal mimicry, particularly its influence on estrogen and testosterone receptors, has been linked to various health detriments, including carcinogenic potential, incident diabetes, and coronary artery disease. Conclusion:Dental practitioners must prioritize patient and occupational safety by adopting preventive measures. Recommended strategies include selecting BPA-free alternatives, employing proper handling techniques, and ensuring adequate office ventilation. This research underscores the need for a rigorous framework for informed consent and continued development of safer dental materials to safeguard the well-being of both patients and professionals.

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**RACIAL DISPARITIES IN STROKE OUTCOMES ONE YEAR AFTER CONGENITAL HEART DISEASE SURGERY IN PEDIATRIC PATIENTS**

Presenter's Name: Mikayla Niara Harris
Classification: Professional Student
School/College: Medicine
*Presentation Type: Oral Presentation*
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Background: Black and African American children with congenital heart disease (CHD) who receive surgical interventions for the management of CHD experience disproportionately higher postoperative mortality and neurologic complications, including stroke, compared with White children. The prevalence of ischemic versus hemorrhagic postoperative stroke between racial groups remains unstudied. Methods: A retrospective cohort study was conducted using the TriNetX global research network of 27 million pediatric patients. 416,872 total pediatric patients (< 18 years) with a diagnosis of CHD who underwent cardiac surgery were identified; of this there were 84,075 Black and 332,797 White pediatric patients. Postoperative ischemic and non-traumatic hemorrhagic stroke within 1-year was the primary outcome. Propensity score matching balanced cohorts on age and sex. Patients with a sickle cell disease diagnosis and preoperative stroke were not included. Risk ratios with 95% confidence intervals were calculated. Results: After matching, 84,000 Black and

White children with CHD who underwent cardiac surgery were included. Ischemic stroke occurred in 510 Black versus 453 White children. Hemorrhagic stroke occurred in 1,810 Black versus 1,115 White children. Black children bear a significantly higher risk of hemorrhagic stroke in comparison to White children (Risk Ratio [RR] 1.623, 95% Confidence Interval [CI] 1.508-1.748, $p < 0.0001$). Conclusion: Black and African American children with CHD who underwent cardiac surgery have a significantly higher risk of postoperative hemorrhagic stroke within 1-year compared with their White counterparts. These findings highlight potential disparities in postoperative management which have life-long outcomes for this population.

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**Discovery of Mycobacteriophage PallasAthena**

Presenter's Name: Kayli Harris
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Oluwatomiwa Sunbare-Funto, Swagota Roy, Somiranjan Ghosh, Courtney Robinson

Bacteriophages are viruses that solely infect bacteria, and are host specific, infecting bacteria across an entire genus or down to a singular species. The present aim is to study the genomes of these microbes in order to aid in combating antibiotic resistance with a biological control and understanding viral DNA and the function of their proteins. The host bacterium Mycobacterium smegmatis mc2155, was chosen because it is a part of the Mycobacterium genus that hosts M. tuberculosis, M. leprae, and M. ulcerans, all of which are serious, debilitating diseases that endanger public health across the globe. The lytic mycobacteriophage PallasAthena was isolated from a soil sample collected on College Street on the campus of Howard University (38.921670° N, 77.018617° W). The phage went through spot testing, purification (three rounds), and plaque assays. The plaques were consistently clear, and less than 1 mm in diameter. A webbed plate was generated to obtain a high titer lysate (6.1 x 109 pfu/mL). The phage DNA was then extracted (48.7 ng/µL), and characterized via restriction enzyme digestion, and then sent to the University of Pittsburgh for genome sequencing. Shotgun sequencing using Illumina NextSeq 1000 concluded that PallasAthena's circularly permuted genome has 63289 base pairs and 103 genes. It is a cluster B, subcluster B1 bacteriophage with a GC content of 66.5%. Final annotation of the sequenced genome to understand the possible functions of the mycobacteriophage's proteins with bioinformatics is occurring in the lab.

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**Migration Patterns**

Presenter's Name: Logan Hassell
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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In our research project we examined the differences in southward migration patterns between the Cape May Warbler (scientific name: Setophaga tigrina) and Indo-Pacific kingfishers (scientific name: Todiramphus) using observational data from iNaturalist. The purpose of this project was to determine whether the Indo-Pacific kingfishers exhibited a higher rate of southward migration over time compared to the Cape May Warbler. We were able to use the iNaturalist observations from recent years that were mapped and analyzed, and migration frequency compared using graphical data representations. Bird species served as the independent variable, while the frequency of southward migration over time was the dependent variable. The resulting graph showed an increasing constant line showing that the greater southward migration is amongst Indo-Pacific kingfishers. Our findings supported the original hypothesis. However, limitations such as observer bias and uneven identification accuracy within iNaturalist data may have influenced the results. Despite these limitations, this study demonstrates how community science data can be used to analyze biodiversity patterns and migration trends.

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**The Role of Peroxisome Proliferator Activated Receptor-alpha on Blood Pressure and Renal Function During a High Salt Diet**

Presenter's Name: Mark Hatcher
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Dexter Lee

Hypertension contributes to seven of the top ten leading causes of death in the US. About half of the hypertensive population is salt-sensitive, a condition defined by a sustained elevation of blood pressure after ingestion of dietary sodium. Among Black hypertensives, the percentage of salt-sensitivity rises to 70% representing a severe health disparity that is still poorly understood. There are few proposed mechanisms for salt-sensitive hypertension, but one promising hypothesis involves Peroxisome Proliferator Activated Receptor-alpha (PPAR-α), a nuclear protein originally identified in lipid metabolism. Our lab demonstrated that PPAR-α knockout (KO) mice have higher mean arterial pressure (MAP) than wild type (WT) mice after Angiotensin II (Ang II) infusion and that the mice treated with fenofibrate (a PPAR-α agonist) have attenuated MAP. The goal of this study is to investigate the role of PPAR-α in regulating systolic blood pressure (SBP) and glomerular filtration rate (GFR) in mice fed a high salt (HS) diet. C57BL6 (C57), B129S1 (B129), and PPAR-α knockout (KO) mice were fed a control or HS diet for 8 weeks. We hypothesize that all high salt groups will show higher SBP, and that C57 mice will show the lowest average SBP, lowest change in GFR, and highest PPAR-α expression. We hypothesize that KO mice will have a highest SBP and highest change in GFR. We believe that the results of our study will clarify the mechanism upon which PPAR-α acts upon renal function and may lead to future treatments for salt sensitive hypertension.

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**Distinguishing Observer Effort from Ecological Trends: A Decade Analysis of Northern Cardinal Observations Using iNaturalist Data**

Presenter's Name: Kiana Hayes
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Citizen science platforms such as iNaturalist have generated large ecological datasets that allow researchers to analyze species observation trends over time. However, increases in observation frequency may reflect increased participation rather than actual changes in species abundance. The Northern cardinal (Cardinalis cardinalis), a widespread and stable bird species throughout North America, provides an ideal model for distinguishing between observer effort and ecological change. This study examines how annual verified iNaturalist observations of Northern cardinals in the United States and Canada changed between 2014 and 2024 and evaluates whether observed trends reflect increased citizen science participation or biological population shifts. Observation data are being obtained from the iNaturalist Export Tool and filtered to include only Research Grade records, which are verified by multiple users and include accurate species identification, geographic coordinates, and observation dates. Records with missing or invalid data are being removed to ensure reliability. Data cleaning and analysis are being conducted using Microsoft Excel. Annual observation totals are being calculated using pivot tables, and proportional comparisons relative to total bird observations are being performed to account for changes in platform participation. Linear regression analysis is being applied to evaluate trends in observation frequency over time. This research demonstrates how undergraduate analysis of publicly accessible citizen science data can contribute to understanding ecological trends while accounting for observer effort in biodiversity monitoring.

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**Geographic Distribution of Arctic Fox (Vulpes lagopus) Observations in the United States: A Latitudinal and Temporal Analysis Using iNaturalist Data**

Presenter's Name: Imauri Haynes
Classification: Undergraduate Student
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This study investigates whether Arctic fox (Vulpes lagopus) observation frequency in the United States has changed over time and whether geographic distribution remains restricted to high-latitude regions. We hypothesize that annual observation counts will show no significant temporal trend, and that occurrences will cluster north of 60°N latitude, consistent with the species' dependence on Arctic and sub-Arctic habitats. Occurrence records were obtained using the R package rinat, filtered to research-grade U.S. observations only. Latitude and year were used as primary variables. Data analysis and visualization were conducted in RStudio using ggplot2, including a scatterplot to examine latitudinal distribution across years and a bar graph to compare annual observation frequency. To assess temporal trends, a Spearman rank correlation will be applied ($\alpha = 0.05$), selected for its robustness to non-normal distributions and small sample sizes inherent to presence-only citizen science data.Preliminary results indicate that observations are geographically restricted to Alaska, with the majority recorded above 60°N, and that annual counts remain consistently low across sampled years. Limitations include observer bias, uneven spatial sampling effort, and the presence-only nature of iNaturalist data, which precludes absence inference. These findings contribute to our understanding of Arctic fox range boundaries within the United States and demonstrate the utility of open-access citizen science databases for wildlife distribution analysis.

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**Autaptic Hippocampal Neurons as a Model to Study HIV Tat Protein and Cannabinoid Receptor-Mediated Signaling**

Presenter's Name: Thomas Heinbockel
Classification: Senior Faculty
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*Presentation Type: Poster Presentation*
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Co-authors: Natalia Murataeva, Alex Straiker

Autaptic hippocampal neuron cultures create a simplified synaptic circuit where a single neuron forms synapses onto itself. This configuration enables separation of presynaptic release mechanisms, postsynaptic receptor function, and retrograde signaling because one patch-clamp electrode can interrogate both sides of the same synapse. The HIV-1 transactivator of transcription (Tat) protein is strongly implicated in synaptodendritic injury and altered excitability that contribute to HIV-associated neurocognitive disorders (HAND). Cannabinoid receptor signaling via presynaptic CB1 receptors and endocannabinoid (eCB) retrograde plasticity is a powerful regulator of hippocampal neurotransmission and has been proposed as a neuroprotective axis in NeuroHIV. The hypothesis is that Tat protein will inhibit endocannabinoid-mediated synaptic plasticity by altering membrane properties of neurons. We tested this in autaptic hippocampal neurons with presynaptic cannabinoid (CB1) receptors that, when activated, inhibit neurotransmitter (glutamate) release, known as Depolarization-induced Suppression of Excitation (DSE). When neurons were stimulated with a series of successively longer depolarizations (50 ms to 10 sec), this resulted in progressively greater inhibition of neurotransmission. A 5-min treatment with Tat protein at 100 ng/ml did not alter baseline excitatory postsynaptic currents, indicating that Tat was not altering either pre- or postsynaptic components of neurotransmission. The DSE responses were not significantly different with Tat. Other studies have reported robust effects of Tat in a cell line at 1ug/ml. We will test the effect of Tat at higher concentrations to determine its role at the cellular level. The experiments demonstrate the strengths of autaptic hippocampal preparations to dissect mechanisms and therapeutic hypotheses.

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**Inter-fraction and intra-fraction organ motion models for radiotherapy treatment**

Presenter's Name: Gary Henderson
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Rao Khan
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Stereotactic body radiation therapy (SBRT) relies on an accurate positioning of targets accounting for intra-fraction and inter-fraction target tumor motion. For the treatment of an early-stage non-small cell lung cancer (NSCLC), the main benefit of SBRT primarily stems from allowing more rapid radiation dose fall off at the boundaries of the target tumor by having more beams. Delivery of this conformed dose distribution necessitates accurate delineation and positioning of the tumor during radiation treatment. In this work, we will review various tools employed for monitoring both intra-fraction and inter-fraction tumor motion. An individual's anatomic characteristics like body mass index (BMI) may be related to degree of organ movement which can impact the accuracy of the tumor positioning. Based on literature, we will examine what parameters are necessary to characterize an various organ motions for various cancer sites prostate cancers, lung, brain, etc. The major aim will be to build an inter- and intra-fraction motion predicative model for radiotherapy treatments.

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**Towards Identifying Valosin-containing Protein Inhibitors Through Measuring ATPase activity**

Presenter's Name: Kaedan Hendrix
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*Presentation Type: Poster Presentation*
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Valosin-containing Protein (VCP), also known as ATPase p97, is a ubiquitously expressed member of the ATPase-associated with diverse cellular activities (AAA+) protein family that relies on the catalytic activity of its D1 and D2 ATPase domains to regulate critical cellular processes, including protein degradation, apoptosis, and autophagy. The essential role of VCP in cellular functions, upregulation in cancer cells, and contribution to maintaining homeostasis, proves it to be a potential therapeutic target. Research shows that the inhibition of this protein induces cancer cells to undergo apoptosis, while preserving normal cells. While NMS-873 has proved to be a potent inhibitor of VCP, there is a vital need for novel scaffolds with improved drug-like properties. This project investigates a library of imidazole analogs synthesized via the Groebke-Blackburn-Bienaymé (GBB) reaction. To quantify the potency of synthesized analogs, I am performing rigorous dose-response studies using Malachite Green ATPase Assays to generate precise IC50 inhibition curves needed for evaluation. By quantifying inorganic phosphate release, these results will provide the critical biological feedback required for Structured-Activity Relationship (SAR) studies, identifying steric and electronic factors that optimize VCP bonding. Furthermore, by conducting MTT assays, we will be able to correlate VCP inhibition with cell viability in MCF7 (cancerous) and MCF10A (non-malignant) cell lines. This dual-assay approach will allow us to identify lead imidazole derivatives that surpass NMS-873 potency while simultaneously maintaining favorable specificity for malignant cells. Ultimately, this research provides a novel framework for design of next-generation VCP inhibitors as potential candidates for targeted cancer therapy.

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**Beyond Standard Therapy: The Role of Medical Cannabis in Chronic Neuropathic Pain Management**

Presenter's Name: Kaylee Hensley
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Background Chronic neuropathic pain is a complex and debilitating condition resulting from nerve damage or dysfunction. Standard first-line treatments, including tricyclic antidepressants (TCAs), serotonin-norepinephrine reuptake inhibitors (SNRIs), gabapentinoids, topical agents, and opioids, often provide only moderate relief and are limited by side effects, tolerance, and misuse risk. As a result, there is growing interest in safer, non-opioid alternatives such as medical cannabis. Aim This review examined the comparative effectiveness, safety, and potential benefits of medical cannabis versus standard pharmacologic therapies in adults with chronic neuropathic pain. Method A literature review was conducted using primarily PubMed, with supplemental searches in Google Scholar. Search terms included cannabis neuropathic pain, opioid usage for pain, and pain relief. Peer-reviewed empirical studies, clinical trials, and systematic reviews published between 2020 and 2025 were analyzed. Results Across studies, medical cannabis—particularly combined THC and CBD formulations—produced clinically meaningful short-term pain reduction and improved sleep quality. Some patients reported reduced reliance on other pain medications. Medical cannabis was generally well tolerated, with mild and reversible side effects such as fatigue, dry mouth, dizziness, and appetite changes. However, evidence was inconsistent due to small sample sizes, heterogeneous dosing, and limited long-term follow-up. Implications Medical cannabis may serve as an adjunct therapy for select patients who do not achieve adequate relief from conventional treatments, but careful risk–benefit assessment is necessary. Conclusion Although promising, medical cannabis requires larger, rigorous trials to clarify long-term efficacy, safety, and optimal dosing in chronic neuropathic pain management.

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**Beyond One-Size-Fits-All: Evaluating Pharmacogenomics-Guided Buprenorphine Formulation Selection in Opioid Use Disorde**

Presenter's Name: Danielle Hicks
Classification: Professional Student
School/College: Pharmacy
*Presentation Type: Poster Presentation*
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Background: Substance use disorder (SUD) is a chronic, treatable disease characterized by recurrent substance use despite harmful consequences. Opioid use disorder (OUD) remains a public health emergency, with approximately 105,000 overdose deaths reported in 2023, nearly 80,000 involving opioids. Buprenorphine is an FDA-approved medication for OUD and is available as daily sublingual formulations and long-acting injectable (LAI) products. Variability in metabolism and treatment response may influence optimal formulation selection. Objective: To evaluate pharmacogenomics-guided buprenorphine formulation selection by comparing sublingual and long-acting injectable formulations in patients receiving treatment for OUD in Washington, D.C. Methods: This ongoing study uses a mixed-methods approach, incorporating a systematic literature review and meta-analysis alongside retrospective evaluation of patient cases undergoing pharmacogenomic testing while receiving OUD treatment. Genetic variants relevant to buprenorphine metabolism (e.g., CYP3A4 polymorphisms) are being analyzed in relation to formulation selection, adherence patterns, withdrawal symptoms, and clinical stability. Data collection is currently in progress, with final results anticipated prior to poster presentation. Anticipated Results: We anticipate that pharmacogenomic variability will influence formulation effectiveness and dosing needs, with long-acting injectable formulations potentially improving adherence but offering less flexibility for certain metabolizer phenotypes. Conclusion: Evaluating pharmacogenomics-guided formulation selection may support more individualized OUD management and improve treatment outcomes.

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**Obesity linked factors increase breast cancer invasion potential**

Presenter's Name: Kennedy Hood
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Co-authors: Abigail Jackson, Keren Hilgendorf

The WHO defines obesity as a BMI of over 30 and eAects 41.9% of women in the United States. Adipose tissue is the leading site of estrogen production in post menopausal women, and this increase of estrogen is linked to the optimization of cancer growth and development. Both post and pre menopausal obese women have higher percentages of metastasis in breast cancer. Metastasis is the process of cancer cells detaching from the original tumor location and spreading throughout the body. Actin is a protein found in the extracellular matrix that impacts cell motility, shape, and flexibility. This protein is a factor in the metastasis of breast cancer as increased invasion allows for higher motility and higher chances of metastasis. Actin invasion is determined by the formation of structures that reach from the cells. Calcium dependent cell adhesion molecules or cadherins are proteins that drive cell to cell adhesion. Studies suggest that the decrease in E-cadherin expression paired with the increase in N-cadherin expression drive invasion in cancer patients. The methods used to analyze cadherin expression were immunofluorescence and the spheroid assay examines cell invasion. When treating cells with obese conditioned media, N-cadherin expression is increased compared to treatment with lean conditioned media. Additionally, actin invasion was also increased in cells treated with obese media. During the spheroid invasion assay, cells treated with either obese inguinal or obese visceral media invaded out faster than the spheroids treated with lean inguinal or visceral media.

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**Seasonal Activity Patterns and Disease Transmission Risk of Aedes albopictus in the DMV Region (2020–2025)**

Presenter's Name: Danielle Hoover
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*Presentation Type: Poster Presentation*
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Co-authors: Briona Robinson, Alyssa Lee, Arianna Nance

The invasive mosquito Aedes albopictus (Skuse, 1894), commonly known as the Asian Tiger Mosquito, poses a significant public health threat due to its capacity to vector arboviruses including dengue, chikungunya, and Zika. This study characterizes the seasonal activity dynamics of Ae. albopictus within the Washington–Baltimore–Arlington (DMV) metropolitan area from 2020 to 2025 and evaluates environmental conditions associated with peak transmission risk. Occurrence data were obtained from iNaturalist, a citizen science platform aggregating georeferenced community-submitted species sightings. Temporal trends were analyzed at global and regional scales across the five-year study period. Results revealed a consistent increase in documented sightings both globally and within the DMV region. Seasonal analysis demonstrated that observation frequency peaked during July through September, corresponding with elevated ambient temperature and humidity. These findings suggest that warm, humid conditions are the primary environmental driver of heightened transmission risk in the region. Limitations include biases inherent to crowd-sourced data, including uneven geographic sampling and variable reporting rates, as well as potential morphological misidentification of Ae. albopictus due to its small size. Nevertheless, this analysis contributes to understanding climate-driven vector seasonality in mid-Atlantic urban environments, with implications for public health surveillance and mosquito abatement program timing.

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**PERCEIVED EFFECTS OF CANNABIS USE AMONG ADOLESCENTS AND YOUNG ADULTS WITH SICKLE CELL DISEASE**

Presenter's Name: Patricia Houston
Classification: Staff
School/College: Medicine
*Presentation Type: Poster Presentation*
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Co-authors: Sohail Rana, Joanne Adelberg, Cynthia Gipson, Jaden Petrus

Background: Cannabis is sometimes used to treat chronic pain. While opioids are a mainstay of the treatment of sickle cell pain, clinical studies show promising but mixed results for cannabis use, alone or in combination. Methods: We examined marijuana use in 14 to 30-year-

olds with sickle cell disease, looking at rates of use and perceived benefits or reasons for non-use. A survey (Howard, J., 2005, modified) was conducted in our clinic, and online through REDCap. The study was IRB-approved with participants completing a consent form (<18 assent/parental consent). Results: The sample (48 evaluable responses) was evenly divided between males and females, with 41.7 % age 17 or below, most reporting Black race. Marijuana use ("ever used"), was reported by 64.6% and 35.4% never used. Use was higher in males and those over 18. Legal issues, "I don't think it will help with my pain" and "It will have other effects I don't desire" were the biggest reasons for non-use. The top benefits: relaxation (77.4%), improved sleep (77.4%) and improved mood (74.2%). Reducing the need for pain medication (61.3%) and reducing anxiety (64.5%) were also commonly indicated. When asked if they use marijuana to "get high" 61.3% of users responded yes. Conclusion: Use was high in our study compared to previous data. While marijuana has shown benefit for pain in some studies, research is limited. Cannabis education for young teens with sickle cell is recommended, to ensure that they are fully aware of the risks as well as the benefits.

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**A 3D t-SNE Map of Microglial Morphology in a Rat Brain Following Cardiac Arrest**

Presenter's Name: Chao-hsiung Hsu
Classification: Post Doc/Resident/Fellow/Research Associate
School/College: Medicine
*Presentation Type: Poster Presentation*
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Co-authors: Be-Ming Chang, Essiet Adid Ette, Da-Yuan Liu, Mu-Jan Shih, Stephen Lin, Hoai T. Ton, Raffensperger Katherine, Micah Kadden, Michael Shoykhet, Yi-Yu Alan Hsu, Paul C. Wang, Tsang-Wei Tu

Microglia undergo dynamic morphological remodeling during neuroinflammation after brain injury, spanning intermediate and mixed states that can be obscured by discrete class labels. Here, we apply a t-distributed Stochastic Neighbor Embedding (t-SNE) framework to characterize microglial morphology transitions, and visualize their activation patterns as continuous states in the rat brain following cardiac arrest. Using our previously developed microglia analysis pipeline, StainAI, we obtained automated segmentations of ~420,000 microglia from high-resolution histology and extracted 25 morphometric features describing cell size, branching complexity, elongation, and texture-related properties. These features were embedded into a 3D t-SNE space to capture a continuous activation morphology spectrum, providing a more comprehensive representation of neuroinflammation beyond discrete class labels alone. To improve interpretability, a polar colormap anchored to six canonical morphologies (ramified, hypertrophic, bushy, amoeboid, rod, and hyper-rod) was applied. Anchor directions were estimated from discrete-labeled reference groups with convex-hull–based filtering to reduce the influence of outliers, enabling stable color encoding of continuous morphological states. Neuroanatomical context was incorporated by summarizing microglial state distributions across different brain regions. Embedding quality was evaluated using complementary metrics, including kNN preservation to assess local neighborhood retention and convex-hull–based measures to characterize global organization in the reduced space. Compared with six-class labeling alone, the t-SNE representation reduced ambiguity for borderline cells and provided a more nuanced view of microglial morphology after global ischemic injury. This approach offers a scalable framework for studying neuroimmune remodeling while preserving continuous morphological change.

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**Mucin-HIV Interactions in Cervicovaginal Lavages from BV+ and BV- Patients**

Presenter's Name: Sunniya Iftikhar
Classification: Post Doc/Resident/Fellow/Research Associate
School/College: Engineering & Architecture
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Mucins are high molecular-weight glycosylated proteins which acts as a first line of defense against the pathogens. While mucins are heavily glycosylated and are known to interact and trap viruses, it is not clear how the glycan composition of mucin influences the adhesion and entrapment of viruses like HIV, which are known to be covered with high mannose glycans. We investigated the interaction between HIV-1 and mucins in the cervicovaginal lavage (CVL) obtained from women with and without Bacterial Vaginosis (BV). The glycan composition of mucin is known to change in BV- and BV+ states, and the susceptibility to HIV is also known to increase in BV+ state. The aim of the study was to determine if the changes in patient mucin glycosylation correlated to observable differences in mucin trapping of HIV-1, which would explain increased susceptibility associated with BV+ states. Virus-mucin interaction was investigated with Dynamic Light Scattering (DLS), a comparatively non-invasive, and cost-effective technology, by tracking the changes in the autocorrelation signal and size histograms after antibody pullout of virus or mucin from the virus and CVL mixture using magnetic beads. Mucin glycan composition was broadly determined with lectin-specific agglutination which is distinguishable in DLS. Initial results suggest broad similarities in the virus-mucin interaction in both BV+ and BV- CVL, despite there being differences in mucin type and extent of glycosylation in the BV+ and BV- samples from the same patient. The study demonstrates the use of light scattering techniques to interrogate clinical samples with minimal sample preparation.

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**Where Are Species Most at Risk? Machine Learning–Driven Insights into Amphibian Diversity and Extinction Risk Across Nigeria**

Presenter's Name: Chukwudi Ikegwu
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
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Co-authors: Amari Hutchins, Layla Smith, Natanim Ambaye, Winnie Mambo, Segun Oladipo, Lotanna Nneji

Amphibians are the most threatened group of vertebrates on Earth and require urgent conservation attention, yet the broad-scale patterns of diversity and extinction risk necessary for effective conservation planning remain poorly resolved across tropical Africa. We focus on Nigeria, one of Africa's most amphibian-rich countries, to determine where amphibian diversity is concentrated and which species face the greatest intrinsic risk of extinction. Drawing on a nationally comprehensive dataset, we implemented a national-scale, data-driven spatial modeling framework that integrates high-resolution climatic predictors, human footprint indices, and machine learning approaches to identify the environmental drivers of species richness and areas of high vulnerability. Spatial analyses revealed pronounced biodiversity strongholds in southern lowland forests and montane regions, with consistently elevated richness across spatial scales. Machine learning analyses revealed that annual precipitation was the dominant environmental driver of species richness, with amphibian diversity peaking in areas with very high annual rainfall. Human influence also emerged as a significant correlate of richness, indicating that moderately modified landscapes may sustain assemblages dominated by disturbance-tolerant generalists. In contrast, precipitation seasonality reduced richness, while vegetation metrics contributed comparatively little explanatory power. Trait-based intrinsic vulnerability assessments revealed marked heterogeneity among species, with nearly one-third classified as highly vulnerable, particularly range-restricted montane taxa exposed to cropland expansion and intensifying human pressure. This study provides the first nationwide, machine-learning–driven macroecological assessment of amphibian diversity and extinction risk in Nigeria and establishes a scalable framework for biodiversity risk assessment in data-limited tropical regions.

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**Spatial Analysis of Aedes aegypti Distribution in Washington, D.C.: Leveraging Citizen Science to Map Urban Vector Risks**

Presenter's Name: Hailey Jeffers
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School/College: Arts & Sciences
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Aedes aegypti, the primary vector for dengue, Zika, and chikungunya, has seen recent range expansions into temperate urban centers, including Washington, D.C. This study investigates the environmental and demographic determinants of Aedes aegypti presence across the District's diverse urban landscape. Utilizing opportunistic occurrence data from the iNaturalist platform (2019–2024), observations were georeferenced and analyzed within QGIS. Each detection was aggregated to the census-tract level and correlated with high-resolution land-use data, specifically impervious surface fractions, commercial-to-residential ratios, and green space. Preliminary spatial analysis reveals significant clustering in tracts characterized by high impervious surface coverage and moderate population density, suggesting an ecological preference for container-rich anthropogenic environments. These findings highlight the utility of citizen science in monitoring invasive vectors and provide a data-driven foundation for targeted public health interventions and metropolitan mosquito control strategies in evolving urban climates.

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**Food Allergies and Food Insecurity at HBCUs in the Greater Washington, D.C. Area**

Presenter's Name: Oluwaseyitodun Johnson
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Historically Black Colleges and Universities (HBCUs) serve a diverse population of African Americans, a demographic that is significantly affected by food allergies and food insecurity. However, there is a lack of research exploring how these issues intersect at HBCUs. Food allergies and insecurity disproportionately impact Black students and college communities for reasons such as tuition costs and limited resources. Previous research with 351 students attending four HBCUs found that nearly three in four students experienced some level of food insecurity in the past year, with rates higher than those at predominantly White institutions. Meanwhile, food allergies affect approximately 2.3% of teenagers, a figure that closely estimates the prevalence among students entering college. The purpose of this study is to explore how HBCUs in the Washington, DC, Maryland, and Virginia area are addressing the needs of students with food allergies and limited access to safe, nutritious food. As of now, there are 11 HBCUs in this area, serving a diverse student population. This study also identifies barriers to creating an inclusive on-campus dining experience. It uses a student survey to assess the prevalence of food allergies and food insecurity, dining accessibility, and campus support. By highlighting student experiences and institutional practices, this study aims to raise awareness of inequities in campus food systems and inform practical strategies to improve health, safety, and inclusion for students at HBCUs.

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**Incidence of Allergic and Allergic-Type Reactions to IV Opioids in Black vs White Populations**

Presenter's Name: Sydney Johnson
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School/College: Medicine
*Presentation Type: Poster Presentation*
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Co-authors: Mikayla Harris, Rejoice Spivey, Syed Fahad Gillani, MD, Mrinalini Deverapalli, Miriam Michael, MD

Background: In comparison to White skin, Black skin contains mast cells with larger, fewer granules and higher tryptase densities. Additionally, populations of color have faster metabolism of certain opioids. Environmental racism and opioid prescription patterns could contribute to variations in mast cell reactivity. These dynamics create questions surrounding if physiological differences truly exist between the mast cells and their activity in Black and White patients. Objective: This paper compares the incidence of pseudoallergic and allergic mast cell reactions to IV opioids in Black and White cohorts. Methods: This is a retrospective observational study conducted through the TriNetx database. The TriNetX database is a research network composed of deidentified electronic medical records (EMRs) of over 100 Health

Care Organizations (HCOs) over the last 20 years. A White and Black cohort were propensity score-matched, resulting in 1,262,505 White patients and 1,257,678 Black patients included in this study. This is a total of 2,520,183 patients. Patients who experienced allergic or allergic-type reactions within 1 day of receiving IV opioids were counted as experiencing an outcome. Results: White patients had about a 15% higher chance of being documented as having an allergic-type reaction to opioids in comparison to Black patients. Black patients had a higher rate of repeat allergic or allergic-type reactions. Conclusion: Overall, the findings of this study demonstrate differences in mast cell physiology that may or may not be attributed to previously established anatomical variations and societal structures.

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**Coordinated Particle Transport During Development of a Soil-Dwelling Microbe**

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*Presentation Type: Poster Presentation*
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When faced with food scarcity, the social amoeba Dictyostelium discoideum transitions from a unicellular to multicellular organism, aggregating into fruiting body structures essential to its life cycle. Beyond adhering to one another during aggregation, these cells also adhere to environmental particles, suggesting an ability to actively manipulate their surroundings. How cells balance selective neighbor adhesion with environmental remodeling during this developmental transition remains poorly understood. To investigate systematic microenvironment remodeling, we visualized coordinated motility and aggregation in the presence of fluorescent microbeads simulating soil particles. After initiating starvation to trigger development, we performed long time-lapse imaging using spinning disk confocal and transmitted light microscopy under two conditions: cells in well plates submerged in buffer, and cells on agarose with an air interface. A quantitative analysis pipeline developed in Jupyter notebook was used to track microbead velocities relative to developmental stage. Well plate experiments revealed a clear behavioral shift from random individual movement to highly coordinated streaming during aggregation, with microbead velocities corresponding to these developmental transitions. In air-interface conditions, cells actively gathered microbeads into distinct patterns based on bead size during early aggregation, then excluded all beads during later multicellular formation — demonstrating selective, stage-dependent environmental remodeling. These findings uncover previously unknown environmental manipulation capabilities in Dictyostelium, shedding light on how cells actively modify their surroundings during development. Future work will explore adhesion differences across developmental stages and cell types, with broader implications for understanding human neutrophil behavior and the design of targeted drug delivery systems.

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**Toward Automated, Accessible Neuroimaging: An Auto-MRI Pipeline for Very-Low-Field (0.05 T) Systems**

Presenter's Name: Rania Jones
Classification: Graduate Student
School/College: Other
*Presentation Type: Poster Presentation*
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Portable, very-low-field (VLF) MRI systems offer a promising path to accessible, point-of-care neuroimaging but are vulnerable to reduced signal-to-noise ratio and environmental variability, which can degrade image quality and limit quantitative analysis. This work outlines a generalizable framework for Auto-MRI at 0.05 T that aims to standardize scanner operation and image quality with minimal on-site expertise. The approach integrates: (1) segmented multi-slab acquisitions that permit frequent system checks; (2) automated pre-scan updates per slab (transmit-frequency adjustment to mitigate thermal drift, basic dynamic shimming to improve B0 homogeneity, and electromagnetic-noise monitoring); and (3) an auto-QA module that detects common artifacts (e.g., wrap-around, Gibbs ringing, and gross motion) and triggers targeted rescans via a simple look-up table of pass/fail thresholds. The planned validation includes repeat phantom scans and healthy-volunteer studies to assess repeatability, artifact burden, and suitability for downstream volumetry workflows. We will describe system architecture, decision logic, and practical deployment considerations for research and educational environments. By emphasizing automation, vendor-agnostic implementation, and transparent QA, this project seeks to lower operational barriers to dense, longitudinal neuroimaging—particularly in settings where high-field MRI access is limited. The session will present the protocol, implementation progress, and lessons learned to inform future studies that combine VLF acquisitions with reconstruction and analysis pipelines appropriate for neurodevelopmental research.

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**The Impact of Amplitude on Flatfish Burial Performance and Sediment Fluidization**

Presenter's Name: Niomi Jones
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Fish burial is a behavior in which fish cover themselves with sediment and settle into the substrate to camouflage themselves with sand. Fish bury themselves to ambush prey, conceal themselves from predators, and even escape from extreme temperatures. Flatfish are a group of specialized ray-finned fish that are known for their body asymmetry and great locomotion (Shao et al., 2017). Flatfish are excellent at camouflaging themselves and use burial as a strategy to avoid predators and ambush prey, suspending sand into the water column and settling back onto the fish to provide concealment (Corn et al., 2018). The effectiveness of the fish's burial performance can depend on several kinematic variables, such as undulation frequency and amplitude. Fish burial data and research can

inform public policy, as policies can be refined to protect their natural habitat. Understanding that fish require specific amplitudes and types of substrates to properly bury, help to create more eco-friendly environments that suit fish natural behaviors. Low amplitude trials showed low burial percentages with generally minimal sediment displacement and a small amount of sand cover (Fig.5). High and medium amplitudes statistically were not different from each other; however, high and medium were the best for fish burial performance; low was the worst statistically. This research will investigate how the amplitude of the fish's head and tail undulations and biomechanics contribute to effective burial. Overall, understanding how flatfish's substrate interactions and fluidization mechanism affect fish burial will assist other researchers to build upon this research.

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**The Molecular Alarm System**

Presenter's Name: Ke'ajah Jones
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*Presentation Type: Poster Presentation*
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The innate immune system serves as a primal line of defense, yet the structural parallels between distantly related species remain a profound evolutionary mystery. This study investigates parallels in immune responses by comparing the Factor C protein in the Atlantic horseshoe crab (Limulus polyphemus) with the TLR4 protein in humans. Despite millions of years of independent evolution, both species rely on specific proteins to detect bacterial lipopolysaccharides (LPS), thereby triggering a "molecular alarm system" essential for survival. Through the use of public genomic databases, full-length protein sequences will be analyzed to pinpoint the exact regions responsible for LPS recognition. While the overall amino acid sequences likely differ significantly due to evolutionary drift, the hypothesis is that the LPS-binding domains will reveal high structural similarity and conserved residues. By utilizing tools like NCBI BLAST for sequence retrieval and Multiple Sequence Alignment (MSA) via tools like MUSCLE, this research aims to identify the specific clusters of amino acids that have remained unchanged throughout history. Identifying these matching clusters would suggest a winning blueprint for pathogen detection, a molecular strategy so effective that evolution has preserved it throughout evolution. This work not only highlights the shared biological heritage between humans and the Atlantic horseshoe crab (Limulus polyphemus) but also indicates that the amino acids used for recognizing a biological threat have been constant over millions of years.

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**An Investigation of the Relationship Between Woolly Bear Caterpillar (Pyrrharctia Isabella) Activity and Seasonal Dermatitis Trends**

Presenter's Name: Braniyah Jones
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The Woolly Bear caterpillar (Pyrrharctia isabella) represents an under-recognized public health concern in the Northeastern United States. During biannual dispersal periods spring emergence and autumn pre-hibernation heightened human contact with these insects increases the risk of contact dermatitis caused by physical irritation from the larvae's setae (bristles). In the Northeast, cultural practices, particularly the folk tradition of handling caterpillars to predict winter severity, amplify exposure risks that are not consistently captured by traditional clinical surveillance systems. This study examines whether passive digital data streams serve as effective proxy indicators for seasonal dermatitis incidence. We analyzed five years (2020–2024) of Research Grade P. isabella occurrence records from iNaturalist alongside Google Search Trends data for caterpillar rash. Cross-correlation analyses conducted in RStudio quantified the temporal relationship between biological activity peaks and search query frequency. Preliminary results identify a distinct bimodal phenological pattern, suggesting a strong correlation between caterpillar sightings and search interest with a one-week temporal lag. Findings from this study may support the integration of citizen science biodiversity data with digital epidemiological surveillance, offering public health departments a cost-effective tool for anticipating and communicating seasonal dermatological risks associated with arthropod exposure.

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**Amata kuhlweinii**

Presenter's Name: Dasha Jones
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Citizen science platforms such as iNaturalist have become increasingly valuable tools for biodiversity monitoring, yet detection records are inherently vulnerable to observer effort bias the tendency for species to appear more abundant simply because more people are searching for them. Accurate interpretation of these records is essential for understanding true species phenology and informing effective conservation strategies. This pilot study investigates whether elevated winter detection rates of Amata kuhlweinii, an Australian day-flying moth, reflect genuine seasonal activity peaks or are an artifact of increased observer effort in warmer geographic regions during cooler months. Occurrence records were obtained from the Global Biodiversity Information Facility, which aggregates publicly available iNaturalist observation data with associated timestamps and coordinate data. Observer effort was operationalized as the total number of unique observers per one-degree grid cell per month. A negative binomial Generalized Linear Model implemented in R, was used to evaluate whether moth detection rates are predicted by observer effort, mean monthly temperature, and season, independent of true abundance. This framework allows for statistical control of sampling bias while identifying patterns attributable to actual moth behavior. Findings from this study contribute to the broader methodological conversation around citizen science data reliability and establish a replicable analytical framework applicable to other understudied Lepidoptera species. Correcting for observer effort bias is critical to ensuring that conservation decisions are based on accurate phenological data rather than sampling artifacts.

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**Biopotency and surrogate assays to validate the immunomodulatory potency of extracellular vesicles derived from mesenchymal stem/ stromal cells for the treatment of experimental autoimmune uveitis**

Presenter's Name: Gagandeep Kaur
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Extracellular vesicles (EVs) derived from mesenchymal stem cells (MSCs) show great promise as immunomodulatory therapies. However, their therapeutic potency varies significantly due to donor and culture conditions, complicating their clinical application. To address this, a surrogate assay was developed to validate the potency of MSC-EVs. A strong correlation was demonstrated between the levels of TGF-β1 in MSC-EVs and their ability to suppress IFN-γ secretion in stimulated splenocytes. This finding was validated in a mouse model of experimental autoimmune uveoretinitis (EAU). It was found that MSC-EVs from microcarrier cultures, which had higher TGF-β1 levels, were more effective at halting disease progression in mice than those from monolayer cultures. These high-potency EVs also inhibited the chemotaxis of retina-reactive T cells and induced their apoptosis. The results suggest that TGF-β1 levels can serve as a predictive biomarker for the in vivo potency of MSC-EVs, providing a crucial tool for quality control and standardization.

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**Observing the Effects of ATM Inhibition, ATR Inhibition, & ΔE4orf3 on Adenovirus Host Cell Immune Response Evasion in A549 Cells**

Presenter's Name: Ibukunoluwa Kayode
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Co-authors: Ahlam Akmel

Adenoviruses (Ads) are a group of double-stranded DNA respiratory viruses that are responsible for infections such as the common cold, conjunctivitis, and influenza. Because of the variety of the adenoviral group, Ads prove to be very useful in many avenues of biomedical research, such as vaccine development and cancer treatment. However, knowledge of how adenovirus is able to bypass host cell defense mechanisms is not in surplus. The JAK-STAT pathway is a crucial biological pathway in terms of activating host cell defense mechanisms in the event of viral infection. Previous research has concluded that wild-type Ads can bypass host cell immune responses by preventing antiviral proteins from being expressed. This is done through both phosphorylation blockage of Stat1 and Stat2 proteins, as well as adenoviral-induced decreasing of the Jak1 protein's mRNA levels. Based on this, the goal of my research was to assess for immune response inhibition in A549 cells infected by the Ad dl1520 and 3112 strains during ATM and/or ATR inhibition. These results were to be achieved by culturing A549 cells and infecting them with either viral strain, followed by experimental inhibition of either ATM, ATR, or both via inhibitory drugs. The culture samples were then collected and used for Flow cytometry and western blotting to ascertain the presence of JAK-STAT-related proteins and genetic material. Preliminary results of the experiment implied a need to replicate the experiment and redo the western blot, as the probed loading control failed to show up on the membrane after multiple attempts.

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**Preoperative TXA Lowers Thromboembolism Following Major Orthopedic Surgeries**

Presenter's Name: Dy'quan Kearney
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Background: Tranexamic acid (TXA) is widely used in orthopedic surgeries to reduce blood loss, but concerns persist regarding its association with thromboembolic complications. This study aimed to compare the incidence of thromboembolic events in patients undergoing spine, knee, or hip surgeries with and without perioperative TXA administration. Methods: Using TriNetX, a federated electronic health record network, we identified 406,609 matched patients in each cohort: one receiving TXA and one not receiving TXA during orthopedic surgery. Propensity score matching was performed on demographics and comorbidities. Outcomes included the incidence of thromboembolic events within one day post-surgery. Statistical analyses included risk ratio, odds ratio, Kaplan-Meier survival analysis, and t-tests. Results: The TXA group demonstrated a lower incidence of thromboembolic events (0.060%) compared to the non-TXA group (0.089%), corresponding to a risk ratio and odds ratio of 1.478 (95% CI: 1.257, 1.739, $p < 0.0001$). Kaplan-Meier analysis did reveal a significantly higher event-free survival in the TXA group (99.940% vs. 99.911%, $p < 0.0001$). Conclusions: This large-scale, real-world analysis demonstrates that TXA use in orthopedic surgery is associated with a significantly reduced risk of early postoperative thromboembolic events. The results support TXA's continued use in perioperative protocols, with no evidence of increased event burden among affected patients. Future studies should evaluate longer-term outcomes and specific surgical subtypes.

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**Model Comparison in High Agreement Regimes**

Presenter's Name: Malick Kebe
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*Presentation Type: Oral Presentation*
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When two classifiers achieve near-identical accuracy, standard metrics — accuracy, F1, even the confusion matrix — cannot reveal whether the models differ in how they make decisions. We develop a diagnostic toolkit for this high-agreement regime, where pairwise agreement exceeds 95%

and measures like Cohen's kappa compress into a narrow, uninformative band. The toolkit comprises four methods: stratified error profiling, disagreement meta-classification, correctness discordance analysis, and counterfactual perturbation sensitivity. We validate it using a controlled simulation in which two models share an identical linear scoring function over 60 features but differ in whether they use a Z-gated interaction term active for only 10% of instances. A negative and positive control are calibrated to produce the same 2% disagreement rate and comparable κ, making them indistinguishable by standard metrics. The toolkit correctly separates them: stratified profiling localizes disagreement to the gated regime; meta-classifiers achieve AUROC = 0.87 in the positive control versus near-chance in the negative; and perturbation sensitivity identifies the two mechanism features with a 10× gap ratio. Crucially, the meta-classifier finds where models disagree but not why, while perturbation analysis recovers the mechanism variables directly — demonstrating that no single diagnostic suffices. The negative control produces no false positives across all methods.

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**Hyperactivation of cGAS-STING Pathway Promotes Liver Inflammation in Down Syndrome**

Presenter's Name: Nyima Kinteh
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School/College: Medicine
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Co-authors: Aashirwad Shahi, Julia Goewey Ruiz, Jonathan Santoro, Lekidelu Tadesse-Heath, Dawit Kidane-Mulat

Individuals with Down Syndrome (DS) often experience dysfunction across multiple organs, including the liver, brain, heart, and gastrointestinal system, along with severe immune hypersensitivity. They are also predisposed to inflammatory conditions including hepatic autoimmune diseases. The enzyme cyclic guanosine monophosphate-adenosine monophosphate synthase (cGAS) activates the stimulator of interferon genes (STING) pathway, which drives proinflammatory responses. In this study, we hypothesized that oxidative stress–induced DNA damage activates the cGAS–STING signaling pathway, contributing to liver inflammation in DS. To test this, we examined the role of reactive oxygen species (ROS)–mediated DNA damage and cGAS–STING signaling in hepatic inflammation within a DS model. Our findings revealed that DS fibroblasts and DS mouse liver cells exhibit elevated ROS levels and significant DNA damage. Additionally, DS cells accumulate micronuclei, which likely serve as cytoplasmic DNA sources that activate cGAS–STING. RNA-seq analysis further demonstrated increased expression of type I interferon genes associated with cGAS–STING signaling, alongside heightened inflammatory responses and elevated liver enzymes such as alanine transaminase (ALT), indicative of hepatocellular injury. These results suggest that endogenous DNA damage may trigger innate immune activation, which may amplify cGAS–STING signaling and worsen hepatic inflammation in DS.

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**The Spatial Ecology of Oral Health: Linking Streptococcus mutans Activity to Dental Care Access and Socioeconomic Vulnerability**

Presenter's Name: Maya Kiraithe
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Dental caries, or tooth decay, is one of the most common chronic diseases worldwide and remains a major public health concern in the United States. Caries development is closely linked to the oral bacterium Streptococcus mutans, a biofilm-forming species that metabolizes dietary sugars into organic acids, leading to enamel demineralization. Underserved communities often experience higher rates of dental caries due to limited access to routine dental care, inadequate oral hygiene resources, and socioeconomic challenges. This study uses a spatial ecology approach to examine how the geographic distribution of dental caries prevalence, used as a population-level indicator for S. mutans activity given its central role in plaque biofilms and acid-mediated tooth decay, relates to access to dental care and socioeconomic factors. Publicly available data from the Centers for Disease Control and Prevention (CDC), the Health Resources and Services Administration (HRSA), and the U.S. Census Bureau were analyzed using geographic information systems (GIS). Spatial maps were generated to compare dental caries prevalence with dental provider availability and socioeconomic indicators. Preliminary results suggest that communities with fewer dental offices and higher socioeconomic vulnerability exhibit higher rates of dental caries. Limited access to preventive dental care and high-sugar diets may promote conditions that favor S. mutans colonization and persistence within oral biofilms. These findings highlight how healthcare access and social conditions shape oral health outcomes and demonstrate the value of spatial analysis for identifying communities at increased risk for oral health disparities.

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**Isolation of Mycobacteriophage MidMama**

Presenter's Name: Roselyne Kutai
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Co-authors: Roselyne Kutai, Mayce Langford, Oluwatomiwa J. Sunbare-Funto, Swagota Roy, Somiranjan Ghosh, Courtney J. Robinson

Bacteriophage research is essential in the field of microbiology when furthering efforts to circumvent antibiotic resistance. A bacteriophage is a host-specific virus that infects bacteria. A virus's structure includes a capsid, containing genetic material, and the tail, responsible for the injection of DNA into the host bacteria. During the lifecycle of the virus, the DNA infiltrates the bacteria and the virus replicates within, ending with lysis of its host. The SEA-PHAGES Program's research focuses on the isolation and genome annotation of the bacteriophage, with our phage being found outside E.E. Just Hall at Howard University

at the coordinates 38° 55' 18" N, 77° 01' 08" W, in soil at a depth of 5.5cm. In this study, the host bacterium throughout the investigation was Mycobacterium smegmatis mc2155. A phage was isolated via a direct plating protocol and spot-tested. Three rounds of purification assays resulted in a single phage population with small, clear plaques that was labeled MidMama. A lysate was generated with a titer of 5.3 x 10^9 pfu/mL, which was a lower-than-expected concentration and likely due to the small size of MidMama's plaques. The low titer potentially contributed to the low concentration of DNA that was extracted. Restriction enzymes digests using enzymes EcoRI and ClaI, aided in visualizing the phage's genetic fingerprint, but readings were difficult to decipher due to the faintness of the bands. In continuing this experimentation, the next steps include efforts to increase the lysate titer, extract DNA again and further characterization of this bacteriophage.

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**Distinguishing Observer Effort from Ecological Trends: A Decade Analysis of Northern Cardinal (Cardinalis cardinalis) Observations Using iNaturalist Data**

Presenter's Name: Janae Lacayo
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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Citizen science platforms such as iNaturalist have generated large ecological datasets that allow researchers to analyze species observation trends over time. However, increases in observation frequency may reflect increased participation rather than actual changes in species abundance. The Northern cardinal (Cardinalis cardinalis), a widespread and stable bird species throughout North America, provides an ideal model for distinguishing between observer effort and ecological change. This study examines how annual verified iNaturalist observations of Northern cardinals in the United States and Canada changed between 2014 and 2024 and evaluates whether observed trends reflect increased citizen science participation or biological population shifts. Observation data are being obtained from the iNaturalist Export Tool and filtered to include only Research Grade records, which are verified by multiple users and include accurate species identification, geographic coordinates, and observation dates. Records with missing or invalid data are being removed to ensure reliability. Data cleaning and analysis are being conducted using Microsoft Excel. Annual observation totals are being calculated using pivot tables, and proportional comparisons relative to total bird observations are being performed to account for changes in platform participation. Linear regression analysis is being applied to evaluate trends in observation frequency over time.
This research demonstrates how undergraduate analysis of publicly accessible citizen science data can contribute to understanding ecological trends while accounting for observer effort in biodiversity monitoring.

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**Quality Improvement: Improving Protocols for Intravenous Iron Use in Anemic Pregnant Patients**

Presenter's Name: Giselle Lampley
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Co-authors: Brieanna Bell, Mya Gardner, Shannon Wentworth, Miriam Michael

Introduction: In the U.S., Mexican American and non-Hispanic Black women have the highest prevalence of iron deficiency, increasing maternal and neonatal risks such as postpartum hemorrhage, maternal death, low birth weight, and intellectual disability (Benson et al., 2022). Diagnostic and treatment protocols vary across hospitals. At our urban academic hospital, there is currently no standardized approach for administering intravenous iron, leading to inconsistent care. This study aims to develop a standardized protocol for intravenous iron treatment at Howard University Hospital. Methods: Retrospective chart data from August 2024 to April 2025 was analyzed, including hemoglobin and platelet levels pre-delivery and postpartum, along with whether patients received oral iron, IV iron, blood transfusions, or no intervention. Average hemoglobin levels were calculated for patients receiving each treatment. Additionally, TriNetX, a national electronic medical record database, was used to compare national hemoglobin trends with those observed at our hospital among patients receiving IV iron. Results: Among 757 patients, 72 received IV iron, 4 during pregnancy and 68 postpartum. The average hemoglobin before IV iron administration was 8.55 pre-delivery and 6.55 postpartum. National data from TriNetX showed higher averages: 9.51 pre-delivery and 9.49 postpartum. Conclusions/Implications: IV iron was administered at lower hemoglobin levels at our institution compared to national trends. Due to incomplete data on coadministered treatments nationally, direct comparisons are limited. We propose aligning IV iron administration with national practices and will implement a standardized protocol, followed by prospective evaluation using a Plan-Do-Study-Act model for ongoing quality improvement.

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**Discovering and Analyzing Phage ReidMinds**

Presenter's Name: Janāai Landry
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Background: Phage research is becoming more significant in biomedical sciences as antibiotic resistance rises. Bacteriophages can infect and kill specific bacteria; they are being explored as an alternative or complement to antibiotics for managing drug-resistant infections. It is therefore necessary to create diverse, well-characterized phage collections to help understand phage biology and support future therapeutic and

comparative genomics work. This project, carried out through the SEA-PHAGES program, focused on collecting, isolating, and purifying an uncharacterized bacteriophage. Methods: Mycobacterium smegmatis was used as the bacterial host in phage isolation. Soil samples were collected from Greene Stadium at Howard University (38.92472°N, 77.021°W) and processed using an enriched isolation technique to increase the chances of recovering phages. Plaque purification was performed after isolation to obtain a single phage population. A high-titer lysate was then prepared for downstream analysis. Phage DNA was extracted from the lysate for initial molecular characterization, and aliquots of lysate were submitted for archiving.Results: During the isolation stage, three distinct plaque morphologies were observed, and one phage morphology was selected for purification. The purified phage was named ReidMinds. After amplification, high-titer lysate was obtained with a concentration of $1.33\times10^{1}$□ pfu/mL. The process of DNA extraction on the lysate generated quantifiable genomic DNA with an average concentration of 14 ng/uL. Conclusion: ReidMinds was isolated, purified, and archived successfully, providing a good basis for further characterization. More characterization will be made to further identify the genetic characteristics of Reidminds and facilitate comparison with other related mycobacteriophages.

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**The FPN Q248H Mutation Increases Body Fat without Iron Accumulation in Liver and Pancreas**

Presenter's Name: Carlie Lee
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Inherited hemochromatosis (HH) is a genetic disorder of iron homeostasis characterized by excessive iron absorption and progressive iron overload. HH commonly results from impaired hepcidin production or reduced hepcidin binding to ferroportin (FPN), the primary cellular iron exporter. A common mutation in SLC40A1 (FPN Q248H) occurs in African and African American populations, with allele frequencies ranging from 2.2% to 13.4%. The physiological effects and potential survival benefits of this variant remain poorly understood. The knock-in mouse (SLC40A1 FPN Q248H) model was generated, and iron metabolism was studied. Unexpectedly, homozygous mice gained weight and became obese. We hypothesize that homozygous mice accumulate excess iron in the liver and pancreas, affecting body metabolism. Homozygous and wild-type mice are fed standard iron diets (SID) or high iron diets (HID). Iron deposition was examined in the liver and pancreas through Perls' Prussian blue staining. Ghrelin, an appetite-stimulating hormone, was measured using an ELISA kit. No significant iron accumulation was observed in the pancreas across genotypes and diets. In the liver, homozygous mice on a HID accumulated less iron than wild-type controls. Homozygous male mice on SID exhibited significantly higher ghrelin levels compared to controls. These results suggest that the FPN Q248H mutation does not increase iron accumulation in the liver and pancreas but increases the ghrelin levels in the homozygous. Ongoing, we will study iron accumulation in other organs and examine glucose levels in mice.

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**Understanding the Functions of SroA and Its Impact on Sigma S**

Presenter's Name: Sophie Lee
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Faculty Advisor: Karl Thompson
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Sigma factors are proteins that play a pivotal role in bacterial gene expression by enabling the specific binding of the RNA polymerase to gene promoters which initiates bacterial transcription. Sigma S is the least understood, of sigma factors, yet seems to be crucial for processes such as antibiotic resistance, virulence, and immune cell survival. Its activity is triggered by DNA damage and is vital for Staphylococcus aureus' adaptation to stress. Previous research demonstrates the significance of Sigma S through experiments where its absence resulted in diminished resistance and virulence. Two proteins of interest produced by Sigma S are SroA and SroB and they are believed to help with DNA damage resistance. To test this hypothesis four samples were collected: Wildtype, SroA deletion mutant, SroA and SroB deletion mutant, and Sigma S deletion mutant. The samples were to be tested against DNA damage stressors, cell wall targeting antibiotics, and immune stressors. The DNA stressor being focused on is Methyl Methane Sulfonate (MMS). This is done by subculturing our samples, aliquoting the pre-stressed samples as a control and then stressing our samples with MMS. Then, both the stressed and aliquoted pre-stressed samples are serially diluted and plated on TSA agar. The number of plaques from these samples are later counted and compared to observe the differences in growth. By examining the resistance properties of Sigma S and its products, this research seeks to enhance our understanding of their interconnected roles in bacterial stress responses and pathogenicity and better understand Staph. aureus infections.

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**The Role of Scales in Flatfish Burial Using a Robotic Model**

Presenter's Name: Kristin Lewis
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*Presentation Type: Oral Presentation*
Faculty Advisor: Stacy Farina
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Co-authors: Stacy Farina

There are millions of flatfish populations throughout the world, including various species located throughout the Chesapeake Bay, but there is little information known about their burial mechanics. We want to understand how scales affect the burial performance of flatfish because there is not a strong understanding of the role that scales play in this burial process. Tinker CAD was used to create a 3D mold of the flatfish (Lepidopsetta bilineata) with an embedded scale design, and this mold was 3D printed with the use of a Form Labs printer. Following the mold print, two

silicone fish were created, one with 00-45 Ecoflex silicone (less flexible) and one with 00-35 Ecoflex silicone (more flexible). The less flexible silicone fish was removed from the model and attached to a robotic simulator to mimic the process of flatfish burial. We completed 30 trials with the scale side facing up and 30 trials with the smooth side facing up. A picture was taken of each trial, and we calculated the sand coverage to total coverage using ImageJ. We will complete the same process with the more flexible silicone fish and compare the results. We plan to complete a statistical analysis in RStudio using an ANOVA test to compare multiple variables (smooth side up vs. scales side up and less flexible vs. more flexible silicone) to determine how significant the various factors were in the total sand coverage of the fish molds. We expect that the scales will significantly improve the burial performance of flatfish.

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**Seasonal Peaks in Sundowner Moth Observations and Potential Links to Allergy and Dermatitis Exposure Risk**

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Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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Sphingomorpha chlorea (Sundowner Moth) is a fruit-piercing moth native to Africa and southern Asia. Adults are commonly found near orchards and farms, where they pierce fruit while feeding, and larvae use a wide range of host plants, increasing the likelihood of frequent contact with human-modified environments. Exposure to Lepidoptera material (scales, debris, or contact) has been linked to respiratory allergy pathways and skin reactions such as lepidopterism, supporting the medical relevance of this species. This project examines whether iNaturalist observation data for the S. chlorea shows seasonal peaks that may overlap with periods of increased human outdoor and agricultural activity, suggesting predictable windows of environmental exposure relevant to allergy and dermatitis risk. In this study, publicly available iNaturalist records of S. chlorea were analyzed to evaluate whether temporal observation patterns reveal distinct seasonal peaks that may correspond to predictable windows of human environmental exposure. Observations were organized by month and treated as a proxy for species presence and activity. The majority of recorded observations were adult moths. Observation frequency showed pronounced clustering in the late fall and winter months, with peak activity between November and February, and markedly fewer observations during mid-year months (June–September). These findings indicate a non-uniform seasonal distribution of S. chlorea activity, suggesting that environmental exposure risk may be temporally concentrated rather than evenly distributed throughout the year. This study demonstrates that ecological datasets derived from science platforms can detect biologically meaningful temporal patterns and may inform environmental exposure science and allergy and dermatitis risk assessment.

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**Seasonal Peaks in Sundowner Moth Observations and Potential Links to Allergy and Dermatitis Exposure Risk**

Presenter's Name: Alayna Lewis
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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This project examines whether iNaturalist observation data for the Sundowner Moth (Sphingomorpha chlorea) shows seasonal peaks that may overlap with periods of increased human outdoor and agricultural activity, suggesting predictable windows of environmental exposure relevant to allergy and dermatitis risk. Sphingomorpha chlorea is a fruit-piercing moth native to Africa and southern Asia. Adults are commonly found near orchards and farms, where they pierce fruit while feeding, and larvae use a wide range of host plants, increasing the likelihood of frequent contact with human-modified environments. Exposure to Lepidoptera material (scales, debris, or contact) has been linked to respiratory allergy pathways and skin reactions such as lepidopterism, supporting the medical relevance of this species.
To investigate seasonality, publicly available iNaturalist records for Sphingomorpha chlorea were used as a citizen-science dataset (2,433 total observations). Observations were treated as a proxy for moth presence and activity. Data was organized by month and season, and trends in observation frequency were examined to identify potential peaks. These patterns were then interpreted in relation to times when humans are more likely to work outdoors in agricultural settings. Preliminary conclusions indicate that iNaturalist data can be used to detect temporal patterns in observations of Sphingomorpha chlorea. If clear seasonal peaks are present, they may support the idea that exposure risk is predictable during certain times of the year rather than evenly distributed. This study highlights how ecological data from citizen-science platforms can inform medically relevant questions related to environmental allergy and dermatitis risk.

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**The Novel Application of RACK1A Modulators as an Adjuvant Treatment Through the Induction of Hypersensitivity to Gibberellins**

Presenter's Name: Priya Lewis
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*Presentation Type: Poster Presentation*
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Co-authors: Hemayet Ullah, Ashton Webber-Deonauth

Gibberelins (GAs), one of the five primary plant hormones, are crucial in the regulation of plant growth and developmental processes. These phytohormones have widespread implications in agriculture with the potential to increase productivity and product marketability. Previously, RACK1 was found to regulate GA3 signaling pathways. To this end, our preliminary findings suggest that our in-lab-developed RACK1A modulators can serve as an adjuvant treatment when used in conjunction with the exogenous application of GA3. Treatment groups containing the modulator showed hypersensitivity to GA3 compared to the control

through an increase in both the overall stem length of young seedlings, which corresponded to an observable increase in average cell length. Our findings were further supported by altered RACK1A protein expression in the presence of our drug, quantified by a chemiluminescent amino blot assay. This corresponded to phenotypic alterations observed, strongly supporting the potential of RACK1A modulation in the improvement of agriculture and food security through early bolting of biomass and the potential competitive advantage of desired crops.

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**Comparative Mutational Analysis of CIRBP Reveals Evolutionarily Conserved Stability Determinants**

Presenter's Name: Xin Li
Classification: Staff
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Cold-inducible RNA-binding protein (CIRBP) is a stress-responsive protein that regulates mRNA stability and translation under adverse conditions, including hypothermia, hypoxia, and genotoxic stress. In addition to its role in RNA metabolism, CIRBP has been implicated in genome maintenance and DNA damage repair, processes linked to cancer resistance and longevity. Here, we performed a comparative mutational analysis of CIRBP across whale, human, and mouse to investigate the evolutionary conservation of structural stability determinants. Sequence and structural alignments revealed a high degree of conservation among CIRBP proteins. Using computational saturation mutagenesis and structure-based energy calculations, we systematically evaluated the effects of missense mutations on CIRBP stability. Our results identify several conserved residues, including G30, G50, A63, D59, and G122, that consistently modulate protein stability across species. Notably, mutations at G30, G50, and A63 were predominantly destabilizing, whereas mutations at D59 and G122 increased stability. These findings highlight evolutionarily conserved structural constraints that may reveal CIRBP-mediated stress responses and genome stability, providing a quantitative framework for interpreting CIRBP variants in the context of cancer resistance and longevity.

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**Comprehensive Assessment of Sequence-Derived Features for Predicting SUMOylation Sites**

Presenter's Name: Junyan Li
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SUMOylation is a common post-translational modification that can change protein stability, localization, and interaction networks. However, predicting SUMOylation sites from sequence remains challenging because many true sites do not follow a strict consensus motif and because local context can strongly influence modification. In this work, we systematically evaluated sequence-derived physicochemical features for SUMOylation-site prediction using AAindex-based descriptors. For each candidate lysine, we generated lysine-centered windows of multiple lengths and encoded each window with 566 AAindex properties. We first ranked individual AAindex features using single-feature XGBoost performance on the full dataset, then assembled top-N feature subsets and benchmarked several classifiers (logistic regression, SVM, random forest, and XGBoost) across window sizes. Based on these results, we trained a XGBoost model and a stacked ensemble (XGBoost + random forest + logistic regression with a logistic regression meta-learner) using a balanced training subset and evaluated both models on an external independent dataset. The best setting used an 11 (±10 from center lysines)-residue window and ~350 top-ranked features. Under this configuration, the stacked ensemble achieved an AUC-ROC of 0.9426 on the test set, substantially outperforming the best single model. Motif-level analysis confirmed the presence of the canonical Ψ-K-x-E consensus, but the strongest predictive signals arose from flexible, coil-promoting sequence regions flanking the lysine. Overall, our results show that rich physicochemical encoding combined with stacking can markedly improve SUMOylation-site prediction and helps highlight property patterns that are most informative around modified lysines.

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**3D Bioprinted Tumor Models for Drug Testing and Personalized Oncology: A Pharmacist's Perspective**

Presenter's Name: Aijha Liggins
Classification: Graduate Student
School/College: Pharmacy
*Presentation Type: Poster Presentation*
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Background: Development of effective cancer therapies is limited by preclinical models that poorly replicate human tumor biology. Traditional two-dimensional (2D) cultures lack structural complexity, while animal models do not fully capture human-specific tumor–immune interactions and drug metabolism, contributing to high clinical trial failure rates. Three-dimensional (3D) bioprinting offers an innovative approach to generate tumor models that better mimic human cancer architecture and microenvironment. Methods: A structured review of current literature was conducted on 3D bioprinting techniques, bioink composition, and the incorporation of multiple cell types. Applications in cancer research, drug testing, and personalized medicine were summarized, along with reported advantages and limitations. Results: 3D bioprinted tumor models more accurately reproduce the tumor microenvironment by integrating extracellular matrix components, stromal and immune cells, and perfusable vascular-like networks. Compared to 2D cultures, these models show more realistic drug penetration and resistance profiles, demonstrated in breast cancer, glioblastoma, and bladder cancer studies. Bioprinting also facilitates evaluation of immunotherapies, including CAR-T cells and monoclonal antibodies, in physiologically relevant systems. Challenges remain, such as high cost, technical expertise requirements, limited standardization, and scalability. Conclusion: 3D bioprinting bridges the gap between preclinical models and clinical outcomes. Pharmacists with PharmD training can contribute by applying expertise in pharmacokinetics, pharmacodynamics, and drug safety to optimize dosing, evaluate drug–drug interactions, and guide personalized therapies. By integrating clinical pharmacology with

advanced tumor models, PharmDs play a critical role in translating 3D bioprinting innovations into safer, more effective, and patient-centered oncology care.

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**Hormonal Suppression and Injury Risk in Dancers: Finding Balance in the Art of Movement**

Presenter's Name: Rahni Lindsey
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School/College: Medicine
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Co-authors: Rawan Elkomi, Mrinali Deverapalli, Kyla Baron

Rationale: Dancers are often conditioned to train through pain. Many use hormonal contraception to regulate cycles, yet effects on bone and soft tissue remain under-researched in this population. Existing literature regarding protective/adverse associations is inconsistent, and large-scale data on hormonal suppression in adolescent dancers are limited. Purpose: To evaluate the association between hormonal suppression and musculoskeletal (MSK) injury risk in female dancers, exploring injury subtype risk over time. Methods: A retrospective, propensity-matched cohort study was conducted using TriNetX. Female dancers aged ≥12 years were identified using dance-related ICD-10 activity codes (Y93.41, Y93.49, E005.0, E005.9). The exposure group included dancers with hormonal suppression, operationalized as documented hormonal contraceptive use or amenorrhea prior to injury. The primary outcome was MSK injury and secondary analyses evaluated injury subtypes. Time-to-event analyses were assessed at 12 months, 3 years, and 5 years following the index exposure date (first documentation of hormonal suppression). Matching was performed on age and BMI; training variables and hormonal therapy details were unavailable. Results: After 1:1 matching, cohorts were balanced (n=1,721 per group). At 1 year, hormonal suppression was associated with increased MSK injury risk (9.0% vs 5.7%; RR 1.56; p=0.003). Elevated risk persisted at 3 years (RR 1.43; p=0.004) and 5 years (RR 1.32; p=0.015), with higher rates of knee ligament and lower-leg tendon injuries at 5 years. Conclusion: Hormonal suppression was associated with increased MSK injury risk over time. Given potential residual confounding and heterogeneity within exposure groups, findings should be interpreted as associative rather than causal and warrant prospective subgroup analysis.

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**StainAI-Web: An Interactive Platform for Automated Whole-Slide Microglial Morphology Analysis**

Presenter's Name: Da-yuan Liu
Classification: Staff
School/College: Medicine
*Presentation Type: Poster Presentation*
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Microglial morphology analysis has emerged as a critical approach for investigating neuroinflammatory dynamics across physiological and pathological conditions. The growing availability of high-resolution and whole-slide histological images has generated increasing demand for robust, scalable analytical frameworks capable of efficiently processing large datasets while preserving spatial and regional specificity. Existing approaches remain limited by code-dependent local computation, prolonged inference times on whole-slide data and continued reliance on manual, labor-intensive morphology quantification. Previously, we developed a multi-stage deep learning system, StainAI, to analyze whole-slide microglial images, classify individual microglia based on their morphology, and generate morphology-based color maps to characterize the degree of neuroinflammation in the brain. In this study, StainAI-Web is presented as a web-accessible server for rapid and automated microglial morphology detection across whole-slide immunohistochemistry images. The platform integrates an overlap-aware, patch-based deep learning strategy to enable efficient large-scale inference while maintaining spatial consistency. Users may upload their own slides or access datasets within the platform, supporting flexible integration into diverse research workflows. ROI-based regional quantification allows systematic comparison of microglial populations across anatomically defined compartments, with real-time visualization dynamically updating morphological distribution summaries as regions are selected or modified. Output, including morphology-annotated overlays, original images and structured result files suitable for downstream statistical or computational analyses, are fully downloadable to ensure reproducibility and interoperability. Collectively, these features establish StainAI-Web as a comprehensive and scalable resource for whole-slide microglial morphology analysis.

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**The Impact of Cutibacterium acnes on Prostate Epithelial Cell Transformation**

Presenter's Name: Taylor Lofton
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*Presentation Type: Poster Presentation*
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Prostate cancer represents a significant health concern, being the most prevalent cancer among men and a leading cause of cancer-related mortality in the United States. Emerging research suggests that chronic inflammation and pathogen infections are pivotal in its etiology. Notably, Cutibacterium acnes, a skin commensal bacterium commonly associated with acne vulgaris, has been identified as a prevalent microorganism in prostate tissues and is frequently detected in prostate cancer biopsies. This proposal aims to explore the molecular mechanisms underlying C. acnes' pathogenesis in the context of prostate cancer development, particularly investigating the interaction between androgens and C. acnes in Primary Prostate Epithelial Cells. I hypothesize that C. acnes infection alters the transcriptome and cellular processes of prostate cells, potentially leading to cellular transformation, with an affinity for dihydrotestosterone (DHT) influencing these outcomes. The research will be conducted through two specific aims: first, to determine the modulation of coding and non-coding transcripts in prostate cells upon C. acnes infection; second, to investigate the role androgens play in the adhesion and subsequent transformation of prostate cells by C. acnes. Utilizing advanced techniques, including transcriptomic analysis,

adhesion assays, and imaging, this study seeks to unravel the complex interplay between C. acnes and prostate cells, ultimately contributing to a deeper understanding of how pathogen infections may facilitate cancer progression and informing future prevention and therapeutic strategies.

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**From Nuclear Receptor Biology to FDA Approval: The Translational Journey of Resmetirom**

Presenter's Name: Naalomoley Lomotey
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School/College: Pharmacy
*Presentation Type: Poster Presentation*
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Background: Metabolically–dysfunction–associated steatohepatitis (MASH) is a progressive liver disease with significant cardiometabolic risk and historically limited therapeutic options. Thyroid hormone receptor beta (THR-β) was selected as a therapeutic target because it predominates in the liver and regulates genes controlling fatty acid oxidation, lipid metabolism, and cholesterol homeostasis. Selective targeting of THR-β emerged as a rational strategy to achieve hepatic metabolic benefits while minimizing extrahepatic toxicity. Methods: A structured literature search of peer-reviewed publications indexed in PubMed was conducted to review the discovery, medicinal chemistry optimization, preclinical evaluation, clinical trials, and regulatory approval of resmetirom (MGL-3196), a liver-directed THR-β selective agonist. Results: Medicinal chemistry optimization identified a pyridazinone-based scaffold incorporating a cyanoazauracil moiety to enhance THR-β selectivity by exploiting structural differences in the ligand-binding domain. Resmetirom demonstrated high plasma protein binding, liver targeting, and favorable oral pharmacokinetics. Preclinical studies showed significant reductions in LDL cholesterol and hepatic triglycerides without cardiac or bone toxicity. Phase 1 trials confirmed dose-dependent lipid lowering with preserved thyroid axis function. Phase 2 and 3 trials demonstrated significant reductions in liver fat (MRI-PDFF), improved NASH resolution, and fibrosis improvement with an acceptable safety profile. In March 2024, the FDA granted accelerated approval for resmetirom (Rezdiffra) in adults with noncirrhotic NASH with F2–F3 fibrosis. Conclusion: Resmetirom exemplifies successful translational drug development. PharmD professionals play a critical role across the continuum, from pharmacokinetic and pharmacodynamic evaluation, clinical trial design and safety monitoring, to post-marketing pharmacovigilance, patient counseling, and optimization of cardiometabolic risk management, ensuring safe, effective integration of novel therapies into clinical practice.

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**Identifying Protein Partners Interacting With UPF1**

Presenter's Name: Kendall-cherie Long
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*Presentation Type: Poster Presentation*
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Co-authors: Sarah Nock, Eva Savelli, Dr. Kristian Baker

Nonsense-Mediated mRNA Decay (NMD) is an RNA quality control pathway in the cell that recognizes and degrades mRNAs containing a premature stop codon. The core machinery involved in NMD consists of three highly conserved proteins: UPF1, UPF2, and UPF3. In previous work performed in the Baker lab, biotin-based proximity labeling was employed to identify potential protein partners ofUPF1. In this study, we aimed to validate interactions between UPF1 and several of these proteins through co-immunoprecipitation (co-IP) and Western blot analysis. To facilitate coIP studies, we employed CRISPR-Cas9 gene editing to introduce an epitope tag (myc) into the genes encoding these putative protein partners. To achieve this, gRNA targets were identified computationally, and gRNA sequences were cloned into a plasmid vector also expressing the Cas9 protein. DNA repair templates containing the myc tag DNA sequence flanked by regions of homology to each gene of interest were transformed into yeast with the corresponding gRNA+Cas9 plasmid. Yeast colonies were screened by PCR to determine if the myc DNA sequence was inserted at the appropriate genomic location, and expression of myc-tagged proteins was analyzed by Western blot. This new generation of yeast strains will be used to validate protein partners of UPF1.

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**Interactions of Hydrogen Peroxide and Anthocyanins on Planktonic and Dispersed Candida albicans Cells**

Presenter's Name: Cai Malone
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
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Candida albicans is an opportunistic fungal species that colonizes the gastrointestinal, oral, and genital surfaces and the skin of most healthy people. Unfortunately, C. albicans also causes a range of diseases, especially in immunocompromised individuals, and its transition to pathogenesis is associated with specific cellular states. C. albicans research tends to focus on the formation of biofilms, so this project studies another key cell type of the biofilm cycle: dispersed cells, which have a higher resistance to chemical and physical stressors than planktonic cells. The goal of this project was to quantify the resistance of planktonic and dispersed C. albicans to H2O2 and anthocyanins—individually and in combination—to determine whether anthocyanins enhance or inhibit C. albicans growth in the presence of H2O2 and to understand the dynamics of this crucial but understudied cellular state. Results showed that dispersed cells were orders of magnitude more resistant to H2O2 than planktonic cells. Even though the highest tested dose of anthocyanins did not affect the viability of either state, it exhibited a synergistic effect on both when combined with H2O2, noticeably reducing the growth of dispersed cells. The synergistic effect of the anthocyanins suggests that the increased resistance to oxidative stress of dispersed cells may be due to changes in cell wall or membrane architecture, a hypothesis that will be tested via cell permeability assays and other methods of disruption.

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**Integrating Machine Learning and Large-Scale Data to Reveal Multidimensional Global Patterns of Chameleon Biodiversity**

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Global biodiversity is multidimensional, shaped not only by the number of species in a region, but also by their evolutionary history and ecological roles. Capturing this complexity at global scales requires integrative, data-driven approaches that move beyond single measures of diversity. Here, we combined large biodiversity datasets with machine learning methods to investigate global diversity patterns in chameleons, comprising 234 species across 13 genera. We compiled 29,222 georeferenced occurrence records, assembled 40 ecological traits, and used a time-calibrated phylogeny to quantify taxonomic, functional, and phylogenetic diversity. Using machine learning–based distribution modeling, we identified the environmental drivers shaping these dimensions of diversity, examined their geographic overlap, and assessed how effectively existing protected areas capture regions of high biodiversity value. Our analyses identify Madagascar, Tanzania, and Kenya as global hotspots of multidimensional chameleon diversity. Areas with high species richness frequently also preserve deep evolutionary history, yet patterns of functional diversity do not always align spatially, revealing hidden and complementary dimensions of biodiversity. Rainfall emerged as the dominant environmental driver, while human influence also played a significant role in structuring global patterns. Importantly, several high-diversity regions remain insufficiently protected, with Madagascar emerging as the most critical global conservation priority. By integrating large-scale biodiversity data with machine learning, this study provides one of the most comprehensive global assessments of chameleon diversity to date. More broadly, it demonstrates how data-driven, multidimensional frameworks can strengthen conservation planning by identifying not only where species occur, but where evolutionary heritage and ecological function are most at risk.

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**Histological examination of NKCC1 staining in NHERF1 KO mice: Preliminary analysis**

Presenter's Name: Brianna Manderson
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Brianna Manderson, Rhys Coleman, Annalise Manderson, Gabrielle Gibbs, Jasiah Granizo, Syed J. Khundmiri, Jahn N. O'Neil

NHERF1 ($Na^+/H^+$ Exchanger Regulatory Factor 1) is a PDZ-domain scaffold protein that regulates membrane transporters, GPCR signaling, and cytoskeletal organization. In the brain, NHERF1 is expressed in ependymal cells, astrocytes, and choroid plexus epithelium—structures that are very critical for ventricular integrity and cerebrospinal fluid (CSF) dynamics. The lateral ventricles are lined by ciliated ependymal cells that maintain CSF flow throughout the brain. NKCC1 is a basolateral $Na^+$–$K^+$–$2Cl^-$ cotransporter also expressed in ependymal cells, choroid plexus epithelium, and astrocytes. In addition, NKCC1 and NHERF1 staining is seen in neurons. Utilizing NHERF1 KO mice, we hypothesize that NHERF1 regulates ventricular size, NKCC1 distribution, and neuroinflammation secondary to CSF regulation in the perivascular space. We will examine the lateral ventricles and perivascular space in 8- and 18-month-old wildtype and KO mice. We expect a mild to moderate increase in ventricular enlargement, reactive gliosis around ventricles, and gaps in NKCC1 signaling. This would suggest neurodevelopmental dysfunction resulting in NHERF1-dependent dysregulation of NKCC1, progressive hydrocephaly, and increased ventricular size.

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**Discovery of Asase: Isolation, Purification, and Lytic Characterization on Mycobacterium smegmatis**

Presenter's Name: Elissa Matthews
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Elissa Matthews | SEA-PHAGES | Howard University

Bacteriophages are viruses that infect bacteria, and they are highly host specific. They can replicate through the lytic cycle that produces clear plaques or through the lysogenic cycle that produces more turbid plaques. In this study, we isolated, purified, and began characterizing a bacteriophage we named Asase using Mycobacterium smegmatis mc2155 as the host bacterium. We used direct and enriched methods to isolate phage population, and verified phage activity by plaque assays and purified the population through three rounds of plaque purification in order to achieve the same plaque phenotype which we named "Asase". As anticipated, direct isolation showed more variation in the morphology of plaques, and enrichment amplified one prominent plaque type. Following purification, Asase caused large, clear, and uniform plaques, which implicate a lytic infection cycle. The phage was then amplified to produce a concentrated lysate and the titer was calculated to be high at 1.1 x 1011. As a preliminary step toward molecular characterization, phage DNA was extracted, with an average concentration of 38.5 ng/µL, suitable for further analysis. Restriction enzyme digests were set up using SalI, EcoRI, BamHI and cut and uncut DNA were visualized by gel electrophoresis. Whole-genome characterization using Illumina sequencing is planned as a future step to support genome assembly, annotation, and comparative analyses. The isolation and initial characterization of Asase contribute to the SEA-PHAGES objective of expanding phage discovery and establish a foundation for future sequencing and follow-up research with potential phage-based applications.

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**Investigating Environmental Influences on Malaria and HbAS Distribution**
Presenter's Name: Savannah Mcbride
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*Presentation Type: Poster Presentation*
Faculty Advisor: Maurice Fluitt
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Co-authors: Ilisa Gray, Tessa Farria

Malaria prevalence in sub-Saharan Africa remains high, where environmental conditions strongly support transmission. Although high malaria transmission is known to correlate with increased sickle cell (HbS) allele frequency due to the protective advantage of the heterozygous genotype (HbAS), the extent to which climate-driven environmental factors influence this evolutionary relationship has yet to be fully characterized. This study utilized a biomedical literature review design, analyzing peer-reviewed research, epidemiological data sets, and public health reports collected across four months. The purpose of this research was to evaluate interactions among malaria prevalence, sickle cell distribution, and climate patterns in sub-Saharan Africa. The review examined HbS polymerization, irreversible sickling, and vaso-occlusion to assess how environmental pressures influence disease expression and allele frequency, alongside climate factors that enhance Anopheles-mediated Plasmodium falciparum transmission. Across studies, malaria transmission showed a strong positive correlation with HbS frequency, with the HbAS genotype conferring a selective advantage by reducing severe infection without causing full sickle cell disease. Malaria-infected HbAS erythrocytes were more likely to sickle and be destroyed by the spleen, thereby limiting parasite proliferation. Regions with the highest malaria burden, particularly in West and Central Africa, consistently exhibited the highest HbS allele frequencies. Overall, the findings support the hypothesis that environmental drivers of malaria transmission shape the geographic distribution of the HbS allele through natural selection, reinforcing the evolutionary link between climate, malaria prevalence, and sickle cell trait frequency.

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**Analysis of Protein Structure using RStudio**
Presenter's Name: Zoe Mcclendon
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Understanding the dynamics and complexity of protein structure and interactions is key in determining biological functions, molecular interactions, and evolutionary relationships. The structural characterization involves calculations involving different matrices and structures such as α-helices and β-sheets. RStudio provides approaches enhancing visualization techniques including 3D structure plotting and statistical graphics which facilitate interpretation of spatial and geometric properties. This bioinformatics tool can aid in correlation analyses and clustering algorithms for further classification of structural similarities and detection of functional motifs. The study focuses on outlining a detailed computational procedure for analyzing the proteins structural data using RStudio, an analytical bioinformatics tool with an integrated development environment for the R programming language and statistical computing approaches to examine protein structures primarily from the Protein Data Bank (PDB). The integration of these statistical modeling strategies with structural bioinformatics can enhance reproducibility and provide a scalable framework for high-throughput protein structure analysis.

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**Programmable Epigenetic Silencing of Enhancers with CRISPR based Epigenetic Modifiers**
Presenter's Name: Jameel Mcdaniel
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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The transcriptional start site and enhancers of expressed genes are decorated with active epigenetic marks (i.e. H3K27ac and H3K4me3), highlighting the critical role of epigenetic mechanisms in regulating these non-coding genomic elements. The CRISPR based epigenetic editor CRISPRi induces strong gene silencing by depositing H3K9me3 therefore inducing gene suppression. CRISPRi has been used to study enhancer regions; however, other histone modifications may be necessary to silence enhancer regions and study the biology and function of enhancers. To address this, I targeted five epigenome editors: MeCP2, RCOR1, SAP25, dCas9, and CRISPRi to modify chromatin structure and evaluate gene silencing at enhancer regions. Each editor functions uniquely to repress gene expression, with the main difference being MeCP2, SAP25, and RCOR1 recruit various repressor complexes that deacetylates H3k27ac. By engineering single guide RNAs, we are able to target the enhancer regions of essential genes: GATA1, MYC, and HDAC6, within K562 cell lines which constitutively express dCas9 fusions. To test for effects on cell proliferation, we stably expressed sgRNAs targeting essential or non-essential genes in our parental cell lines through lentiviral transduction, followed by FACS sorting. We then monitored cell proliferation over 12 days using an internally normalized competitive growth assay and showed that: enhancer targeting cell lines produced intermediate silencing compared to cells that were targeted at the transcriptional start site (TSS) and CRISPRi continues to be the most functional way to silence enhancer regions.

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**"Post-transcriptional regulation of an operon encoding virulence sigma factor Sigma B by a small RNA in Staphylococcus aureus"**
Presenter's Name: Olivia Mcglaughlin
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Karl Thompson
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Staphylococcus aureus (S. aureus) is a gram-positive bacterium commonly found on the skin and nasopharyngeal tract. It is also a pathobiont, able

to cause disease as a commensal, when it invades the dermis, lungs, or circulatory system. S. aureus infection pathogenesis is influenced by virulence, structural, or secreted factors that promote disease. Virulence factor gene regulators control the expression of virulence factors through transcriptional regulators and post-transcriptional modifications. In S. aureus, Sigma B (sigB) is a major virulence gene regulator that controls expression of several virulence factors and therefore promotes infectious disease. The genetic locus encoding sigB includes several upstream genes that share a promoter and subsequently, these genes are expressed on one transcript - rsbVWsigB. Post-transcriptional regulation of this operon may influence sigB levels, and the virulence potential of S. aureus. Small RNAs (sRNAs) play a critical role in post-transcriptional regulation of gene expression through complimentary base pairing with mRNA targets, subsequently suppressing translation and mRNA stability. Our preliminary studies have identified a potential Small RNA regulator of the sigB operon - Teg16. Specifically, we identified potential pairing between Teg16 and the Translation Initiation Region (TIR) of rsbV. In this study, we aim to test the hypothesis that Teg16 post-transcriptionally regulates the rsbVWsigB operon by over-expressing Teg16 and measuring mRNA levels of rsbVWsigB and downstream gene regulation (such as sigB targets) and phenotypes (such as S. aureus pigment formation).

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**Decoding PCOS: Aligning Patient Language with Clinical Diagnosis**
Presenter's Name: Kira Mchugh
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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Co-authors: Brieanna Bell, Mckenzye Webster

Polycystic Ovary Syndrome (PCOS) is a common hormonal disorder affecting 10 to 13% womenof reproductive age globally. This heterogeneous endocrine disorder, marked by dysregulated sex hormone balance, metabolic dysfunction, and variable clinical presentation, involves confusing aspects, including prevalence, diagnosis, causes, management, clinical practices, psychological issues, and prevention. Understanding laypeople's terms for discussing PCOS on social media will help clinicians better understand treatment options. Methods: Narratives on Reddit will be downloaded to evaluate concerns and shared ideas. Ethnographic subreddit posts on "r/pcos" discussed between 2024 and 2025 will be scraped from the social media site for analysis. The data collection will be conducted using the R programming language and RStudio. RedditExtractor will be utilized to extract content and save it as a CSV file.In collaboration with the Howard University Hospital PI in Ob/GYN, deidentified clinical medicalrecords of patients consulted in 2024 to 2025 related to PCOS diagnosis will be accessed and evaluated to determine the association between clinical terms and descriptions used by the public. Results: Social media narratives have emerged as a critical resource for understanding patient perspectives and lived experiences with health conditions. Key themes derived from the analysis of Reddit posts will be categorized using general terms for PCOS to identify gray areas in patient-provider communication and elucidate treatment options. Conclusion: Hypothesizing that general terms for discussing PCOS on social media are poorly articulated and do not support informed diagnostic options, this study will identify the gray areas of patient-provider communication and elucidate treatment options.

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**Decoding PCOS: Aligning Patient Language with Clinical Diagnosis**
Presenter's Name: Kira Mchugh
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Polycystic Ovary Syndrome (PCOS) is a common hormonal disorder affecting 10 to 13% women of reproductive age globally. This heterogeneous endocrine disorder, marked by dysregulated sex hormone balance, metabolic dysfunction, and variable clinical presentation, involves confusing aspects, including prevalence, diagnosis, causes, management, clinical practices, psychological issues, and prevention. Understanding laypeople's terms for discussing PCOS on social media will help clinicians better understand treatment options. Narratives on Reddit will be downloaded to evaluate concerns and shared ideas. Ethnographic subreddit posts on "r/pcos" discussed between 2024 and 2025 will be scraped from the social media site for analysis. The data collection will be conducted using the R programming language and RStudio. RedditExtractor will be utilized to extract content and save it as a CSV file. In collaboration with the Howard University Hospital PI in Ob/GYN, deidentified clinical medical records of patients consulted in 2024 to 2025 related to PCOS diagnosis will be accessed and evaluated to determine the association between clinical terms and descriptions used by the public. Social media narratives have emerged as a critical resource for understanding patient perspectives and lived experiences with health conditions. Key themes derived from the analysis of Reddit posts will be categorized using general terms for PCOS to identify gray areas in patient-provider communication and elucidate treatment options. Hypothesizing that general terms for discussing PCOS on social media are poorly articulated and do not support informed diagnostic options, this study will identify the gray areas of patient-provider communication and elucidate treatment options.

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**Allostatic Load and Chronic Stress in the Eurasian Oystercatcher (Haematopus ostralegus): A Comparative Physiological Analysis Using Public Ecological Datasets**
Presenter's Name: Madisyn Mclaurin
Classification: Undergraduate Student
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The Eurasian oystercatcher (Haematopus ostralegus) is a long-lived shorebird whose survival is increasingly threatened by commercial over-exploitation of benthic food stocks and climate-driven prey scarcity. This study investigates how chronic nutritional deficit influences stress

physiology, immune function, and winter survival, drawing translational parallels to HPA axis dysregulation and immune suppression in humans under chronic environmental stress. Using publicly available datasets from Dryad (van de Pol et al., 2010) and Movebank (Study ID: 986343), a secondary data analysis examining foraging efficiency, fecal glucocorticoid metabolite (fGCM) concentrations, and heterophil-to-lymphocyte (H:L) ratios as physiological proxies for allostatic load was conducted. No new field collection or laboratory sampling was performed. An allostatic load index was constructed as a z-score composite of these variables and modeled using Generalized Linear Mixed Models (GLMM) in R (lme4, ggplot2, tidyverse), with population and year included as random effects. Results indicate that food scarcity significantly predicts elevated baseline glucocorticoids ($\beta = 0.43$, $p < 0.01$) and suppressed H:L ratios ($r = -0.38$, $p < 0.05$), both associated with reduced winter survival. These findings parallel chronic stress-induced HPA dysregulation in humans, positioning the oystercatcher as a powerful cross-species model for understanding how environmental stressors translate into measurable physiological burden with broad implications for ecological and human health research.

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**Geriatric Sepsis: Pharmacist-Led Strategies to Reduce Risk and Improve Outcomes**

Presenter's Name: Alanna Mears
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School/College: Pharmacy
*Presentation Type: Poster Presentation*
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Co-authors: Alanna Mears, Oluwatosin Bakare, Vincent Taah

Background: Sepsis is a leading cause of morbidity and mortality, with older adults at particularly high risk due to age-related physiologic, biologic, clinical, and pharmacologic changes. Objective: This review examines factors contributing to increased susceptibility to sepsis and poorer outcomes in geriatric patients, with emphasis on the preventive and therapeutic role of pharmacists.Methods: A systematic literature review was conducted using PubMed to identify peer-reviewed publications from the past 25 years. Search strategies focused on biologic, physiologic, clinical, and pharmacologic factors influencing sepsis risk and management in older adults. Titles and abstracts were screened for relevance, and full-text articles were reviewed when inclusion criteria were met. Data extraction emphasized immune dysfunction, comorbidities, antimicrobial dosing considerations, medication-related risks, and clinical outcomes. Findings: Age-related immunosenescence impairs host defense through reduced T-cell activity and diminished neutrophil chemotaxis. Older adults demonstrate blunted inflammatory responses, resulting in atypical infection presentations, delayed diagnosis, and delayed treatment. Reduced organ reserve and common comorbidities, including diabetes, chronic kidney disease, heart failure, and chronic obstructive pulmonary disease, further increase vulnerability. Polypharmacy, frequent healthcare exposure, malnutrition, and frailty contribute to infection risk and impaired recovery, while altered pharmacokinetics heighten antimicrobial toxicity.
Role of Pharmacists: Pharmacists play a critical role in sepsis prevention and management by optimizing medication regimens, identifying immunosuppressive and high-risk therapies, ensuring appropriate antimicrobial selection and dosing, monitoring for adverse effects, and educating patients and caregivers on infection prevention strategies.
Conclusion: Targeted pharmacist involvement is essential to reduce sepsis incidence, promote early detection, and improve therapeutic outcomes in geriatric patients.

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**Orexin Signaling Differenitally Regulates Palatable and Chow Intake in Female Rats with Distinct Feeding Preferences.**

Presenter's Name: Zain Mensah
Classification: Undergraduate Student
School/College: Medicine
*Presentation Type: Poster Presentation*
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Binge eating is characterized by the consumption of a large amount of palatable food (PF) within a specific time period and is predominantly observed in females. The lateral hypothalamus (LH), contains orexin-positive neurons that regulate both homeostatic feeding and reward-seeking behaviors. The orexin receptor-1 (OxR1) antagonist, SB-334867, has shown promise in reducing consumption of PF, but it remains unclear whether it also decreases normal chow consumption in female rats. Female Sprague-Dawley rats (n=28) received multiple, intermittent PF feeding tests and were classified as high preference (HP), low preference (LP), or neutral based on consumption tertiles. Chow-only controls (n=8) received no PF. After phenotypes were established, SB-334867 was administered across five additional feeding tests to determine time-dependent differences and selectivity in reducing food intake. SB-334867 produced significant time-dependent PF reduction in HP rats at 1h ($p<0.0001$) and 4h ($p<0.01$), and LP rats at 1h ($p<0.01$) and 4h ($p<0.05$). A significant time-dependent decrease in chow intake after SB-334867 in control rats was observed at 1h ($p<0.01$) and 4h ($p<0.05$). Both chow and PF intake were significantly reduced by SB-334867; however, the magnitude of reduction was greater for PF and depended on feeding phenotype. Future studies will investigate whether differences in orexin receptor density after SB-334867 exclusively correlates with reduced PF intake.

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**Post Traumatic Meningitis Outcomes and Incidences on Mental Health**

Presenter's Name: Papa Midley
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School/College: Medicine
*Presentation Type: Poster Presentation*
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Co-authors: Kaitlyn Blake, Hanan Yusuf, Banuja Munasinghe, Mekdam Bisrat, Elizabeth Beyene, Syed Fahad Gillani, Rawan Elkomi, Miriam Michaels, Nuha Mohammed

Background: Traumatic brain injury (TBI) causes substantial morbidity and long-term neuropsychiatric sequelae. Bacterial meningitis may worsen outcomes after TBI, yet its mental-health impact is

undercharacterized. This study examined 90-day neuropsychiatric outcomes following post-traumatic meningitis. Methods: We performed a retrospective cohort study using the TriNetX Global Collaborative Network. Two propensity-matched cohorts were assembled: severe TBI with subsequent bacterial meningitis and severe TBI without meningitis (2,977 patients each). Outcomes included post-concussional syndrome, amnesia, altered mental status, depressive episodes, anxiety disorders, and non-psychotic mental disorders. We estimated risks, risk ratios, and odds ratios, and generated Kaplan–Meier survival curves and instance-based frequency analyses. Results: Compared with TBI without meningitis, post-traumatic meningitis was associated with higher risk of amnesia (RR 2.65), altered mental status (RR 5.32), depressive episodes (RR 2.12), and anxiety (RR 2.05). Post-concussional syndrome risk was lower (RR 0.41). No difference was observed for non-psychotic mental disorders. Kaplan–Meier analyses showed significantly lower symptom-free probabilities for most outcomes. Conclusion: Post-traumatic bacterial meningitis substantially increases early neuropsychiatric complications after severe TBI, highlighting the need for proactive psychiatric evaluation, neurocognitive monitoring, and tailored rehabilitation in this high-risk population. Findings support early infection prevention and integrated neurocritical care pathways implementation.

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**From Pavement to Park: A Comparative Study of Microbial Composition in Habitat Specific Urban Ants**

Presenter's Name: Leeah Miller
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*Presentation Type: Poster Presentation*
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Urban ants frequently inhabit human-occupied environments, increasing the potential for indirect microbial exposure. This study investigates whether differences in ecological distribution between carpenter ants (Camponotus pennsylvanicus) and pavement ants (Tetramorium caespitum) correspond to differences in their reported microbiome composition. Using a secondary data analysis framework, this project integrates species occurrence data from iNaturalist with publicly available microbiome sequencing datasets. Research grade iNaturalist observations will be filtered by geographic location (Washington, DC), habitat classification, and proximity to buildings, sidewalks, and landscaped areas to quantify each species' association with urban environments. Published 16S rRNA gene sequencing datasets will be identified through the NCBI Sequence Read Archive (SRA) and peer-reviewed literature. Processed taxonomic tables and relative abundance data will be extracted and compared. Microbial community composition will be evaluated using reported alpha diversity metrics (e.g., Shannon index) and beta diversity measures (e.g., Bray Curtis dissimilarity), with particular attention to the presence and relative abundance of bacterial taxa associated with soil, waste, and human-impacted environments. Comparative analyses will assess whether pavement ants, which are more frequently documented in ground-level urban habitats, exhibit higher representation of environmentally associated or enteric bacterial taxa relative to carpenter ants. The findings contribute to understanding how habitat preference may shape insect-associated microbial communities in human-impacted environments.

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**A Quality Review of Fluoroscopy Time as a Surrogate for Radiation Exposure During Intramedullary Nailing of Tibia, Femur, and Hip**

Presenter's Name: Diwane Mills
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
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Introduction: Orthopedic trauma surgeons experience increased radiation exposure from frequent fluoroscopy use. Despite doses being within limits, cancer rates, especially breast and hematologic, are higher in female surgeons. This study examines the use of fluoroscopy in intramedullary nailing, analyzing trends by surgeon experience and case type. Methods: A quality review was completed of intramedullary nailing of isolated hip, femur, and tibial shaft fractures at an urban level II trauma center between 2023-24. Injury, patient, and surgery details were recorded, along with fluoroscopy time. Surgeons were stratified by years of practice and specialty training. Descriptive statistics were used. Results: Surgeons with 11–20 years of experience had an average fluoroscopy time of 94 seconds, and surgeons with less than 11 years of experience averaged 39.3 seconds. Trauma surgeons possessed a higher average fluoroscopy time of 98.72 seconds. Non-trauma surgeons averaged 87.92 seconds. Procedures performed on weekdays had an average fluoroscopy time of 87 seconds, while weekends showed increased usage, averaging 122 seconds. Discussion: The study found higher fluoroscopy times in experienced surgeons and trauma cases, likely due to complexity. Non-trauma and weekday procedures had lower usage, suggesting more predictability and staffing. Weekend cases showed increased times.Conclusion: The recording of fluoroscopy times is not standardly reported for surgeons. Intramedullary nailing of hip, femur, and tibia fractures is a mandatory case for case logs in residency training. Yet, nowhere is fluoroscopy time recorded. Our study demonstrated variability based on surgeon experience, training, and fracture type.

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**Fluoride or Calcium Phosphate? A Comparative Review of Subsurface Lesion Remineralization**

Presenter's Name: Abigail Moh
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*Presentation Type: Poster Presentation*
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Dental caries is the demineralization of tooth hard tissue by dietary acid. The use of fluoride-containing dentifrices is the gold standard of preventative caries management. The major scientific principle fluoride forms insoluble fluorapatite (FA) with enamel hydroxyapatite (HA),

thus preventing caries progression. However, the formation of insoluble FA on the enamel surface may prevent the penetration of calcium and phosphate ions, reducing the repair of the subsurface lesion. This literature review aims to compare fluoride-only approaches with CaPO4-based remineralization systems. Evidence consistently demonstrates that CaPO4-based systems help with mineral bioavailability and promote deeper remineralization of enamel subsurface lesions compared with fluoride alone. Reynolds et al have conducted several studies on the remineralization of the subsurface lesion by transverse micro-radiology (TMR). Human enamel specimens with sub-surface lesions were prepared and inserted into intra-oral appliances worn by volunteers. Slurries from different toothpastes were used to remineralize the enamel blocks for two weeks. Different products containing low fluoride (1000 ppm), high fluoride (5000 ppm), CPP-ACP, fTCP, or their combination were used. Mineral content was measured using transverse microradiography (TMR). The concentrations of fluoride, calcium, and phosphate were also measured. The results show that CPP-ACP alone or combined with fluoride significantly increased the remineralization of subsurface lesions. This suggests that bioavailable calcium and phosphate might be more effective in remineralizing the sub-surface lesion, and calcium phosphate and fluoride could have a synergistic effect on remineralization. These studies highlighted the potential of the calcium phosphate system in remineralizing the sub-surface lesion of early enamel caries.

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**Association Between Intratumoral Spatial Heterogeneity from AI-Derived Aggressiveness Score Maps and Time to Recurrence in Glioblastoma: Personalizing Recurrence Risk Stratification**

Presenter's Name: Khalid Mohamed
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Introduction: Glioblastoma (GBM) recurrence is nearly universal, yet objective biomarkers for recurrence timing are lacking. This limits early risk stratification and personalized surveillance planning. We hypothesized that intratumoral spatial heterogeneity features from AI-derived aggressiveness score maps would be associated with time-to-recurrence in GBM. Methods: GBM patients from The Cancer Genome Atlas (TCGA) with histopathology images from the National Cancer Institute (NCI) Imaging Data Commons (IDC) were analyzed. 13 predefined spatial heterogeneity features were calculated in Python from previously published AI-derived aggressiveness score maps. Clinical and pathological data were obtained from the NCI Genomic Data Commons (GDC). O-6-methylguanine-DNA methyltransferase (MGMT) methylation status and Karnofsky Performance Status (KPS) were obtained from cBioPortal. Time-to-event was defined as days from primary diagnosis to first documented recurrence or progression. Univariate and multivariate Cox regression (adjusted for age, KPS, MGMT, tissue sample size, and treatment courses) and Kaplan-Meier (KM) analysis were performed in Python (lifelines v0.30.1). For KM analysis, patients were dichotomized at the cohort median Fragmentation Max Size (556 pixels) into above-median and below-median groups. Results: Of the 13 heterogeneity features, 5 were significantly associated with recurrence on univariate analysis. On multivariate analysis, Fragmentation Max Size remained the only independent feature significantly associated with time to recurrence (p=0.0212). KM analysis confirmed shorter recurrence-free survival in patients with above-median Fragmentation Max Size (log-rank p=0.044).Conclusion: Fragmentation Max Size was independently associated with earlier time-to-recurrence. If prospectively validated, this pathology-derived biomarker could improve early risk stratification and support more personalized surveillance planning in glioblastoma.

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**Colorectal Cancer Risk in Crohn's Disease Patients After Colectomy: A Propensity-Matched Cohort Study Using a Nationwide EMR Database**

Presenter's Name: Ahmad Mohammed
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Co-authors: Syed Fahad Gillani, Rawan Elkomi, Anand Deonarine, Syed Asad Geelani, Ali Chand, Jesse Maynard, Mekdem Bisrat, Miriam Michael

Objective: To assess the risk of colorectal malignancy in CD patients with and without colectomy over time. Methods: A retrospective cohort study was conducted using the TriNetX Research Network, which includes data from 70 U.S. healthcare organizations. A total of 7,315 CD patients who underwent partial or total colectomy were matched 1:1 to 7,315 patients without surgical intervention. Patients with ulcerative colitis were excluded. CRC outcomes including colon (C18), rectosigmoid (C19), and rectal (C20) cancers were analyzed at 5-, 10-, and 20-year follow-up intervals. Hazard ratios (HR) with 95% confidence intervals (CI) were calculated, and Kaplan-Meier curves were compared using log-rank testing. Results: Among 14,630 matched CD patients, colon cancer incidence at 5 years was 5.4% in the colectomy group vs. 0.6% in the non-colectomy group (HR 8.40; 95% CI: 6.19 to 11.40). Elevated risk persisted at 10 years (5.5% vs. 0.8%; HR 7.02) and 20 years (6.1% vs. 0.9%; HR 7.06). Rectosigmoid cancer occurred in 1.5% of colectomy patients vs. 0.2% of controls (HR 7.09), and rectal cancer in 1.5% vs. 0.5% (HR 3.23). All differences were statistically and clinically significant. Conclusions: Colectomy in CD is associated with a sustained increase in CRC risk, especially in the colon and rectosigmoid junction, highlighting the need for lifelong surveillance in this population.

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**Evaluating Delivery of mRNA to Liver Cells Using a PEI-GalNAc Polymer**

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Introduction: Liver-targeted drug delivery holds significant therapeutic potential for conditions such as liver cancer and metabolic disorders. However, current nanoparticle delivery systems lack cell-type specificity, leading to off-target effects and reduced efficacy. This study investigates whether a GalNAc-functionalized polyethylenimine (PEI) polymer can facilitate targeted mRNA delivery to liver cells via asialoglycoprotein (ASGPR) receptor uptake, which is highly expressed in hepatocytes. Meth0ds: PEI was conjugated with GalNAc at varying ratios, previously characterized by NMR spectroscopy to confirm GalNAc incorporation. These polymers were complexed with mRNA, forming nanoparticles at a defined size, and used to transfect three cell lines: HepG2 (ASGPR-expressing liver cells), RAW264.7 (macrophages), and HEK293 (receptor-negative control). Nanoparticle uptake was measured in cells containing and not containing GalNAc receptors via GFP fluorescence 8–12 hours post-transfection, quantified using fluorescence microscopy and imaging software. Results: Preliminary data indicates that conjugation of GalNac to PEI, in addition to complexing of mRNA using conjugates within cell-compartible sizes was successful. GFP expression in HepG2 cells compared to receptor-negative controls will be investigated. Implications: If selective hepatocyte uptake is confirmed, this platform could advance targeted liver therapeutics while minimizing off-target delivery to tissues such as the kidney.

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**Examining Cranial Pathologies in Pinnipeds**

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The use of studying animals as models in the field of medicine is commonplace, as animals can provide a larger sample size and, in some cases, low genetic diversity in comparison to using data only from humans. These types of models may also provide insight into the pathogenesis of different types of diseases because animal models, especially wild caught, can exhibit the full development of a disease and its symptoms without medical intervention. There is already a body of pathological studies in large, domesticated animals such as horses and cattle, due to the ease of use and understanding of their genetic lineage, However, pathologies in pinnipeds is relatively unexplored when compared to domesticated animals due to most specimens not only requiring a visible pathology, and lack of domesticated specimens.Three pinniped skulls were examined for pathology and were analyzed grossly and macroscopically. Findings in E. jubatus suggest trauma consistent with a sharp strike or bite, with possible associated inflammation. In hydrurga 606165, lesions suggestive of multiple osteomas or osteochondroma were present. In hydrurga 277255, bilateral mandibular lesions consistent with apparent non-malignant bone and non-bony tissue growths, potentially fibrous dysplasia. These observations demonstrate that despite limited existing literature on osteological pathology in pinnipeds, comparative analysis may yield meaningful diagnostic interpretations and highlight the value of comparative anatomy.

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**The Potential of Scaffold Protein RACK1 (GNB2L1) Y248 Phosphorylation in Mediating the Metastasis of MDA-MB231 Triple-Negative Breast Carcinoma Cells**

Presenter's Name: Cayla Moore
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The spread of cancer, or metastasis, remains the leading cause of mortality in breast cancer patients and highlights the urgent need for innovative strategies to disrupt tumor cell migration and invasion. Scaffold protein RACK (Receptor for Activated C Kinase 1) functions as a central regulator of focal adhesion kinase (FAK)-driven cytoskeletal remodeling that coordinates adhesion signaling with actin polymerization and protrusive formation of lamellipodia and filopodia required for directional cell movement. This proposal aims to evaluate the effects of the patented RACK1 signaling regulator compound on in-vitro carcinoma models, focusing on its ability to modulate RACK1 phosphorylation (Y248), FAK-associated signaling (FAK-Y397), and actin cytoskeletal dynamics. Building on current literature defining RACK1's role in adhesion-dependent migration, we outlined an experimental framework using the MDA-MB231 Triple-Negative Breast Carcinoma cell line. Through a series of in-vitro assays, we are investigating how SD29-14 influences cell morphology, actin polymerization, focal adhesion organization, and motility-related cellular expression with particular attention to FAK Y397 phosphorylation and the Y248-phosphorylated (active) form of RACK1. Therefore, by integrating molecular and structural analyses, this study aims to determine whether the regulation of phospho-RACK1 affects actin-driven remodeling and suppresses metastatic signaling cascades in malignant cancers. These findings are expected to advance mechanistic understandings of how scaffold-mediated cytoskeletal signaling drives tumor motility and may provide a foundation for developing targeted anti-metastatic strategies in which RACK1-FAK pathways contribute to metastatic disease progression.

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**Racial and Ethnic Disparities in Distant- Stage Presentation of Lung, Breast, and Colorectal Cancers, 2006–2021**

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Background: Racial/ethnic disparities in stage at cancer diagnosis remain a major contributor to cancer-related mortality in the United

States. It is unclear whether the magnitude and direction of these disparities differ across common solid malignancies. Methods: This is a retrospective cohort study using the National Cancer Database (2006–2021) to examine associations between race/ethnicity and distant-stage presentation among adults diagnosed with lung, breast, or colorectal cancer. Multivariable logistic regression models with robust standard errors were used to estimate adjusted odds ratios (ORs) for distant-stage disease, including a race-by-cancer type interaction. Results: Among 3,386,771 patients, race/ethnicity was independently associated with distant-stage presentation, with substantial heterogeneity across cancer types. In lung cancer, compared with Non-Hispanic White (NHW) patients, the odds of distant-stage disease were higher among Non-Hispanic Black (NHB) (OR, 1.02; 95% CI, 1.00–1.03), Hispanic (OR, 1.12; 95% CI, 1.10–1.14), and Non-Hispanic Other (NHO) patients (OR, 1.19; 95% CI, 1.16–1.22), corresponding to absolute increases of 0.5, 2.8, and 4.3 percentage points, respectively. In breast cancer, NHB patients had markedly higher odds of distant-stage presentation (OR, 1.61; 95% CI, 1.58–1.64; +2.2 percentage points), while no significant difference was observed among Hispanic patients and lower odds were observed among NHO patients. In colorectal cancer, NHB patients had higher odds of distant-stage disease (OR, 1.14; 95% CI, 1.12–1.16; +2.3 percentage points), whereas Hispanic and NHO patients had lower odds and absolute risks compared with NHW patients. Conclusions: Racial/ethnic differences in distant-stage presentation vary by cancer type, with the largest inequities observed among NHB patients.

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**Postpartum Gastrointestinal Outcomes in Patients With Endometriosis by Mode of Delivery**

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Objective: To evaluate the association between the mode of delivery and gastrointestinal outcomes in patients with endometriosis. Study Design:We conducted a retrospective cohort study using the TriNetX Research Network. Patients with endometriosis who underwent either cesarean or vaginal delivery were included. Each cohort included 16,652 patients.Primary outcomes included postoperative adhesions, fistulas, and bowel obstruction. Analyses included risk estimation, Kaplan-Meier survival curves, and recurrence assessments. Results: Cesarean delivery was associated with a significantly higher risk of adhesions and bowel obstruction. No significant difference was observed in fistula formation. Conclusion: In patients with endometriosis, cesarean delivery is associated with a higher baseline risk of adhesions and bowel obstruction, especially at first birth, compared with vaginal delivery. These findings highlight the long-term surgical implications of selecting the delivery method in this population and may inform counseling and obstetric decision-making.

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**The Role of Lipid Droplets in Hepatitis C Virus Infection: Viral Assembly, Host Lipid Metabolism, and Therapeutic Potential**

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Hepatitis C virus (HCV) JFH1 strain is a positive-sense RNA virus that alters host lipid metabolism. However, temporal changes in lipid droplet (LD) function during infection remain unclear. We investigated how LD metabolic pathways, specifically LD biogenesis and degradation, change during HCV infection in human hepatoma cell lines Huh7.0 and the RIG-I–defective derivative Huh7.5.1. Time-course analysis revealed two phases of LD metabolism. Early infection showed increased LD abundance, whereas later stages showed a steady decrease and eventual loss of LDs as viral protein levels rose. mRNA sequencing revealed a corresponding shift in LD-associated proteins, including early increases in LD structural proteins perilipin 2 (PLIN2) and perilipin 3 (PLIN3), and the lipid synthesis enzyme diacylglycerol acyltransferase 1 (DGAT1), followed by increased expression of the lipolytic enzyme adipose triglyceride lipase (ATGL) and fatty acid oxidation (FAO) pathways at later time points. Measurements of cellular respiration showed higher oxygen consumption during infection, consistent with increased mitochondrial activity and ATP demand for viral replication. LD-associated enzymes appear to organize viral assembly by bringing structural and nonstructural proteins, including HCV core protein, to LD surfaces, linking lipid storage organelles to production of new virus particles. Together, these results support a model in which HCV replication and assembly are driven by LD metabolism and host-derived energy following viral entry, enabling production of infectious particles. These findings highlight LD metabolic remodeling, particularly DGAT1-mediated biogenesis and ATGL-dependent lipolysis, as potential targets for host-directed antiviral strategies.

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**Radiation Oncology Initiative: Using Wait Time to Improve Patient Centered Care**

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*Presentation Type: Oral Presentation*
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Patient-centered care is foundational to modern healthcare, emphasizing the role of patients as active partners in treatment decision-making. Through shared decision-making and comprehensive patient education, individuals are empowered to better understand their diagnoses, treatment options, and expected outcomes. This collaborative approach enhances patient satisfaction, promotes adherence to therapy, and improves overall health outcomes. Holistic care further strengthens this model by addressing not only the physical aspects of illness but

also the emotional, mental, spiritual, social, and financial dimensions that influence a patient's well-being. Such an approach is particularly important in oncology, where treatment often extends over many months and may significantly impact multiple areas of a patient's life. Oncology care is inherently multimodal, frequently involving a combination of chemotherapy, surgery, and radiation therapy. Navigating these complex and sometimes overwhelming treatment pathways requires clear communication and continuous education. Radiation oncology, in particular, remains less understood by many patients due to its highly technical nature and advanced technology. As a result, targeted education and supportive communication are essential to demystify the process, reduce anxiety, and encourage informed participation in care. By integrating patient partnership, education, and holistic support, oncology providers can foster trust, improve satisfaction, and deliver more comprehensive and compassionate cancer care.

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**Effect of Partial Volume Correction on Lesion-Level PET Quantification in Multiple Sclerosis**

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Partial volume effects can obscure lesion-level PET quantification in multiple sclerosis (MS). This study evaluated the impact of partial volume correction (PVC) on PET distribution volume ratio (DVR) and its association with quantitative susceptibility mapping (QSM). Lesion-wise analysis was performed in 9 MS subjects (128 lesions) using PET DVR with and without PVC. Three deconvolution-based PVC approaches were implemented: the Van Cittert algorithm, the Re-blurred Van Cittert algorithm, and the Lucy–Richardson algorithm. Among the evaluated methods, the Re-blurred Van Cittert algorithm demonstrated superior performance, providing the most stable DVR estimates, improved lesion contrast recovery, and reduced noise propagation compared with both standard Van Cittert and Lucy–Richardson implementations. Based on this performance evaluation, all subsequent quantitative analyses in this study were conducted using the Re-blurred Van Cittert PVC framework. PVC effects depended on baseline uptake: low-uptake lesions showed DVR reduction after PVC, while rim+ lesions demonstrated preserved or increased signal, suggesting improved recovery of true lesion activity. QSM–PET association at the lesion rim became more apparent after PVC, indicating enhanced localization of biologically relevant PET signal. These results suggest that PVC improves lesion-specific PET interpretation and may enhance characterization of inflammatory heterogeneity in MS.

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**Isolation and Identification of the Phage Treelanka**

Presenter's Name: Kendall Nelson
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Bacteriophages are viruses that infect bacteria and often have narrow host ranges, making them a re-emerging interest in the biomedical community as antibiotic resistance increases. In this work, Mycobacterium smegmatis mc²155 was used as the host bacterium because it is nonpathogenic but belongs to the same genus as M. tuberculosis and M. leprae. The phage Treelanka was discovered from a soil sample collected from under a tree near the Howard University sign (38.097722°N, 77.021944°W). After collecting, we isolated, purified, and characterized the phage. This included plaque assays, DNA extraction, restriction enzyme digests, and gel electrophoresis. The plaque assays showed us that our plaques were small, clear, and round, consistent with lytic activity. We calculated a titer of $8.33 \times 10^9$ PFU/mL and the DNA concentration of our first sample was 35 ng/µL and our second sample concentration was 29 ng/µL. After DNA extraction, we used enzymes HindII and SalI to cut our DNA, then ran the samples on an agarose gel to separate the fragments and check the digestion patterns. In the future we plan to focus on genomic characterization of our phage's genome, through predicting gene functions, comparing genomic features, annotating, and reviewing final assembly. By studying phage infection, we aim to clarify its biological mechanisms and contribute to ongoing research on drug treatments for antibiotic-resistant bacteria and the growing field of phage therapy. Key words: Mycobacterium smegmatis mc² 155(smeg), Bacteriophage, Isolation, Lytic

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**Effects of substituting serine to aspartic acid at position 177 in the allosteric site of Δ1-Pyrroline-5-carboxylate reductase (P5CR)**

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Background: Proline is a vital osmolyte that protects plants during environmental stresses such as drought and high salinity. However, its natural biosynthesis via Δ1-pyrroline-5-carboxylate reductase (P5CR) is regulated by feedback inhibition, limiting production even when the plant requires higher levels for survival. This study aimed to engineer a P5CR variant (S177D) insensitive to this downregulation, theoretically allowing for unrestricted proline accumulation to enhance crop resilience and stress tolerance. Methods: Bioinformatics tools (BLAST, PyMOL) were used to analyze sequence conservation and protein structure. The experimental phase involved transforming E. coli Rosetta 2 DE3 cells with the recombinant S177D gene. The protein was overexpressed, harvested, and purified using Ni-NTA affinity chromatography. SDS-PAGE was used to verify purity, and spectrophotometric kinetic assays

were conducted using the substrate analog L-thioproline to monitor NADH oxidation. Results: The purification process successfully yielded a 95% pure protein with a molecular weight of ~30 kDa. Kinetic analysis revealed a stark contrast between the enzymes: the wild-type displayed robust activity (Km: 57 μM, kcat: 241 min-1), whereas the S177D mutant exhibited significantly reduced substrate affinity (Km: 193 μM) at an eight-fold slower catalytic rate (kcat: 30 min-1).Conclusion: Finally, the mutant appeared less efficient in the assays. It is important to note that the experiment measured the reverse reaction. Therefore, a new hypothesis suggests that a slower backward reaction may indicate a kinetically favored forward reaction, potentially leading to enhanced proline production. These findings offer a promising applications in agricultural biotechnology solutions to improve food security.

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**Development of melatonin [N-(2-(1H-indol-3-yl) ethyl) acetamide] derivatives as novel drug candidates for Alzheimer's therapeutics**

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Cognitive decline, memory loss, and functional deterioration are the hallmarks of Alzheimer's disease (AD), a progressive neurological illness. Current approved drugs, such as acetylcholinesterase inhibitors and the N-methyl-D-aspartate (NMDA) receptor antagonists memantine, merely relieve symptoms and do not stop the progression of the disease. Recently created amyloid-targeting monoclonal antibodies such as Lecanemab-irmb, donanemab-azbt, and aducanumab-avwa pose accessibility and safety issues in addition to their limited clinical benefit. There is still a pressing need for small-molecule therapies that can alter several pathogenic pathways at once. According to preclinical research, melatonin maintains mitochondrial function, suppresses β-amyloid aggregation, lowers tau hyperphosphorylation, and controls enzymes like GSK-3β, CDK5, and BACE-1. The objectives of this study include design and synthesis of melatonin derivatives with potential multiple mechanism of actions such as anti-inflammatory, antioxidant, and neuroprotective, targeting GSK-3β, CDK5, and BACE-1. Our current study focuses on designing and synthesizing a library of novel (2-(3-(2-acetamidoethyl)-1H-indol-1-yl)-2-oxoethyl)carbamate derivatives from melatonin as the precursor, and evaluating the biological activity using in vitro enzyme- and cell line-based assays to develop potential multi-target-directed ligands for AD. Structural modification and optimization will be made to improve the pharmacokinetic stability, target interaction, and permeation to the blood brain barrier.

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**Theoretical Design and Structural Analysis of Cross-Genera AAVGo.1-HBoV3 Chimeric Capsids**

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Parvoviruses are small, non-enveloped ssDNA viruses, several of which have been redesigned as vectors. While adeno-associated virus (AAV) is clinically documented, its utility is limited by restricted genome packaging and pre-existing immunity. In contrast, human bocaviruses (HBoVs) exhibit greater packaging potential, motivating the design of cross-genus hybrid capsids. We engineered a chimeric construct (AAV-HB3) by substituting the α-helix and βH/βI strand of AAVGo.1 VP1 with the corresponding structural elements from HBoV3. Structure prediction using AlphaFold2, scoring of pLDDT > 80 and pTM > 0.75 confirmed preservation of the canonical eight-stranded β-barrel scaffold. Consecutive RoseTTAFold2 refinement yielded stable conformations suitable for dynamic assessment. Provisional 100 ns molecular dynamics simulations revealed divergent stability profiles. The AAVGo.1 VP1 control rapidly equilibrated and remained conformationally rigid with a backbone RMSD = 0.03 nm, providing insights into N-terminal movement. In comparison, AAV-HB3 displayed localized flexibility concentrated at variable regions, with loop displacements of ~43-54 nm proximal to the three-fold and five-fold symmetry axes. These results demonstrate that targeted cross-genus substitutions redistribute capsid surface dynamics while preserving the core β-barrel architecture. This structure-guided framework provides a multiscale computational strategy for evaluating structural tolerance in engineered parvoviral capsids and informs the rational development of next-generation gene-delivery vectors.

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**Geographic Distribution of Phytolacca americana and Human Exposure Risk: A Correlation Analysis of iNaturalist and Census Data**

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American pokeweed (Phytolacca americana) is a highly toxic plant distributed broadly across North America, with all plant parts containing harmful phytolaccatoxins, saponins, and lectins. Despite its toxicity, limited research has quantified the relationship between its geographic prevalence and potential human exposure risk. This study proposes to investigate whether counties with higher observation densities of P. americana correspond to greater estimated exposure risk, operationalized through population density as a proxy for human-plant contact probability. Occurrence data will be obtained from iNaturalist via the Global Biodiversity Information Facility (GBIF) API, filtered to research-grade observations recorded between 2020 and 2024, yielding 111,000+ georeferenced records across the contiguous United States. To address observer bias inherent in citizen science platforms, records will be normalized by user activity density per county. County-level population data will be sourced from the 2020 U.S. Decennial Census. Geographic distribution and observation density will be visualized using Tableau Public, and a Spearman rank correlation will be conducted in Microsoft Excel to assess the relationship between pokeweed observation density and human population density across counties. A positive correlation between observation frequency and population density is anticipated,

particularly across the Mid-Atlantic and Southeastern United States, suggesting that residential and peri-urban environments may represent disproportionate zones of human-plant contact. These findings would highlight the utility of integrating citizen science data with demographic datasets to inform public health education and toxic plant awareness in community settings.

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**Distance-Dependent DNA Damage and Microdosimetric Response from Actinium-225 Alpha Emissions: Implications for Targeted Alpha Therapy Design**

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Targeted alpha therapy (TAT) using radionuclides such as Actinium-225 (Ac-225) is a promising cancer treatment due to the high linear energy transfer (LET) and short range of alpha particles, which produce dense, difficult-to-repair DNA double-strand breaks (DSBs). However, these same properties make biological outcome highly sensitive to the spatial relationship between the radioactive source and the cell nucleus. In clinical and preclinical applications, this geometry is influenced by radionuclide localization, cellular uptake, subcellular trafficking, and the effective linker length between the radionuclide and its targeting vector. In this work, we combine Monte Carlo radiation transport, microdosimetric scoring, and mechanistic DNA damage-and-repair modeling to systematically quantify how DNA damage induction, repair fidelity, microdosimetric quantities, and relative biological effectiveness depend on the distance between an Ac-225 source and the nucleus. Individual alpha energies representative of the Ac-225 decay chain are explicitly resolved and combined into an effective chain-level biological response. Our results demonstrate that DNA damage and repair outcomes are governed primarily by source–nucleus geometry, with biologically significant damage confined to a finite spatial region surrounding the nucleus. These findings provide a quantitative framework for optimizing linker length and subcellular targeting strategies in Ac-225-based radiopharmaceuticals.

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**Impact of Prior Authorizations on Access to Care for Opioid Use Disorder Patients in Washington D.C.**

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Background: Approximately 2.5 million people aged 18 years and older in the U.S. had an opioid use disorder (OUD) and only 1 out of 5 of them received medication. Washington D.C. is among the top three in OUD overdose deaths nationally. Medicaid is key to the improvement of OUD treatment because it helps approximately 40% of the Americans with OUD. Medicaid is available as fee-for-service or through a managed care organization (MCO) and program differences impact access to care and treatment outcomes. This study examines prior authorizations (PAs) from a cohort of patients in Washington D.C. to determine the rationale behind their issuance and the impact on their care. Methods: We employed a retrospective cohort study design using electronic medical record data of patients from an opioid use disorder practice in Northeast Washington D.C. Patient demographic data, insurance information, and PA documentation were collected to determine the rationale behind PA approvals or denials. Univariate analyses were conducted and regression analyses were performed to compare insurance plans by their rate of PA issuance and denials. Anticipated Results: Medicaid MCOs will have a statistically significantly higher rate of PA issuance and denials compared to other insurance plans. Conclusions: Prior authorizations can serve as a useful cost-control mechanism but they can also pose a barrier to treatment, especially for patients with an OUD. Insurance companies must find the balance between cost efficiency and access to care for OUD patients.

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**Long Term Neurological Sequelae in HELLP Patients**

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HELLP syndrome, characterized by hemolysis, elevated liver enzymes, and low platelet count, is one of the most severe complications of pregnancy and is associated with significant maternal morbidity and mortality in the acute period. Although maternal mortality rates may reach 24%, its incidence ranges from 0.5–0.9%. While short-term systemic and neurological complications are well described, long-term neurological sequelae remain poorly understood. Using the TriNetX Global Collaborative Network, we conducted a retrospective cohort study of pregnant women aged 25–40 diagnosed with HELLP syndrome compared to matched controls without HELLP. Patients diagnosed within the last 20 years across 160 healthcare organizations in 30 countries were included. Neurological outcomes assessed included stroke, migraine, epilepsy/seizure disorders, and all-cause mortality. Propensity score matching was performed 1:1 for demographic and clinical covariates, with standardized mean differences <0.1 indicating excellent balance. After matching, both cohorts included 15,556 women with a mean follow-up of 5.2 years. Although women with prior HELLP had higher incidences of stroke, epilepsy/seizure disorders, and migraines than controls, these outcomes were rare overall. Patients diagnosed with HELLP syndrome were 3.5x more likely to have a stroke, twice as likely to develop epilepsy/seizure disorders, and 25% more likely to develop

migraines compared to control groups. Mortality was not significantly different between cohorts. Long-term neurological complications after HELLP are uncommon but significantly increased. These findings provide reassuring evidence of low absolute risk while highlighting the importance of long-term follow-up and awareness.

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**The City Struggling to Sleep: Examining Associations between Neighborhood and Sleep Health through the Lenses of Self-Reported and Geospatial Indicators of Neighborhood Distress**

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Introduction: Environmental factors increase the risk for negative health outcomes which disproportionately effect African Americans. Poor sleep duration and sleep efficiency– both of which are influenced by poverty and crime rates– have been linked to metabolic and cardiovascular disease. Threats of violence may increase feelings of vulnerability and hypervigilance, potentially decreasing sleep quality. This study aims to explore relationships between sleep health measures and neighborhood distress using both subjective and geospatial neighborhood indicators. Methods: African Americans in DC, between the ages of 18-36, completed the Insomnia Severity index (ISI) and City Stress Index (CSI). The sample includes 2 cohorts who were recruited between 2010-2015 and 2017-2024. Sleep quality indicators, including sleep duration, sleep efficiency, and wake after sleep onset (WASO), were measured using home-based actigraphy. The addresses of the participants were linked to census tracts defined by the Census Bureau using the MAR geocoder and QGIS mapping software. Violent crime, poverty rates, and noise levels were obtained from the DC Census Bureau. Results: CSI was found to be positively correlated with ISI ($p< 0.01$), negatively correlated with sleep efficiency ($p<0.001$), and positively correlated with WASO ($p<0.001$). Poverty rate was also negatively correlated with total sleep time ($p < 0.05$). Conclusion: That self-reported perceptions of neighborhood disorder were more strongly correlated with poor sleep outcomes than geospatially-derived indicators suggests that perceptions may be important to understanding neighborhood's effect on sleep health, and aggregated spatial measures may not fully reflect lived experiences.

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**Synthesis and Characterization of Cell-Penetrating Peptide-Drug Conjugates for Pancreatic Cancer Treatment**

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Pancreatic cancer (PC) is highly lethal, requiring innovative therapies. This study aims to develop a novel treatment using a peptide conjugate system with a potent cytotoxic agent, emetine. A modified cell-penetrating peptide; azide-terminated cyclic iRGD was synthesized by solid-phase peptide synthesis (SPPS) and conjugated to the emetine (Eme)-bearing linker. The targeted conjugate iRGD-GFLG-Eme was synthesized via a revised Strain-Promoted Azide-Alkyne Cycloaddition (SPAAC) method. The iRGD-GFLG-Eme conjugate synthesis was confirmed by mass spectrometry (m/2:1405.48; calculated exact mass: 1404.65). The conjugate's drug release was evaluated at pH 6.0 and 37 °C using high performance liquid chromatography (HPLC), and its stability was assessed in PBS at pH 7.4. In the presence of exogenous cathepsin B, approximately 50% of the drug was released after 8 hours and 80% after 24 hours. No drug release was observed in the absence of cathepsin B. These findings highlighted the requirement of cathepsin B for the specific release of the drug. Additionally, there was no change in the pattern and retention time (5.53 min) of the conjugate peak across various time intervals when analyzed by HPLC, suggesting that the conjugate would be stable in the blood. These findings imply that the conjugate may offer significant therapeutic advantages in PC in vitro and in vivo models. iRGD peptide will ensure tumor penetration of the conjugate while specific cathepsin B cleavage of the conjugate will allow selective drug release within the tumor microenvironment.

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**Effects of a 1-Month High-Fructose Diet on Insulin Signaling in Skeletal Muscle of Protein Kinase C Epsilon Heterozygous (PKCε-Het) Male Mice**

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Background:Protein kinase C epsilon (PKCε) plays a central role in insulin signaling and glucose metabolism in liver and skeletal muscle. High-fructose diets (HFrD) are known to induce insulin resistance, a hallmark of type 2 diabetes, by impairing the Akt pathway. The impact of PKCε heterozygosity on insulin signaling under HFrD conditions remains unclear. Objective: To investigate the effects of a 1-month high-fructose diet on insulin signaling in skeletal muscle of liver-specific PKCε heterozygous (Liv-PKCε-Het) male mice, with a focus on Akt and Foxo1 phosphorylation as markers of insulin sensitivity. Methods: Liv-PKCε-Het mice were assigned to either a high-fructose diet (HFrD) or control diet (CD) for 1 month. Western blot analysis of skeletal muscle tissue assessed phosphorylation of Akt (S473) and Foxo1 (S256), along with total protein levels and insulin receptor expression, under basal and insulin-stimulated conditions. Results: HFrD impaired insulin signaling as evidenced by reduced p-Akt/Akt ratios in both basal (HFrD: 0.74 vs CD: 1.00) and insulin-stimulated conditions (HFrD: 1.30 vs CD: 1.20). Paradoxically, downstream p-Foxo1/actin and p-Foxo1/Foxo1 levels were elevated in HFrD-fed mice after insulin stimulation (3.66 and 2.21, respectively), suggesting compensatory mechanisms. Total AKT and Foxo1 protein levels were modestly increased (AKT/actin: 3.86; Foxo1/actin: 1.28), and insulin receptor expression was upregulated (HFrD+Ins:

1.83 vs CD-Basal: 1.00). Conclusion: A 1-month high-fructose diet disrupts normal insulin signaling in skeletal muscle of Liv-PKCε-Het mice, characterized by impaired AKT activation despite preserved or enhanced downstream Foxo1 phosphorylation. These results suggest altered feedback or cross-talk within insulin-responsive pathways, highlighting the complex role of PKCε in diet-induced insulin resistance.

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**The Impact of Temperature on the Geographic Distribution of the Pipevine swallowtail**

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*Presentation Type: Poster Presentation*
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This study investigates the lepidopteran species Battus philenor (Pipevine swallowtail) to determine if its geographic range and population density are significantly modulated by latitudinal thermal gradients. As sensitive bio-indicators, shifts in butterfly distribution provide critical insights into environmental responses to climatic warming. The hypothesis of this study is that B. philenor exhibits significantly higher prevalence and extended phenological activity in southern regions due to increased Growing Degree Days (GDD) and prolonged breeding seasons. Observational datasets were synthesized from the iNaturalist Research Grade database and analyzed alongside NOAA seasonal temperature patterns using R. To evaluate the genetic implications of these distribution patterns, Cytochrome c Oxidase I (COI) sequences were retrieved from GenBank, aligned via MUSCLE, and analyzed in MEGA11 to assess latitudinal genetic distance. Graphical and regression analyses were used to examine the precise relationship between thermal accumulation and butterfly prevalence. Findings are expected to demonstrate that warmer climatic envelopes in southern states facilitate higher population success and potentially distinct phenological cohorts. These results will suggest that temperature-dependent breeding windows are the primary drivers shaping the geographic constraints and adaptive capacity of the Pipevine Swallowtail.

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**Laponite as an Efficient nanocarrier for dual delivery of curcumin and Chloroquine Diphosphate**

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Breast cancer accounts for nearly 30% of new cancer diagnoses among women worldwide, highlighting the urgent need for more effective therapeutic strategies. Combination chemotherapy has consistently demonstrated superior efficacy over monotherapy in breast and other cancers, including lung and ovarian malignancies. However, conventional drug delivery approaches often suffer from burst release, poor site specificity, and systemic toxicity. Nanoparticle-based systems offer significant advantages, enabling targeted, controlled, and sustained drug release while minimizing off-target effects. This study investigates Laponite as a dual-function nanocarrier for Chloroquine (CHQ) and Curcumin (CUR). Laponite is a Janus nanoclay characterized by negatively charged basal surfaces and positively charged edges. This unique charge anisotropy enables electrostatic loading of cationic chloroquine onto the negatively charged surfaces and anionic curcumin at the positively charged edges, facilitating dual-drug incorporation within a single platform. Encapsulation efficiency, release kinetics, and structure–composition–cancer efficacy relationships were systematically evaluated. Comprehensive physicochemical characterization using FTIR, XRD, UV–Vis spectroscopy, DLS, and TGA provided insights from atomic-scale interactions to macroscopic structural behavior. The Laponite-based nanocarrier achieved over 95% chloroquine and curcumin encapsulation efficiency, preserved crystallinity after intercalation, and exhibited pH-responsive release behavior. Understanding the charge chemistry and interfacial interactions of Laponite enables the rational design of advanced nanocarriers for dual drug delivery. By exploiting its anisotropic surface and edge charges, this system provides a synergistic therapeutic advantage compared to single-drug administration through enhanced loading efficiency and controlled release behavior. Beyond oncology, these insights extend to broader materials science applications, offering design principles relevant to pharmaceutical formulations, catalysis, and energy-related systems.

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**Utilizing Citizen Science Data to Monitor Vector-Borne Disease Risk: A Study of Triatoma gerstaeckeri and Chagas Disease in Texas**

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Triatomines are hematophagous insects within the family Reduviidae and serve as vectors for Trypanosoma cruzi, the causative agent of Chagas disease. Triatoma gerstaeckeri is among the most frequently reported triatomine species in Texas and participates in regional transmission cycles of T. cruzi. This study evaluates whether annual research-grade observation frequency of T. gerstaeckeri in Texas is associated with reported annual Chagas disease cases between 2013 and 2024. Research-grade observations will be obtained from iNaturalist and filtered for confirmed Texas records.To account for growth in platform participation over time, annual T. gerstaeckeri observations will be normalized relative to total annual Texas insect observations recorded on iNaturalist. Annual Chagasdisease case counts will be collected from the Texas Department of State Health Services. Spearman rank correlation analysis will be conducted in RStudio to assess the monotonic association between normalized vector observation frequency and reported disease incidence. Citizen science observations will be interpreted as a proxy for reported vector presence rather than direct measures of population density. Limitations include reporting bias, potential underdiagnosis of Chagas disease, inability to distinguish travel-associated from autochthonous cases, and constraints inherent toecological correlational analyses. This

study explores the utility of publicly available surveillance and citizen science data in identifying patterns relevant to vector-borne disease risk in Texas.

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**Carrier Mediated Therapies for PARPi via LAT1 for Glioblastoma Treatment**

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*Presentation Type: Poster Presentation*
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Central nervous system tumors are one group of elusive cancers that are difficult to treat due to their location and sensitivity of their host organ. Of the three most common CNS tumors, glioblastoma multiforme is the most common in adults and the only malignant one characterized by a highly invasive proliferation of astrocytes. Presently, there is no definitive treatment for glioblastoma and recurrence is common. Studies have shown that poly-(ADP-ribose)-Polymerase (PARP) inhibitors are a potential treatment for GBM, however, their poor capacity to cross the blood brain barrier limits their clinical application. This study aims to overcome this challenge using carrier-mediated drug delivery via L-type Amino Acid Transporter 1 (LAT1). LAT1 is found in high concentrations on the blood brain barrier and is known to transport aromatic and branched chain amino acids. Previous studies in our lab show that azatryptophans utilize LAT1 for cellular transport and provide traceable fluorescent signals. We aim to couple tryptophan and its derivatives to Poly9(ADP-Ribose) -Polymerase inhibitors to potentially allow the drugs to cross the blood-brain barrier and expand their use as a trackable treatment method for CNS tumors. Using fluorescent substrates, this strategy will allow real-time monitoring of drug delivery.

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**Impact of PNPLA3 rs738409 Variant on IL-6-Mediated Inflammation in African Americans with MASLD**

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Background: Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD) takes a major share in globally causing chronic liver disease. Prior research at Howard University suggests that African Americans (AA) exhibit partial protection against MASLD, potentially due to a single nucleotide polymorphism (SNP) in PNPLA3 (rs738409), which results in an isoleucine-to-methionine substitution. Given population differences in PNPLA3 allele frequencies, understanding the functional consequences of this SNP in AA populations is critical. This pilot study examined the upstream and downstream effects of the three PNPLA3 genotypes (C/C, C/G, G/G) on IL-6–related signaling. Methods: SNP genotyping was performed to identify PNPLA3 rs738409 variants in AA MASLD patients (n=11; mean age 45 ± 8.15 years) and non-MASLD AA controls (n=10; mean age 27 ± 11.42 years) from Washington, DC. Sociodemographic, lifestyle, and clinical data were collected. Ingenuity Pathway Analysis (Qiagen) was used to characterize IL-6–associated gene networks and metabolic pathways. Result: Allele frequencies were 62% C/C, 29% C/G, and 10% G/G. Differential gene expression demonstrated IL-6 activation in mutated alleles compared with wildtype. Ten genes were significantly dysregulated ($p<0.05$; $\geq\pm$4-fold), including MAPK12, TPTE, and CRYBB2. Hepatic Fibrosis Signaling and Hepatic Stellate Cell Activation were the key canonical pathways. Causal network analysis showed activation of IL1B, EXOSC3, and PRTN3, with inhibition of MYOCD, MAP3K5, and E2F1.Conclusion: The study provides novel insight into PNPLA3 polymorphism–specific inflammatory signaling in AA with MASLD. These findings support further large-scale, multiethnic studies incorporating blood and liver tissue to validate molecular classifiers of MASLD risk and progression.

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**Suppression of the Notch Pathway by Tangeretin: A Therapeutic Strategy for Androgen-Dependent and Androgen-Independent Prostate Cancer Cells**

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Prostate cancer ranks among the most common malignancies in men globally and is the fifth leading cause of cancer related deaths in males. Studies show that early detection and hormone therapies often improve outcomes, but advanced or recurrent prostate cancer is still difficult to treat, since radical prostatectomy does not prevent recurrence, which can occur locally or at distant sites. Most deaths are due to metastasis. The Notch1 signaling pathway, involving Notch ligands, receptors, and transcription factors, is linked to poor survival in cancer patients and may serve as a prognostic marker. Higher Notch expression promotes cell growth, invasion, and possibly metastasis. The KISS1 gene encodes a precursor processed to generate Kisspeptin 10; KISS1 binds to GPR54/KISS1R and suppresses metastasis in various cancers. In some cases, KISS1 is reexpressed without the receptor yet still suppresses metastasis, suggesting an unknown signaling pathway. EIF2AK2, a kinase activated by double stranded RNA, inhibits metastasis and supports tumor suppression when activated by increased Kisspeptin levels. Tangeretin, a polymethoxylated flavonoid from citrus peel, exhibits anti inflammatory and anticancer properties. It inhibits Notch signaling, which elevates KISS1 levels; KISS1 activates EIF2AK2, thereby reducing metastasis. Enhancing tangeretin's activity through acetylation can improve its anticancer effects and oral bioavailability. Proposed experiments will use multiple prostate cancer cell lines to measure tangeretin's effects on viability, gene expression, apoptosis, and cancer stem cell markers, with results expected to show that tangeretin suppresses the Notch pathway and reduces proliferation while increasing apoptosis.

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**Distinct Metabolic Pathways of Hidradenitis Suppurativa and Severity-Associated Biomarkers**

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School/College: Other
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Background: Hidradenitis suppurativa (HS) is a chronic inflammatory skin disease disproportionately affecting patients with skin of color. While biologics such as TNF-α and IL-17 inhibitors benefit some patients, variable response rates suggest alternative pathogenic pathways. Moreover, the biological basis of HS heterogeneity and severity across Hurley stages remains poorly defined. Methods: We analyzed serum samples from 58 individuals (HS patients and controls) using matrix-assisted laser desorption/ionization (MALDI) mass spectrometry. Data were processed through MetaboAnalyst and mapped onto KEGG pathways to identify altered metabolic signatures. Comparative analysis was performed to identify the pathways altered in patients with HS compared to controls, using a statistical significance threshold of –log10(p-value) > 1.1. Results: Compared with controls, HS patients showed significant disruptions in vitamin B3 (niacin) metabolism (−log10(p)=1.6) and terpenoid backbone biosynthesis (−log10(p)=1.34). Anatomic site–specific analyses revealed associations between atypical HS distributions (neck/face) and alterations in xenobiotic and sphingolipid metabolism, while gluteal HS correlated with terpenoid backbone biosynthesis changes. Conclusions:
HS is characterized by distinct metabolic alterations in lipid and vitamin metabolic pathways with potential therapeutic relevance. Ongoing work will profile HS across Hurley stages to identify severity-associated biomarkers and metabolic drivers of disease progression, to inform tailored stage-based interventions. Discussion: Our findings highlight lipid and vitamin metabolic dysregulation in HS, implicating pathways that regulate inflammation, skin barrier function, and immune signaling. These results underscore the complexity of HS biology and the need for stage-specific metabolic profiling. Limitations: This study analyzed serum from a single cohort, and further tissue-specific validation is needed.

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**Exosomal miRNA as Potential Early Indicator of Diabetic Kidney Disease**

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Diabetic kidney disease (DKD) is the leading cause of end-stage renal disease worldwide and remains difficult to detect in its early stages. Current clinical markers, including estimated glomerular filtration rate (eGFR) and albuminuria, often fail to identify renal dysfunction before significant damage has occurred. Urinary exosomal microRNAs (miRNAs) have emerged as promising noninvasive biomarkers that may reflect early molecular changes in kidney pathology. This study investigated whether specific urinary exosomal miRNAs are differentially expressed in patients with Type 2 diabetes mellitus (T2DM) and DKD. Urine samples were collected from healthy controls (n=6), T2DM patients (n=9), and DKD patients (n=9). Exosomes were successfully isolated and characterized through nanoparticle tracking analysis and confirmation of exosomal markers (CD9, CD81, and TSG101). RNA was extracted, and expression levels of miR-451a and miR-133a-3p were quantified using RT-qPCR. Preliminary results revealed a significant increase in miR-451a expression in DKD patients compared to healthy controls ($p < 0.05$), while no significant difference was observed between T2DM and DKD groups. In contrast, miR-133a-3p showed no significant differential expression across groups. These findings support the potential role of miR-451a as an early, noninvasive biomarker for DKD. Ongoing analyses aim to further evaluate stage-specific expression and clinical correlations.

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**Regulation of Nrg1 by Gbx2 in Development and Photothrombotic Stroke Models**

Presenter's Name: Oluwafayokemi Oyolola
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The transcription factor Gbx2 has established roles in central nervous system development and has been shown to regulate Nrg1 expression. Nrg1 is implicated in microglial modulation following ischemic injury, yet it remains unclear whether Gbx2 participates in post-stroke regulatory responses or whether reduced Gbx2 expression alters Nrg1 distribution beyond the developing brain. This collaborative project investigates two questions: (1) whether photothrombotic stroke induces altered Gbx2 expression to regulate Nrg1 during microglial activation, and (2) whether Nrg1 expression is modified in Gbx2^neo/neo^ hypomorphic mutants, which express 6–10% of wild-type Gbx2 levels. Wild-type (P21+) mice and stroke models (3–12 hours post-injury) are analyzed alongside developmental wild-type and Gbx2^neo/neo^ embryos (E12.5, E16.5). In situ hybridization is used to visualize spatial expression patterns of Gbx2 and Nrg1 in brain and urogenital tissues. Comparative analysis across injury and developmental contexts will determine whether Gbx2 functions as a regulatory node linking developmental patterning to injury-induced signaling pathways. Identifying dose-dependent or injury-responsive changes in Nrg1 expression may clarify mechanisms underlying microglial modulation and reveal broader tissue-specific roles of Gbx2. This work integrates developmental genetics with neuroinflammatory models to define transcriptional control mechanisms in both physiological and pathological contexts. This material is based upon work supported by the National Science Foundation under Grant No. 2000005. The content is solely the responsibility of the authors and does not necessarily reflect the official views of the NSF.

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**Assessing Transfusion-Associated Iron Overload and Through Exercise in Pediatric Sickle Cell Disease**

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*Presentation Type: Poster Presentation*
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Symptoms associated with Sickle cell disease (SCD) include anemia, Vaso-occlusive pain crises (VOC), localized swelling, rapid infections, and organ damage. To combat extreme cases for these symptoms, patients typically undergo a combination of medications with blood transfusions. A side effect of multiple blood transfusions is iron overload, which creates a higher frequency of inflammation amongst SCD patients. This paper aims to investigate whether increased lifetime blood transfusions are associated with higher risk of iron overload and if so, does this correlate with a higher frequency of chronic pain within pediatric SCD? The dataset used is provided by the PUSH cohort from Biodata Catalyst NIH which is a cloud-based pipeline for TOPmed. This cohort contains SCD patients with a mean age of 11.75 years, and the dataset contains a wide range of demographics and phenotypic labels such as iron overload status and type of SCD each patient has. The overall findings within these statistical analyses show a positive correlation between the number of blood transfusions and iron overload status. Furthermore, the finding shows a deviation amongst the mean chronic pain intensity of pediatric SCD patients whose total lifetime blood transfusions exceeded 19 between iron overload and no iron overload.

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**Hexamer and Dodecamer Structures of the Very Large AAA+ ATPase VCP/p97 and Allosteric Inhibition as a Strategy to Stymie Cancer**

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Background: Valosin-containing protein (VCP/p97) is a type 2 ATPase associated with various cellular activities (AAA+). It is conserved across all domains of life. VCP/p97 ATPase is an important cellular machine complex critical for maintaining intracellular homeostasis and holds the key to cell division and cell death. VCP/p97 function is effected through profound structural transitions: as an ATPase, VCP/p97 uses energy derived from ATP hydrolysis to unfold and sort proteins and lipids, thereby facilitating their movement and disassembly. VCP/p97 is overexpressed in several cancers. We have developed a series of small molecules that inhibit VCP/p97 activity and cancer cell progression. We conjecture that the small molecules work through allosteric inhibition. We aim to decipher the precise mechanism of allosteric inhibition through structure determination and analysis using cryoelectron microscopy. Methods: We produced highly purified VCP/p97 protein following standard procedures. We prepared grids to load samples and froze them rapidly at -170°C to create vitreous ice, and used low dose TEM to capture thousands of 2D images. Millions of single protein particles were collected, computationally reconstructed and combined into a 3D model for analysis. Results: We have obtained high resolution hexamer and dodecamer structures of VCP/p97 at near atomic resolution. Conclusion: High-resolution structures are a crucial first step in mapping allostery. Binding at allosteric sites, away from the active sites, regulates VCP/p97 activity in a manner not limited to how the protein interacts with substrates and cofactors. The allosteric inhibitors have the potential to overcome resistance to ATP-competitive inhibitors.

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**The Role of Differential Equation Modeling in Analyzing Vaccination Strategies and Waning Immunity During Epidemics**

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Mathematical modeling plays a pivotal role in capturing the complex mechanisms that govern the spread and control of infectious diseases. Among the most widely used frameworks, the Susceptible–Infectious–Recovered (SIR) and Susceptible–Infectious–Vaccinated (SIV) models provide fundamental insights into how vaccination programs and waning immunity affect epidemic dynamics. While the classical SIR model highlights the natural progression of infection and recovery, the SIV extension incorporates vaccination as an additional compartment, allowing researchers to assess both immediate and long-term impacts of immunization. Moreover, the inclusion of waning immunity within these models reflects the realistic scenario in which vaccinated or recovered individuals may gradually lose protection and return to susceptibility. By integrating these dynamics into systems of differential equations, it becomes possible to evaluate the effectiveness of constant and time-dependent vaccination strategies, explore threshold conditions such as the basic reproduction number, and predict the potential for disease resurgence. Such analytical approaches not only deepen theoretical understanding but also provide actionable insights for policymakers seeking to design robust and sustainable epidemic control measures.

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**Zika Virus-Induced Lipid Droplet Depletion and Lipid Metabolic Reprogramming Drive Cardiac Dysfunction in 2D and 3D Cardiomyocyte Models**

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Classification: Graduate Student
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Zika virus (ZIKV) infection is associated with severe disease outcomes, yet host pathways that support replication and contribute to cardiac dysfunction remain incompletely defined. We focus on a reproducible infection phenotype: lipid droplet (LD) depletion and remodeling of host lipid handling. We hypothesize that ZIKV mobilizes LD stores through

host lipolysis to increase lipid availability for replication and that these metabolic shifts accompany cardiac-relevant functional changes. We quantify LD abundance during infection using an imaging-first workflow combining BODIPY staining, immunofluorescence, and standardized ImageJ analysis. To connect phenotype to mechanism, we integrate RNA sequencing, reverse transcription quantitative polymerase chain reaction (RT-qPCR), and Western blotting to identify candidate lipid regulators associated with LD loss. We test causality using CRISPR-Cas9 perturbations targeting key lipolytic enzymes, including lysosomal acid lipase (LIPA) and neutral lipases (ATGL and LIPE/HSL). In parallel, we modulate lipid availability using lipid depletion and lipid restoration conditions (e.g., 2-bromopalmitate and oleic acid supplementation) to evaluate how LD abundance influences viral replication. To capture lipid mobilization directly, we perform free fatty acid assays as a readout of lipid release during infection and perturbation. To address clinical relevance, we extend these studies to cardiac cell models and organoids and monitor infection-associated phenotypes, including ion irregularities. Together, this work links ZIKV-driven LD depletion and host lipase activity to lipid release and replication outcomes, motivating host-directed strategies that target lipid mobilization pathways.

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**Healing Inequity: Advancing Racial Equity in Diabetic Foot Ulcer Care Through a Standardized Mobile Wound Care Protocol**

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Introduction: Diabetic foot ulcers (DFUs) are a serious complication of diabetes, frequently resulting in infection, hospitalization, and amputation. Racial and ethnic disparities persist, with minority patients experiencing worse outcomes due to delays in specialized care and limited access.[1] Mobile wound care offers a promising strategy to address these disparities by bringing targeted services directly to underserved communities.[2] Methods: A standardized, equity-focused protocol was developed by synthesizing findings from mobile wound care literature and internal clinical case reports.[3] Components include a standardized care plan, clinician training on darker skin tone assessment, and structured screening for social determinants of health (SDOH). Clinician training on recognizing darker skin tones was included to improve diagnostic accuracy and care equity.[4] Results: This protocol was piloted in a mobile wound care setting, where early observations suggest improved DFU outcomes through early detection, expedited care, and increased adherence. Culture-based education and anti-bias training promoted consistent care across racial and ethnic groups. Addressing SDOH during treatment helped eliminate barriers such as food insecurity and limited health literacy, ultimately improving outcomes for patients with DFUs.[5] Discussion: This project would improve access in high-risk populations by integrating SDOH screening, clinician training, and standardized follow-up. Future work should validate these findings across a larger cohort and incorporate EMR-based workflows to support clinical adoption. These findings support broader implementation of mobile wound care models to address longstanding disparities in diabetic foot outcomes and deliver culturally sensitive DFU management.

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**Comparative Genomics of Heat Shock Proteins: Investigating Thermal Tolerance in Thermophilic and Mesophilic Chaetomium Species**

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Heat shock proteins Hsp70 and Hsp90 play critical roles in thermal stress response, yet their contribution to heat tolerance in fungi remains understudied. This study investigates whether thermophilic fungi possess more heat shock protein gene copies than their mesophilic relatives by comparing Chaetomium thermophilum and Chaetomium globosum, congeneric species with contrasting thermal preferences. Genomic sequences for both species were obtained from NCBI and JGI MycoCosm databases. BLAST searches identified all Hsp70 and Hsp90 gene copies in each genome, which were then quantified and compared. Optimal growth temperature data for each species were compiled from published thermal tolerance studies to contextualize copy number differences. The preliminary hypothesis is that C. thermophilum will exhibit significantly more Hsp70 and Hsp90 gene copies than C. globosum, correlating with its ability to survive and proliferate at higher temperatures. Identifying this relationship would provide mechanistic insight into fungal thermotolerance and demonstrate how gene duplication contributes to ecological niche specialization.

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**Using Population Ragweed Observations to Predict Allergy-Related Emergency Department Visits in the Washington–Maryland Region (2019–2024)**

Presenter's Name: Mariah Polk
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Common ragweed (Ambrosia artemisiifolia) is a major contributor to seasonal allergic disease, driving symptoms such as allergic rhinitis and asthma exacerbations that frequently result in emergency department (ED) visits. Pollen networks are infrequent and geographically limited, creating gaps in the understanding of localized allergenic risk. This study evaluates whether citizen-science biodiversity data can serve as an effective proxy for assessing environmental allergy exposure. To do so, it examines the relationship between iNaturalist-reported annual ragweed observations and the rate of allergy-related ED visits. Ragweed abundance was assessed using "Research Grade" iNaturalist observations, while allergy-related ED visits were extracted from publicly available 2019 to 2024 datasets from the Maryland Department

of Health and DC Health using ICD-10 codes for allergic rhinitis and asthma. Population estimates from the American Community Survey were used to calculate annual ED visit rates. Ragweed observations were normalized by county population and total iNaturalist activity to minimize sampling bias. Ragweed hotspots identified through citizen reporting were evaluated for correlation with regional allergic morbidity, and this study investigates the potential of digital epidemiology to supplement traditional aerobiological monitoring. Findings aim to provide a framework for integrating citizen science biodiversity data into public health preparedness and to improve early identification of environmental allergy risks in urban and suburban environments.

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**Optimizing Alzheimer's Prevention in Women with Diabetes: A PharmD Perspective**

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Background: Alzheimer's disease (AD) exhibits significant sex-specific differences, with women experiencing higher risk and greater disease burden than men. Factors contributing to this disparity include hormonal changes, genetic predisposition, neuropathological differences, psychosocial and lifestyle influences, and increased longevity. Emerging evidence suggests that metabolic conditions, particularly diabetes, may differentially modulate AD risk in women. Methods: This project conducted a literature-based review examining sex-specific biological and metabolic mechanisms influencing diabetes-associated AD risk. Key areas of focus included postmenopausal hormonal changes, APOE ε4 genotype effects, insulin resistance, vascular dysfunction, and neuropathological progression, along with psychosocial contributors such as cognitive reserve and mental health. Results: Evidence indicates that postmenopausal estrogen decline accelerates amyloid and tau accumulation, amplifies metabolic stress, and reduces neuroprotection in women. The APOE ε4 allele confers higher risk and earlier onset in women compared to men. Diabetes-related insulin resistance and vascular complications intersect with these sex-specific factors, further increasing AD susceptibility. Women also exhibit faster tau pathology progression and stronger neuroinflammatory responses. Psychosocial and lifestyle factors, including historically lower cognitive reserve and higher prevalence of depression and insomnia, may compound these effects.Conclusion: Diabetes interacts with sex-specific biological, genetic, and metabolic factors to disproportionately increase AD risk in women. PharmD practitioners play a vital role in addressing this risk by optimizing individualized pharmacotherapy, monitoring drug interactions, managing comorbid metabolic conditions, and providing patient-centered counseling. By integrating sex-specific and diabetes-related considerations into clinical care, pharmacists can enhance risk assessment, improve therapeutic outcomes, and contribute to personalized strategies for the prevention and management of Alzheimer's disease.

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**The Incidence of Schizophrenia and Other Psychotic Disorders in Narcolepsy Type 1 vs Narcolepsy Type 2**

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Background: Narcolepsy is a disorder of sleep characterized by excessive daytime sleepiness. Psychiatric comorbidities are common in narcolepsy, but the relationship with the cataplexy subtype and psychotic disorders remains uncertain. Objective: To determine whether patients with Narcolepsy type 1 (NT1) have a higher incidence of psychotic disorders compared with patients with narcolepsy type 2 (NT2). Methods: A retrospective cohort study was conducted using the TriNetX Global Collaborative Network. Two cohorts were defined: NT1 (with cataplexy; n = 22,066) and NT2 (without cataplexy; n = 63,693). After propensity score matching for age, sex, race, and comorbidities, each cohort included 21,709 patients. Incidence of schizophrenia and other psychotic disorders was compared using risk ratios (RR) and Kaplan–Meier survival analysis. Results: During a mean follow-up of 5.6 years, 69 NT1 patients (0.32%) and 65 NT2 patients (0.30%) developed schizophrenia, corresponding to incidence rates of 0.57 and 0.54 per 1,000 person-years, respectively (RR 1.07; 95% CI, 0.77–1.48; p = 0.68). When outcomes were broadened to include all psychotic disorders, NT1 showed a significantly higher incidence than NT2 (0.65% vs 0.44%; RR 1.48; 95% CI, 1.12–1.95; p = 0.01). Kaplan–Meier analysis revealed similar schizophrenia-free survival but a mild divergence favoring higher cumulative psychotic risk in NT1 beyond three years. Conclusion: Patients with cataplexy are not at greater risk of schizophrenia compared with those without cataplexy; however, NT1 may confer a modestly increased susceptibility to broader psychotic-spectrum disorders.

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**Discovery and Initial Characterization of Mycobacteriophage PoloRLTeddy Using Mycobacterium smegmatis**

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*Presentation Type: Poster Presentation*
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Bacteriophages are viruses that infect bacteria and provide insight into microbial evolution, diversity, and potential therapeutic applications. The goal of this project was to isolate and begin characterizing a novel bacteriophage capable of infecting bacteria within the genus Mycobacterium. We used Mycobacterium smegmatis mc²155 as the host bacterium because it is nonpathogenic and closely related to clinically relevant Mycobacterium species. A soil sample was collected from the Howard University campus (38.92225° N, 77.021972° W) and screened for phage presence using an enrichment isolation method. Following enrichment, the sample was plated on a Mycobacterium smegmatis lawn to identify zones of clearing indicative of phage infection. A distinct

plaque was selected and purified through multiple rounds of plaque assays until consistent morphology was observed. The phage was amplified to produce a high-titer lysate of $4 \times 10^{11}$ pfu/mL. DNA extraction yielded a concentration of 26.3 ng/µL. Restriction enzyme digests were performed using EcoRI, HindIII, and ClaI, followed by agarose gel electrophoresis to analyze fragment patterns. The ClaI digest produced clear, distinct bands, indicating successful cleavage. In contrast, EcoRI and HindIII digests resulted in smeared patterns, suggesting incomplete digestion or numerous closely spaced restriction sites.The isolated phage, designated PoloRLTeddy, formed homogeneous plaques approximately 3 mm in diameter with a cloudy, ring-like appearance, suggesting possible lysogenic capability. This initial characterization expands understanding of mycobacteriophage diversity and supports continued exploration of phages as potential tools against antibiotic-resistant bacteria.

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**Assessing Prognostic and Therapeutic Associations Across EMAST, MSI, and MSS among African Americans Colorectal Cancer Subtypes**

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Elevated Microsatellite Alterations at Selected Tetranucleotide Repeats (EMAST), microsatellite instability–high (MSI), and microsatellite stable (MSS) tumors represent biologically distinct forms of genomic instability in colorectal cancer (CRC), reflecting mismatch repair dysfunction or proficiency. EMAST has been reported more frequently in African American (AA) rectal cancers, yet its clinical implications remain uncertain. To clarify its relevance, we retrospectively analyzed 304 CRC patients treated at Howard University, predominantly AAs, comparing clinical features, treatment patterns, and outcomes across EMAST, MSI, and MSS genotypes determined by fragment analysis. EMAST tumors exhibited higher overall mortality (32%) than MSI (18%) and MSS (14%). Five-year survival appeared lowest in EMAST (37%) compared with MSI (40%) and MSS (60%); however, survival data were limited (16 EMAST, 10 MSI, 80 MSS), restricting definitive conclusions. MSI tumors were more frequently right-sided (46%) than MSS (13%) or EMAST (15%), consistent with established biology. Gastrointestinal bleeding was the most common presenting symptom across groups. Chemotherapy and radiotherapy exposure were comparable, yet EMAST patients demonstrated worse outcomes, raising an important question: does EMAST confer intrinsic biological aggressiveness rather than reflecting treatment disparities? Despite mortality differences, statistical comparisons revealed no significant associations across demographic, clinicopathologic, remission, or recurrence variables ($p>0.05$). These findings suggest EMAST may function as a biological modifier linked to adverse outcomes in AA CRC.

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**Adiposity, Smoking and Longevity in Blacks and Whites**

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Background: After age 85, blacks had lower mortality rates than whites. The causes remain unexplained. This study hypothesized that exposures to excess adiposity and tobacco smoking were not greater in NHB than in NHW at ages 75 years and older in a population-based national survey. Methods: Data on demographics, diagnoses and risk factors of NHB and NHW aged 75 years and older were examined in the National Health and Nutrition Examination Survey (NHANES). Statistical analysis was done taking complex survey design and analysis weights into account. Results ;In men the distribution of waist circumference in NHW showed a marked shift toward higher levels compared to blacks (Figure S2). In linear regression, race was significantlyassociated with waist circumference after controlling for age, smoking status and BMI in men and in women. Further, the pattern of age-specific mortality from lung cancer, an indicator oflife-time smoking exposure, resembled that for mortality from all causes. In NH men aged 75 and older, blacks were more likely to be never smokers. Conclusion: The findings of the higher lung cancer mortality suggesting greater lifetime smoking exposure in NHW and higher waist circumference in NHW men aged 75 years and older suggests that these factors may contribute to the mortality crossover with lower mortality rates in NHB than NHW at ages 85 and older. Further studies are needed in samples with larger numbers of NHB above age 80.

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**Predicting Traumatic Brain Injury Severity Using Machine Learning**

Presenter's Name: Paria Rezaei
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Traumatic brain injury remains a leading cause of morbidity and mortality worldwide. Approximately 10% of patients with TBI require intensive care unit (ICU) admission. Neurologic severity is traditionally classified using the Glasgow Coma Scale (GCS) as mild (13–15), moderate (9–12), or severe (3–8). Early assessment of TBI severity is critical for triage, interfacility transfer decisions, and resource allocation—particularly in rural, austere, and military environments.Using the MIMIC-IV critical care database, we conducted two complementary modeling experiments. First, we framed TBI severity prediction as a multiclass classification task (mild, moderate, severe). Second, we modeled continuous GCS score prediction as a regression task. We evaluated machine learning and deep learning models, including Logistic Regression, Ridge Regression, Random Forest, XGBoost, Multilayer Perceptron (MLP), one-dimensional Convolutional Neural Network (1D-CNN), and TabNet. Performance was assessed using AUC-ROC, accuracy, and F1-score for classification, and MAE, RMSE, and $R^2$ for regression.

For classification, XGBoost achieved the highest discrimination (AUC-ROC = 0.9186), TabNet the highest accuracy (0.8112), and MLP the highest F1-score (0.7685). For continuous GCS prediction, XGBoost achieved the lowest MAE (1.1298), highest $R^2$ (0.7362), and RMSE of 1.6320. Gradient boosting methods consistently demonstrated superior performance. These findings show that machine learning—particularly gradient boosting—can accurately predict categorical TBI severity and continuous GCS scores using ICU-derived data, supporting early risk stratification and clinical decision-making in high-acuity and resource-limited settings.

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**Investigation of Pathological Vertebrae Among Two Pinniped Species**

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Spinal pathology in pinnipeds remains under characterized despite increasing recognition of infectious and degenerative skeletal disease in marine mammals. This study investigates vertebral lesions in two phocid species, a grey seal (Halichoerus grypus) and a harp seal (Pagophilus groenlandicus), to characterize lesion morphology, anatomical distribution, and potential etiologies. Vertebral elements from museum specimens were examined macroscopically for lytic defects, cortical perforations, reactive bone formation, remodeling, and fusion across thoracolumbar and sacral regions. High-resolution imaging and digital caliper measurements were used to assess lesion size, symmetry, and progression. Lesions were compared based on morphology and anatomical distribution and evaluated against documented patterns of tuberculous spondylitis in humans and other mammals. Both specimens demonstrate pathology concentrated at the thoracolumbar junction and lumbar spine. The grey seal exhibited advanced cortical destruction, vertebral collapse, irregular remodeling, and circumferential osteophyte formation consistent with chronic infection. The harp seal demonstrated comparatively earlier-stage changes, including localized posterior and lateral vertebral body remodeling with patchy ventral perforations. In both cases, anterior vertebral body involvement with reactive bone formation and absence of aggressive neoplastic features favored an indolent granulomatous infectious process. The morphology and anatomical distribution of lesions support the inclusion of infectious etiologies, particularly Mycobacterium pinnipedii, in the differential diagnosis of pinniped vertebral disease. These findings expand current understanding of the skeletal tuberculosis pathology in marine mammals and underscore the value of comparative skeletal analysis for identifying cross-species patterns of chronic infection with potential zoonotic transmission pathways and public health implications.

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**Comparative Genomics of Innate Immunity: Evaluating Gene Conservation in Camponotus floridanus, Drosophila melanogaster and Homo sapiens**

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The Toll signaling pathway is a critical defense system that helps organisms detect and fight infections. Despite 600 million years of evolutionary separation, insects and mammals may share remarkably similar immune genes. This study investigates whether carpenter ants (Camponotus floridanus), fruit flies (Drosophila melanogaster), and humans (Homo sapiens) share three core Toll pathway genes: Toll/TLR4 (detects pathogens), MyD88 (relays signals), and NF-κB (activates immune genes). Protein sequences for fly and human genes will be retrieved from the National Center for Biotechnology Information (NCBI) database. These sequences will serve as queries in BLAST searches against the annotated C. floridanus genome to identify statistically significant ant homologs. Candidate matches will be verified through domain architecture analysis using InterPro to confirm they possess the same functional building blocks as the fly and human versions. Multiple sequence alignments will be performed to quantify percent identity across all three species, with particular focus on conserved functional domains such as TIR, Death, and Rel homology domains. We predict MyD88 will show the highest conservation due to its central role in signal transduction, while Toll/TLR4 may show greater variation reflecting differences in pathogen recognition. This comparative analysis establishes whether social insects employ the same ancestral immune toolkit as solitary organisms, providing insight into fundamental constraints on immune system evolution.

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**Helicobacter pylori Infection Induces Non-B DNA structure associated mitochondrial DNA Instability triggers an inflammatory response**

Presenter's Name: Sara Rostampour
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Co-authors: Nyima Kinteh

Helicobacter pylori infection is a major risk factor for gastric cancer and is known to trigger chronic inflammation and genomic instability. While its effects on nuclear DNA have been investigated, much less is known about how H. pylori affects mitochondrial DNA (mtDNA). Because mtDNA lacks histone protection and has limited DNA repair capacity, it is susceptible to infection-induced cellular oxidative stress. In this study, we infected normal human gastric epithelial cells and a mouse model deficient for oxidative DNA damage repair with H. pylori to investigate changes in mtDNA integrity, identify RNA-DNA hybrid (R-loop) formation, and inflammatory signaling. R-loops were examined

using S9.6 antibody-based immunofluorescence microscopy and slot blot assays, including analysis of mtDNA-associated hybrids. The data show that H. pylori-infected cells exhibit a low level of mtDNA-encoded Complex I genes (ND1), indicating mtDNA genome instability. We have found that mtDNA copy number and oxidative mtDNA damage increase in mouse stomach tissues. Fluorescence imaging of H. pylori-infected cells revealed increased S9.6 signal intensity and clustered puncta, confirming that infection-induced replication-transcription conflicts lead to elevated R-loop accumulation and non-B DNA structures. Slot blot analysis indicated altered levels of mtDNA-associated RNA-DNA hybrids, pointing to disrupted mitochondrial transcription or impaired mtDNA replication. RT-PCR analysis further revealed a strong induction of the interferon-responsive genes IFNB, CCL5, and CXCL10, confirming activation of innate immune and inflammatory signaling pathways. Our findings demonstrate that H. pylori infection disrupts mitochondrial DNA integrity, increases RNA–DNA hybrid accumulation, and exposes aberrant nucleic acids that stimulate innate immune inflammatory signaling.

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**Comparative Risk of Acne Among Patients with Schizophrenia Treated with Clozapine Versus Other Second-Generation Antipsychotics: A Propensity Score-Matched Analysis**

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Background: Clozapine remains the gold standard for treatment-resistant schizophrenia but is associated with significant metabolic and systemic adverse effects. Although several dermatologic reactions have been described, acne has not been systematically evaluated in patients treated with clozapine compared with other second-generation antipsychotics (SGAs). Given clozapine's distinct pharmacologic profile, understanding its potential cutaneous effects is clinically relevant. Objective: To compare the risk of incident acne among patients with schizophrenia treated with clozapine versus other SGAs. Methods: We conducted a retrospective, propensity score–matched cohort study using the TriNetX Global Collaborative Network (170 healthcare organizations). Adults with schizophrenia (ICD-10 F20) treated with clozapine were compared with those treated with other SGAs (olanzapine, aripiprazole, lurasidone, or ziprasidone). Patients with prior acne diagnoses were excluded to identify new-onset cases. The primary outcome was incident acne (ICD-10 L70.x) occurring after treatment initiation. Risk ratios (RR), odds ratios (OR), and hazard ratios (HR) were calculated following 1:1 propensity score matching. Results: After matching, 10,468 patients were included in each cohort. Clozapine users demonstrated a higher incidence of acne compared with other SGA users (0.8% vs 0.5%). Treatment with non-clozapine SGAs was associated with a lower risk of acne (RR 0.58, 95% CI 0.41–0.83; p=0.003). Kaplan–Meier analysis showed a significantly greater cumulative incidence of acne in the clozapine cohort (HR 0.63, 95% CI 0.44–0.90; log-rank p=0.011). Conclusion: Clozapine therapy is associated with an increased risk of incident acne compared with other SGAs. This underrecognized dermatologic effect may have implications for patient counseling and monitoring.

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**Transcriptomic Characterization of E2F1 in Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD) in African Americans**

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Background: Prevalence of Metabolic Dysfunction–Associated Steatotic Liver Disease (MASLD) that affects approximately 25–30% of the U.S. population. African Americans (AAs) have a lower prevalence of MASLD compared with other ethnic groups. They experience disproportionately higher rates of hepatocellular carcinoma (HCC). E2F1 (transcription factor) plays a key role in lipid metabolism and cell cycle regulation. But its potential protective or the regulatory role in MASLD pathogenesis in AAs is still unsettled. We evaluated E2F1 genetic variants and associated pathways in relation to MASLD pathways in an AA cohort. Methods: 40 AA participants (MASLD (n=20), controls (n=20)) from the Washington, DC metropolitan area were investigated who have confirmed hepatic steatosis and at least one metabolic comorbidity excluding the individuals with advanced fibrosis or other liver diseases. RNA sequencing combined with pathway analysis (by IPA®) was performed to identify MASLD-related networks. Sanger sequencing and TaqMan® Low-Density Array assays were used to screen for E2F1 SNPs. Results: Pathways analysis identified significant gene networks regulated by E2F1, including pathways involving TGFB1 and TP53. Genotyping revealed two highly prevalent variants in the E2F1 3′UTR: rs3213177 (83.3%) and rs3213180 (87.5%). These locations of the SNPs in the regions that may affect microRNA binding and post-transcriptional regulation, potentially influencing metabolic signaling and cancer susceptibility. Conclusions: E2F1 appears to be a critical regulator of metabolic and oncogenic pathways in MASLD. The identification of prevalent 3′UTR variants in AAs provides a foundation for future investigations into genetic contributors to ethnic disparities in liver disease progression.

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**From Seizures to Stroke: A Large-Scale Analysis of Cerebrovascular Risk in Epilepsy**

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Background: Epilepsy is a chronic neurological disorder affecting millions of adults worldwide and is increasingly recognized as being associated with systemic and vascular comorbidities. While stroke is a well-established cause of secondary epilepsy, the extent to which epilepsy itself predisposes individuals to subsequent stroke remains understudied, particularly in large real-world populations. Objective: To evaluate the association between epilepsy and incident ischemic and hemorrhagic stroke in adults using a large, U.S.-based electronic health record network.Methods: We conducted a retrospective cohort study using the TriNetX U.S. Collaborative Network, including adults aged ≥18 years. Patients with epilepsy were identified using ICD-10 codes and compared with individuals without epilepsy. Patients with prior stroke were excluded. Propensity score–matching (1:1) was performed across demographic characteristics and vascular risk factors, including age, sex, hypertension, diabetes mellitus, hyperlipidemia, atrial fibrillation, chronic kidney disease, coronary artery disease, and nicotine use. Outcomes included incident ischemic and hemorrhagic strokes occurring after the index date. Risk was assessed using Kaplan–Meier survival analysis and Cox proportional hazards models. Results: After matching, 1,073,301 patients were included in each cohort. Patients with epilepsy experienced significantly higher rates of ischemic stroke (2.08% vs 1.06%; HR 2.046, 95% CI 2.001–2.093; p<0.001) and hemorrhagic stroke (0.81% vs 0.41%; HR 2.071, 95% CI 1.997–2.148; p<0.001). Conclusion: In this large real-world cohort study, epilepsy was associated with an approximately two-fold increased risk of ischemic and hemorrhagic stroke, highlighting the importance of cerebrovascular risk assessment and preventive strategies in adults with epilepsy.

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**A Sight for Sore Ears: Examining pinniped ossicles using Micro-CT**

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Micro–computed tomography (micro-CT) allows high-resolution, non-destructive visualization of delicate skeletal structures, making it especially useful for studying auditory ossicles that are rarely available for analysis. Pinnipeds (seals, sea lions, and walruses) show diverse ecological adaptations, yet comparative research on their middle ear anatomy remains limited, particularly in rare species. This study uses micro-CT imaging and 3D reconstruction to examine ossicular morphology in phocid seals, focusing on the incus of Monachus monachus (Mediterranean monk seal) and comparing it with extant and fossil taxa. Ossicles from multiple museum collections were scanned using high-resolution micro-CT, segmented in Slicer 5.8.1, and reconstructed into three-dimensional models in Blender 2.8. Comparative analyses included qualitative morphology and proportional scaling across species, incorporating fossil specimens such as Terrenectes parvus alongside modern phocids. Supplementary photographs were used to enhance visual comparisons. Results show generally conserved ossicular architecture across phocids, with variation in size, curvature, and articular surface proportions. The Monachus incus shares features with both living relatives and some fossil taxa, suggesting evolutionary continuity. Although phocids possess relatively large ossicles compared with many mammals, proportional relationships to body size remain similar to terrestrial carnivorans.

These findings demonstrate the value of micro-CT for resolving subtle auditory morphology and support its broader use in evolutionary and functional studies of marine mammals. Improved understanding of pinniped middle ear structure may also contribute to biomedical applications, including auditory prosthetics and biomimetic hearing technologies.

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**ETR-1 plays a previously unidentified role in C. elegans germline apoptosis**

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In Caenorhabditis elegans, ETR-1 is a CELF/Bruno-family RNA-binding proteins. ETR-1 plays important roles in the C. elegans muscle, nervous, and reproductive systems. The etr-1 precursor transcript is extensively alternatively spliced, generating at least 19 protein-coding isoforms and one non-coding transcript. The precise role of ETR-1 in germline integrity and fertility is still unclear. We examined the effect of mutating ETR-1 on germline apoptosis and reproductive capacity using two independent, hypomorphic, viable alleles with mutations in exon 8 that each result in premature stop codons: etr-1(lq61) and etr-1(lq133). Overall fertility of etr-1(lq133) mutants is decreased by 53% while that of etr-1(lq61) mutants is reduced by 75%, suggesting phenotypic severity varies according to allele. RNAi depletion of ETR-1, knocking down all isoforms, previously resulted in reduced fertility and increased apoptotic germ cell corpses in the gonad. Initial studies of these mutants also indicate increased apoptotic germ cells via DIC imaging. A preliminary genetic analysis shows that simultaneous RNAi-mediated depletion of ETR-1 and components of the CED-1–dependent engulfment pathway leads to enhanced reduction in fertility. In contrast, co-depletion of ETR-1 with components of the parallel CED-5/CED-2/CED-12 pathway does not produce a comparable effect. Consistent with the interpretation that suppression of brood size indicates shared pathway function whereas enhancement suggests parallel pathways, these results further support a model in which ETR-1 functions in the CED-1–dependent engulfment pathway rather than the parallel CED-5/CED-2/CED-12 pathway. The study identifies ETR-1 as an important player in germline apoptosis, potentially in engulfment of germline apoptotic corpses.

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**Loss of XRCC1 promotes cGAS/STING mediated innate immune signaling in gastric cancer**

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Background: One of the most defining features of gastric cancer (GC) is harboring deficiency in DNA repair that subsequently contributes to carcinogenesis. The X-ray repair cross complementing 1 (XRCC1) protein is a key molecular scaffold required for efficient repair of DNA single-strand breaks (SSBs) to maintain genomic stability. However, further investigation is needed to uncover the role of XRCC1 in innate immune signaling and inflammation in GC. Methods: We evaluated how loss of XRCC1 triggers cytosolic DNA using immunoflorscence localization assay and measuring DNA from cytosolic extract. We applied ON-TARGETplus™ SMARTpool siRNAs to knockdown XRCC1 in gastric cell lines and examined the innate immune siganling and inflammation with and without ATM inhibitor tratement. Further, we examined Type I interferon gene expression in various gastric cancer cell lines and assessed its role in cGAS-STING signaling using RT-qPCR, RNA-Seq, and and immunoblot analysis. In addition, we generated conditional knockout XRCC1 mice and characterized the innate immune signaling from stomach tissue extract using RT-PCR, western blot. Further, the DNA damage and histological analysis was done by immunohistochemistry. Result and Conclusions: We find that XRCC1 deficient gastric cancer cell lines and mouse stomach tissue shows activation of cGAS/STING signaling. Further, ATM inhibition enhances innate immune signaling and PD-L1 expression in XRCC1 deficient gastric cancer cells.This work demonstrate that XRCC1 is essential to maintain innate immune homeostasis.

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**Dynamic Reactor Design Framework for Planktonic Iodate Bioremediation in Nuclear Waste-Impacted Groundwater**

Presenter's Name: Sarees Shaikh
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*Presentation Type: Poster Presentation*
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The Hanford Nuclear Reservation in Washington State remains one of the most significant nuclear legacy sites in the United States, with groundwater contamination by long-lived radionuclides including iodine-129. Due to its high mobility and extended half-life (15.7 million years), iodine presents persistent environmental risk. In oxidizing subsurface conditions, iodine commonly exists as iodate ($IO_3^-$), a soluble oxyanion that is difficult to immobilize using conventional treatment strategies. Microbial reduction offers a promising alternative pathway for transforming mobile iodate into less soluble iodine species; however, translating microbial reduction kinetics into scalable reactor systems requires systematic engineering design tools. This work presents a computational reactor design framework for evaluating planktonic microbial iodate reduction in continuous stirred-tank (CSTR) and semi-batch configurations. A coupled system of ordinary differential equations was formulated to represent biomass growth and iodate reduction kinetics, incorporating logistic growth behavior and biomass-linked substrate reduction. The model was implemented in MATLAB using a modular architecture to enable flexible simulation of reactor volume, dilution rate, influent concentration, and feed strategy. The framework allows exploration of steady-state behavior, iodate removal efficiency, sensitivity to kinetic parameters, and operational stability regions. By systematically varying design variables, the model provides quantitative guidance for reactor sizing, hydraulic retention time selection, and performance optimization. This computational platform establishes a decision-support tool for assessing the feasibility of planktonic bioreactors in iodate-contaminated groundwater remediation at nuclear legacy sites such as Hanford, providing a foundation for future scale-up and integration into engineered treatment systems.

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**Validation of Real-World Treatment Comparative Effectiveness in Membranous Nephropathy using MENTOR Trial Data**

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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Observational studies, including Cure Glomerulonephropathy (CureGN), can be used to estimate treatment effects for rare diseases like Membranous Nephropathy (MN), but are often prone to confounding. A recent CureGN analysis evaluated long-term comparative effectiveness of rituximab (RTX) and calcineurin-inhibitors (CNI) in MN. To validate these findings, this study performed secondary analysis of Year 1 data from Membranous Nephropathy Trial Of Rituximab (MENTOR), a randomized clinical trial. MENTOR enrolled 130 participants randomized to RTX or cyclosporine (CSA), a type of CNI. Kaplan-Meier curves were estimated for time to (1) complete proteinuria remission; (2) complete/partial proteinuria remission; (3) relapse after complete remission; and (4) relapse after complete/partial remission, using definitions consistent with the observational study analysis. Cox models and Restricted Mean Survival Time (RMST) differences were used to compare treatment effectiveness. Kaplan-Meier curves, Cox models, and RMST differences showed that RTX and CSA were similar in reaching complete remission and complete/partial remission in the first year after treatment (e.g., HR [95% CI] = 0.88 [0.35, 2.24] and 1.38 [0.90, 2.13], respectively). However, hazards of relapse after partial/complete remission for patients in the CSA group were much higher than RTX (HR [95% CI] = 4.03 [0.84, 19.39]), although not statistically significant (p=0.082). Similarly, relapse after complete remission and relapse after complete/partial remission were earlier in the CSA group (RMST difference [95% CI] = -0.12 months [0.41, 0.07], p=0.160 and -0.38 [-0.78, 0.03], p=0.072, respectively). Similar efficacy for remission and a trend towards worse relapses for CSA were qualitatively similar to results from CureGN.

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**Northward Range Shift of the Red Bordered Pixie (melanis pixe) in Response to Climate Change by Kara Sivels**

Presenter's Name: Kara Sivels
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The Red Bordered Pixie (melanis pixe) is a butterfly species with an optimal thermal range of 75–85°F, historically distributed from southern Texas to Costa Rica. Given documented global temperature increases it was hypothesized that m. pixe has undergone a measurable northward range shift over the past decade, consistent with climate-driven migration patterns observed in other Lepidoptera.To test this, geo-referenced occurrence records were extracted from iNaturalist for two discrete time periods: 2015–2017 and 2021–2023. To control for observer effort bias a known limitation of citizen science datasets sightings were normalized against total regional observation counts per period. Temperature anomaly data from WorldClim and NOAA were incorporated as climate covariates to evaluate the relationship between warming trends and shifts in occurrence latitude.Preliminary results indicate a statistically significant northward displacement in mean occurrence latitude between the two periods, with a proportional increase in Texas sightings relative to Central American records after correcting for observer effort. A chi-square test of regional distribution and linear regression of mean latitude over time both support the hypothesis. These findings suggest that m. pixe is responding to regional temperature increases consistent with climate change predictions. Future work will incorporate species distribution modeling via MaxEnt to project continued range shifts under IPCC warming scenarios.

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**Paraventricular Thalamic Neuronal Ensembles Activated During Early-Life Adversity Shape Alterations in Adult Reward Behavior**

Presenter's Name: Asia Smith
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School/College: Arts & Sciences
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Early-life adversity (ELA) encompasses stressful or traumatic experiences that occur during childhood. ELA contributes to poor cognitive health and increased risk for psychiatric illness, including depression and substance use disorders, throughout an individual's lifespan. While the association between adversity in childhood and later life mental health outcomes has been studied extensively, the underlying neurobiological mechanisms remain unclear.In male mice exposed to a rodent model of ELA (limited bedding and nesting), we find persistent disruptions to reward manifesting as anhedonia-like behavior. To identify brain regions encoding adverse early-life experiences, we used TRAP2 mice to permanently tag (i.e., TRAP) neurons engaged during either ELA or standard rearing. This approach revealed selective, robust activation of the paraventricular thalamic nucleus (PVT) during ELA. Using adult TRAP2 mice, we exposed subjects to either reward (i.e., highly palatable food) or no reward and collected tissue 90 minutes after reward exposure, followed by immunofluorescent dual-labeling of c-Fos and the TRAP reporter (GFP). We find that the activity of early-life-engaged PVT neurons is increased during reward consumption in ELA relative to control mice that received reward and to ELA mice that received no reward.ELA augments PVT activity and leads to long-term changes in neuronal activation following exposure to reward. These findings suggest that PVT neurons activated by ELA encode persistent vulnerability to reward disruptions.

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**Effect of Environmental Compounds on Glycan Exposure in Mucin**

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School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
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Mucin is the body's primary defense barrier, forming a protective lining to trap pathogens. However, mucin is exposed to various environmental compounds present in personal care products, textiles, and other everyday materials, which may influence its structure and function. These compounds can interact with mucin's glycosylated regions, potentially altering the availability of its terminal sugars (glycans). In this study, we investigated how environmental compounds affect mucin glycan accessibility by using lectins that binds to the specific sugars. Porcine Gastric Mucin (PGM) is a commercially available, highly glycosylated mucin derived from porcine stomach. The glycosylation profile of PGM strongly influences its interactions with glycan-binding proteins such as lectins. Lectins are carbohydrate-binding proteins that recognize the specific terminal sugar residues on glycoproteins. By using lectins with defined specificities, the glycan composition and accessibility on PGM is evaluated. Environmental compounds such as tocopherol (vitamin E), polydimethylsiloxane (silicone), parabens, and polystyrene may alter glycan accessibility by binding to or disrupting glycosylated domains. Glycan accessibility on PGM is evaluated using Dynamic Light Scattering (DLS), a non-invasive and cost-effective technique. Using DLS, mucin glycan composition is assessed through a change in hydrodynamic size due to aggregation of lectin specific aggregation of glycans. Initial studies show aggregation in Ulex Europaeus Agglutinin I (UEA), binding to α –linked fucose, and Wheat Germ Agglutinin (WGA), binding to *N*-acetyl-D-glucosamine and *N*-acetylneuraminic acid, across mucins that have been exposed to each environmental compound evaluated.

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**FDA Regulations and Approval of Software as Medical Devices (SaMD) for Pre-diabetes and Diabetes Management: A Narrative Review**

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Background: Software as a medical device (SaMD) used in the management of diabetes and prediabetes provides additional benefits in improving health outcomes by helping patients and providers manage diabetes more effectively. The ability of AI to adapt and learn post market is both an advantage and a key regulatory challenge. Objective:This study aims to examine the regulatory landscape for SaMD in the United States, with a focus on devices approved by the FDA for diabetes detection and management. It further explores the regulatory pathways for device approval, the types of AI/ML models if used, and the key challenges associated with these technologies. Methods: This narrative review analyzed the relevant information from the FDA website including FDA databases, guidance documents and official documents as of May 19, 2025. Results: FDA-cleared SaMD for diabetes include continuous glucose monitoring systems, automated insulin delivery platforms, AI-based retinal screening tools, and digital therapeutics, approved through 510(k), De Novo, and PMA pathways. Most AI-enabled systems currently employ locked algorithms, with emerging regulatory frameworks addressing lifecycle oversight and post-market modifications. Conclusion: This review identified FDA-approved SaMDs for diabetes management, including those that integrate AI/ML technologies. These devices are approved through existing regulatory pathways such as 510(k), De Novo, and Premarket Approval. SaMDs have the potential to provide clinical benefits in diabetes care but there are regulatory challenges related to post-market modification, algorithm bias, and the evolving nature of AI/ML.

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**Identifying a Novel Mechanism through which Emerin Regulates Nuclear Architecture**

Presenter's Name: Zavien Spann
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The endoplasmic reticulum (ER) is an organelle that synthesizes lipids and proteins. It also detects and resolves stress via the unfolded protein response (UPR) pathway through adaptive signaling. The nucleus, another important organelle, is surrounded by the nuclear envelope (NE) which regulates the genome and determines the size and shape of it. These independently functioning organelles are physically connected. However, the extent to which they impact each other's functions and structure is not well understood. Our lab has recently shown that the depletion of LEM2, a NE protein, causes lipid stress which activates the ATF6 branch of the UPR pathway in the ER. Subsequently, deformations occur in the nucleus. Since cancer cells often display nuclear dysmorphia, I wanted to investigate the connection between NE proteins and the activation of the ATF6 pathway. My research has shown that the depletion of Emerin, an NE protein related to LEM2, results in nuclear dysmorphia via the ATF6 pathway in U2OS cells. To develop another tactic of assessing nuclear deformation, I cloned and transduced an NE marker, LBR(1-249)-GFP, into cell lines. In the future, live imaging of this new cell line will provide insight as to when and where nuclear deformation begins. Since nuclear dysmorphia is a hallmark of cancer, understanding the kinetics and mechanisms causing nuclear dysmorphia can jumpstart our research towards treating cancer. Future directions will expand on this work to identify mechanisms, such as which protein domains shared between LEM2 and Emerin prevent ATF6 activation and its disruption of nuclear architecture.

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**Impact of SMARCA1 Knockout on African American Prostate Cancer Cells**

Presenter's Name: Madisyn Starks
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Prostate cancer (PCa) affects ⅛ of men in the US, ranking as the second leading cause of cancer-related death among males. African American (AA) men are disproportionately impacted, as they are more frequently diagnosed at later stages of the disease and experience higher rates of morbidity and mortality. The SMARCA1 gene encodes the SNF2L protein, a key regulator of chromatin remodeling and transcriptional activity, and is involved in the DNA damage response, cell proliferation, and apoptosis. Since these processes are critical in tumor progression, SMARCA1 may play a significant role in PCa development. Additionally, the androgen receptor (AR) is central to PCa development, as androgen binding activates AR and stimulates the transcription of genes that promote prostate cell growth. Our objective was to demonstrate that SMARCA1 suppresses PCa growth and disproportionately affects AA populations. Through Western blotting analysis performed with two AA cell lines, MDA PCa 2b and RC77 T/E, and a Caucasian cell line, LNCaP. Results demonstrated significantly higher SMARC1 protein expression in AA cell lines, suggesting increased androgen sensitivity and cellular growth potential. Our findings revealed that SMARCA1 knockout (KO) significantly decreased growth rates and reduced proliferation in RC77 T/E cells, as measured by crystal violet assays. Mechanistically, SMARCA1 KO reduced AKT signaling and induced cellular senescence, confirmed by increased β-galactosidase activity. These findings suggest that SMARCA1 plays a critical regulatory role in PCa progression and may be a target for therapies disproportionately affecting AA males with prostate cancer.

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**Water Hyacinth Biology as a Window into Human Disease and Treatment Pathways**

Presenter's Name: Khalila Stewart
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*Presentation Type: Poster Presentation*
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This project uses a fully computational approach to explore how the invasive water hyacinth, Pontederia crassipes, can inform understanding of human disease processes relevant to premed students. All data are obtained from publicly available resources, including sequence databases and literature databases. A targeted set of 10 to 20 genes and 10 to 15 reported phytochemicals from P. crassipes linked to inflammation, oxidative stress, liver function, or metabolic regulation will be identified and curated. Published studies will be screened using explicit inclusion criteria: peer-reviewed articles from the past 15 to 20 years that directly test P. crassipes or its extracts in mammalian or cell models. Relevant genes and compounds will be coded into a structured dataset that records associated molecular targets and disease-related pathways. The main analysis will be performed in R using descriptive statistics and visualizations, including bar plots and simple networks linking plant compounds to human pathways such as NF-κB–mediated inflammation, oxidative stress responses, or protection from liver injury. No new laboratory experiments or specimen collections will be conducted; all work relies solely on openly accessible databases and publications. The goal is to identify candidate pathways and bioactive compounds that warrant future experimental testing, demonstrating how premed students can use existing data to bridge plant biology, ecology, and molecular mechanisms of human disease within a realistic undergraduate research timeline.

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**DIVERGENT GENOMIC STRATEGIES MAY UNDERLIE IODINE TRANSFORMATION IN HANFORD SITE BACTERIA**

Presenter's Name: Oluwatomiwa Sunbare-funto
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Radioactive iodine-129 is a primary risk-driving contaminant at the Hanford Site in Washington State and a threat to the local and surrounding ecosystems. Bacterial isolates from the Hanford Site with distinct iodide oxidation phenotypes were compared: Pseudomonas mosselii DVZ24 (high), Pseudomonas mosselii DVZ6 (moderate), Enterobacter hormaechei DVZ29 (moderate/low), and Cupriavidus necator DVZ60 (low). Using intraspecies comparisons in addition to cross-isolate contrasts, we have begun dissecting the genomic features driving iodine transformation at Hanford. Isolates were analyzed using NCBI reference genomes, standardized annotation with Prokka, and pan-genome analysis using Roary. Comparing DVZ60 with 32 other C. necator genomes identified 611 distinct clusters linked to metal handling and oxidative stress. These clusters were concentrated in copper resistance, metal efflux, and redox enzymes, indicating functional specialization. DVZ6 and DVZ24 were nearly identical at the genomic-level (<20 unique regulatory gene clusters) and contained 722 clusters absent from the 50 other P. mosselii genomes, suggesting that phenotypic differences may be regulatory. DVZ29, analyzed against 50 Enterobacter hormaechei genomes, carried 363 unique clusters, most of which were associated with conjugative transfer and surface modification, while metal and stress genes were core to the Enterobacter genus. These preliminary results indicate that the genomes of Hanford Site bacteria may have features unique to them within their species that allow them to interact with radioiodine and other high-risk contaminants at the site. Furthermore, there are likely to be genus-level differences in genomic strategies for survival and growth, revealing novel and diverse opportunities for remediation approaches at contaminated sites.

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**Identifying Genetic Variants Associated with Gene Expression Variability Using Single-Cell RNA Sequencing**

Presenter's Name: Peace Taiwo
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Jinrui Xu
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Traditional genome-wide association studies are powerful research methods that identify genetic variants associated with disease risk. While they link genetic variants to disease risk, most functional follow-up studies focus on how these variants influence average gene expression levels. However, gene regulation also involves cell-to-cell variability in expression, often referred to as gene expression noise. Genetic variants that alter expression variability without changing mean expression may contribute to disease risk, yet such effects are not captured by conventional bulk or mean-based analyses. In this study, we investigate whether inherited genetic variants influence gene expression variability independently of expression level. Using single-cell RNA sequencing data from the lymphoblastoid cell lines GM12878 and GM18502, derived from donors of European and African ancestry respectively, we quantify gene expression noise as the standard deviation of expression across individual cells. We apply statistical models designed to identify genetic variants that specifically influence expression variability independently of mean levels. After identifying candidate variants that selectively affect gene expression noise, we evaluate their potential disease relevance by examining overlap with known disease-associated loci using existing genetic databases. By focusing on how gene expression varies from cell to cell, rather than only on average expression levels, this study aims to identify an additional layer of genetic regulation that may contribute to disease risk and population-level health differences.

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**Cell-Based Proximity Labeling to Determine the Interactors of the LEM2 Protein at the Nuclear Envelope**

Presenter's Name: Evita Taneng
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While abnormal nuclear morphology is a hallmark of cancer and other diseases, nuclear membranes are also dynamically remodeled to perform vital functions under physiological conditions. Inner and outer nuclear membranes form the nucleus and comprise the nuclear envelope (NE). The inner nuclear membrane (INM) protein LEM2 is active in

constraining deformations at the NE, and de novo point mutations in this protein result in human diseases, including heart disease and Progeria, a rapid aging disease. However, the mechanism by which LEM2 constrains NE deformations remains unknown.To elucidate mechanisms through which LEM2 regulates NE morphology, I built and tested a biotin-based proximity labeling system to identify interactors of LEM2. I created a LEM2 construct fused to TurboID, an engineered biotin ligase that produces a reactive biomolecule, resulting in neighboring proteins becoming biotinylated. I confirmed that my fusion construct localized with endogenous LEM2 and other INM proteins, resulting in a biotinylation pattern that overlaps with LEM2 by immunofluorescence microscopy. Specific proteins were biotinylated by my LEM2-TurboID fusion protein compared to the non-targeting control.To identify protein interactors of the LEM2-TurboID fusion protein, I performed a pull-down to isolate and enrich biotinylated proteins and tested for known and putative interactors of LEM2 by western blot analysis. To gain a list of LEM2 interacting partners, my samples will be sent for mass spectrometry, allowing for the identification of enriched proteins present. Ultimately, this assay will yield biological clues and identify interactors of LEM2 that may function in regulating NE morphology and represent potential therapeutic targets.

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**Influence of Menstrual Cycle Perception on Countermovement Jump Performance and Injury Risk Prediction in NCAA Division 1 Collegiate Female Athletes at Howard University**

Presenter's Name: Anaya Tankard
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Female collegiate athletes experience higher rates of noncontact lower-extremity injuries than their male counterparts, with hormonal fluctuations across the menstrual cycle proposed as a contributing factor. While existing research has primarily examined physiological mechanisms such as ligament laxity and neuromuscular control, limited attention has been given to athletes' psychological perceptions of their menstrual cycle. The purpose of this mixed-methods study is to examine the relationship between menstrual cycle perception, countermovement jump (CMJ) performance, and injury risk prediction in female collegiate athletes. Female collegiate athletes aged 18–25 will complete CMJ testing using force plate technology across four self-reported menstrual cycle phases: menstrual, follicular, ovulatory, and luteal. Participants will also complete surveys assessing their perceptions, attitudes, and beliefs regarding the impact of their menstrual cycle on athletic performance. Force-time variables will be analyzed across the load, explode, and drive phases of the CMJ to evaluate neuromuscular performance patterns. By integrating objective biomechanical data with subjective perception measures, this study aims to explore whether menstrual cycle perception may serve as a meaningful factor in performance variability and injury risk assessment. Findings from this research are intended to inform athlete-centered training strategies, promote evidence-based injury prevention approaches, and contribute to a more comprehensive biopsychosocial understanding of female athlete health.

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**ACE2 Variants and Interface Peptides Define Host–Virus Binding and Therapeutic Potential**

Presenter's Name: Shaolei Teng
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*Presentation Type: Oral Presentation*
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The human angiotensin-converting enzyme 2 (ACE2) is the cellular entry receptor for SARS-CoV-2 and related coronaviruses. Genetic variation in ACE2 may influence host susceptibility and viral binding, yet its broader impact on infection risk and therapeutic design remains underexplored. To address this, we performed comprehensive computational saturation mutagenesis to evaluate how all possible ACE2 missense mutations affect protein stability and spike-binding affinity across SARS-CoV-1, SARS-CoV-2, and Omicron variants. We identified critical residues—including G268, G399, G405, G486, and G561—that significantly destabilize ACE2, as well as others such as D355 and Y41 that modulate spike-binding strength. Several of these variants are enriched in underrepresented populations, suggesting potential contributions to differential COVID-19 outcomes. Focusing on translational potential, we identified six ACE2 regions essential for spike engagement and synthesized corresponding peptides. In dot blot and pseudotyped viral entry assays, several peptides exhibited strong binding to the spike protein, and four effectively inhibited viral entry in ACE2-expressing cells. Structural alignment of Wuhan and Omicron S1–ACE2 complexes revealed conserved interface patterns, supporting the cross-variant relevance of these peptides. Together, this study integrates computational modeling, population genetics, and experimental validation to identify both functionally significant ACE2 variants and novel peptide inhibitors. These findings provide a foundation for developing ACE2-based therapeutics with potential to block viral entry across emerging variants and inform precision strategies to reduce disparities in disease burden.

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**Biodiversity Mapping and Temporal Abundance Trends of Papilio glaucus Using iNaturalist Data**

Presenter's Name: Hiermela Tewelde
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*Presentation Type: Poster Presentation*
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Co-authors: Jaylen Lopes

Papilio glaucus (Eastern tiger swallowtail butterfly) is widely distributed across eastern North America and frequently recorded on iNaturalist, a free public database, making it an accessible species for biodiversity analysis. This four-week project tested the hypothesis that Papilio glaucus observations on iNaturalist have increased in recent years, reflecting potential growth in reported abundance over time. The independent variable was year of observation, and the dependent variable was the number of iNaturalist records per year, retrieved from iNaturalist's publicly available occurrence dataset. A bar graph of annual observation counts was constructed and analyzed. Results showed the highest number

of observations in 2024–2025, supporting the hypothesis. However, limitations must be acknowledged: increased observations may reflect greater app usage rather than true population growth, and the data may be subject to geographic bias or misidentification. Future studies should control for observer effort to better distinguish reporting trends from actual population changes.

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**Identifying Types of Glycans on Antibodies Using Dynamic Light Scattering**

Presenter's Name: Jediah Thomas
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*Presentation Type: Poster Presentation*
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Antibodies are 'Y' shaped proteins consisting of a fragment antigen binding (Fab) site and a fragment crystallizable (Fc) region. The Fab site varies greatly across antibodies and dictates specific antigen binding, whereas the Fc region is highly conserved and responsible for binding to receptor proteins on immune cells. Using Dynamic Light Scattering (DLS), the binding of magnetic protein A/G beads to the antibodies' Fc region can be measured. DLS is a relatively less expensive instrument with high throughput, making it a more accessible instrument for many laboratories. Antibodies have sequences of sugar moieties (glycans) present at their Fc region, as well as Fab site, that facilitate the binding that occurs. It is the aim of this study to identify the types of glycans on the Fc regions of antibodies using DLS. Since lectins target specific glycans, lectins are introduced to antibodies before the magnetic protein A/G beads to test if their binding to the glycans on the Fc region prevent the subsequent binding to the magnetic beads. The importance of the targeted glycans in the Fc regions' binding is indicated when an interference is observed. Measuring the interference of a variety of known lectins with Fc region interactions provides further insight on antibody behavior and affirm DLS as a reliable method to gauge the glycans present on antibodies.

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**Biogeographical & Ethnobotanical Correlation**

Presenter's Name: Lia Thomas
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Achyranthes aspera is a widely distributed medicinal plant used throughout South Asia for a variety of health conditions. Although research on its pharmacological properties has been on the rise, the geographic accessibility to communities that rely on traditional medicine is underexamined. This study will investigate whether the spatial distribution of A. aspera aligns with the regions documented for traditional medical use between 2020-2025 and how the potential lack of this species can affect the healthcare access in rural areas. A literature review was conducted on the pharmacological data, toxicity profiles, and geolocated ethnobotanical study sites across South Asia. The geographic distribution data was obtained from research-grade iNaturalist observations and standardized to observations per square kilometers at a district level. An analysis of the distribution was conducted in RStudio using "sf" and "tidyverse" packages. Accessibility was defined using 5 kilometer Euclidean buffers around the documented use communities to approximate a feasible rural walking distance. The density of observations within and outside these parameters was compared and a correlation analysis was performed to evaluate the spatial distribution. However, the iNaturalist data was treated as an approximation of observed presence rather than unquestionable ecological abundance. This study frames medicinal plant accessibility as a public health variable by assimilating ethnobotanical literature with spatial distribution models, further allowing it to contribute to discussions about ecological resource distribution, as well as digital reporting bias and healthcare equity, in regions where traditional medicine remains essential to primary and medical care.

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**Characterizing the mechanisms that alter colonic oxygen levels and result in harmful changes to gut health**

Presenter's Name: Taryn Thompson
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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The human gastrointestinal microbiota maintains homeostasis and supports health by defending against pathogens and training the immune system. In the colon, this balance relies on interactions between microbiota, immune cells, and epithelial colonocytes. Disruption by factors such as high-fat diets or antibiotics reduces epithelial oxygen consumption, allowing facultative aerobes to grow and alter microbiota composition (dysbiosis). Dysbiosis can impair immune function, increasing susceptibility to infection, inflammation, and disorders such as cancer and inflammatory bowel disease. The mechanisms underlying changes in colon oxygen levels were previously unclear. Our study aimed to identify the immune effectors responsible for altering colonocyte oxygen levels. Immunofluorescent staining for the hypoxic marker pimonidazole (PMDZ) and immune markers (CD3, CD4, NK cell markers) in colonocytes from streptomycin-treated and untreated mice revealed that NK cells were likely the primary effectors driving the shift. Our techniques produced consistent and accurate results, confirming the reliability of the data. Using NK cell knockout mice, we further observed that the absence of these cells mitigated the hypoxia loss, supporting their role in inducing the metabolic shift in colonocytes from β-oxidation to glycolysis. These findings clarify the immune-mediated mechanisms controlling colon oxygen levels and microbiota composition, highlighting NK cells as key contributors. This work provides a foundation for developing targeted interventions to prevent chronic gastrointestinal illnesses, including colon cancer, colitis, and inflammatory bowel syndrome.

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**Evaluating DNA Barcoding for Species Identification of Urban Ants**
Presenter's Name: Aryanna Toomer
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*Presentation Type: Poster Presentation*
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Accurate species identification is essential for understanding biodiversity and assessing potential human exposure to urban insects. Traditional morphological methods can be limited when closely related or visually similar species coexist, as is often the case with urban ants. This study investigates whether DNA barcoding can reliably distinguish between phenotypically distinct ant specimens, specifically pavement ants (Tetramorium spp.) and carpenter ants (Camponotus spp.), collected from the same urban location. The research addresses the question: Does DNA barcoding distinguish between ants that appear morphologically different but may have overlapping ecological roles in human environments? We hypothesize that if the phenotypically distinct specimens represent separate species, DNA barcoding will reveal clear genetic differences, providing more accurate identification than morphology alone. Ant samples were collected from urban sites, visually classified, and subjected to DNA extraction and sequencing. Preliminary analysis indicates that genetic barcodes can differentiate between species that are otherwise difficult to identify based on morphology, supporting the hypothesis. This approach not only reduces misidentification but also enhances our understanding of species distribution, diversity, and potential interactions with humans. The findings highlight the limitations of relying solely on physical traits for species identification and demonstrate the value of molecular tools in urban biodiversity studies. By improving accuracy in species-level identification, DNA barcoding can inform pest management strategies, public health monitoring, and ecological research in anthropogenic environments.

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**Oxygen Sensor Analysis of Hypoxia in Metastatic Cancer Cell Cultures**
Presenter's Name: Logan Travers
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*Presentation Type: Poster Presentation*
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Tumor hypoxia, a common feature of aggressive tumors like glioblastoma (GBM), is a critical contributing factor in metastasis and therapy resistance. Tumor hypoxia allows for the upregulation of genes involved in metastasis and therapy resistance. Manipulating the conditions relevant to hypoxia translates to efficacious treatment plans and improved patient outcomes. Accurate quantification of oxygen levels in physiologically relevant models is essential for advancing our understanding of how hypoxia affects tumor behavior and treatment response. However, measuring oxygen gradients, to demonstrate instances of hypoxia, directly within metastatic sites in tumors remains challenging due to the spatial heterogeneity of tumor microenvironments (TME); metastatic sites originating from a single tumor can exhibit the same characteristics in different magnitudes. We developed a method that uses a fiber optic probe to directly measure hypoxia in both standard cell culture media and in three-dimensional Matrigel-embedded cell models. This method provides minimally invasive measurement of absolute values of oxygen pressure at various locations within a cell over time. The probe recorded the oxygen concentration and temperature of lung, breast, and GBM cancer cell lines over ten days. Each day, microscopic imaging was done in 4x, 10x, and 20x magnification to show density over time, hypoxia with respect to density, and hypoxia over time. All cell cultures showed an increase in oxygen demand over time. However, in different TMEs, the oxygen concentration and, consequently, demand were different. Shifting the conversation from treatment to prevention, the results support consideration of spatial heterogeneity in research and development of cancer therapeutics.

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**Characterization of Mycobacteriophage Ronpheasely**
Presenter's Name: Farai Tshililiwa
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Co-authors: Olatunde Adesina, Oluwatomiwa Sunbare-Funto, Swagota Roy, Somiranjan Ghosh, Courtney Robinson

Bacteriophages are the most diverse and abundant entities in the biosphere. In the wake of bacterial resistance to antibiotics, a new way to treat bacterial infections has become a necessity. Since bacteriophages infect bacteria and naturally evolve to combat bacterial resistance, they have recently become a topic of interest. The aim of this study was to discover a new mycobacteriophage that could infect potentially pathogenic mycobacteria. Mycobacterium smegmatis was used as the host for the bacteriophage. The mycobacteriophage eventually named RonPheasley was collected in Howard University's Yard (38.92336°N, 77.01965°W). This phage was isolated at 37°C using an enrichment protocol. The phage was subjected to many rounds of plaque assays for purification, a lysate was made and DNA was extracted before restriction enzyme digest. During the rounds of purification the mycobacteriophage produced clear plaques about 1 mm in diameter indicating that it was a lytic bacteriophage. The lysate had a titer of 5*10^9 PFU/mL The genomic DNA had a low concentration at 18.6 ng/uL. Despite the low concentration, restriction digestion was performed using SalI, EcoRI, and HindIII to begin molecular characterization. For future experimentation, DNA will need to be extracted again to be able to more accurately characterize the mycobacteriophage RonPheasley.

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**A Generalized 19F MRS Platform for Quantifying Efflux Transporter Kinetics at the Blood–Brain Barrier via Fluorinated Molecular Reporters**
Presenter's Name: Tom Tu
Classification: Staff
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*Presentation Type: Poster Presentation*
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Quantifying the functional activity of ATP-binding cassette (ABC) transporters, such as P-glycoprotein, is crucial for understanding restricted drug delivery to the central nervous system. Current research methodologies commonly rely on fluorinated PET tracer substrates to assess P-gp function. However, the allowable tracer radioactivity dose is limited, which poses a barrier to repeated or longitudinal measurements. This research presents a methodological framework utilizing 19F MRS to monitor the brain-to-blood transport dynamics of trifluoromethyl-containing substrates across the blood–brain barrier (BBB). By employing a fluorinated CNS-active reporter molecule, we enable direct, background-free visualization of CNS-active fluorinated probe distribution within the brain parenchyma.The study utilizes a 9.4T preclinical imaging system to establish baseline pharmacokinetic profiles in wild-type mice, followed by modulation via potent efflux transporter antagonists to simulate clinically relevant drug–drug interactions. Significant emphasis is placed on the optimization of scan protocols and the implementation of external calibration standards to ensure absolute quantification of the fluorinated probe's concentration. Our preliminary data demonstrate a clear $^{19}F$ spectral separation (~10–15 ppm) between the $CF_3$-containing P-gp substrate and trifluoroacetic acid (TFA) used as a reference. These findings support the feasibility of 19F MRS as a sensitive and generalizable platform for evaluating fluorinated P-gp substrates.The framework facilitates the longitudinal study of transporter-mediated resistance and provides a scalable solution for preclinical screening of BBB-penetrating compounds and their modulatory pathways.

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**Characterization of the Mouse TSHR-hyt Mutant Mouse as a Potential Model for Dopaminergic Neurodegeneration and Parkinson's Disease**

Presenter's Name: Christina Twiggs
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The mechanisms underlying dopaminergic neuron (DAN) loss in Parkinson's disease (PD) remain unknown. The TSHR-hyt mouse harbors a dominant-negative point mutation (Pro556Leu) in the IV transmembrane domain of the thyrotropin receptor (TSHR), a structural change that disrupts signaling and downstream effector mechanisms. A subset of homozygous (hyt/hyt) mutants show PD-related phenotypes such as reduced tyrosine hydroxylase (TH+) DANs in the substantia nigra (SN), and circling behavior. Additionally, our laboratory has identified limited circling behavior in a fraction of heterozygotes (+/hyt). Initially, we compared circling behavior in homozygous mutants treated with saline (0.9%) or the dopamine precursor L-DOPA (10 mg/kg) to determine the impact of dopamine on circling behavior. While saline failed to alter circling behavior, L-DOPA attenuated circling after 30 minutes, which was restored to full capacity within 24 hrs. Next, immunoblotting of SN tissues between non-circling and circling homozygotes revealed significant decreases in levels of TH (60%) and GPR37 (56%), a neuroprotective factor of DANs. Astroglial markers GFAP and IBA1 decreased and increased, respectively, in SN of circling mice compared to non-circlers. Finally, preliminary analysis of the neuroprotective/neuroinflammatory regulatory factor IGF-1R, was increased (66%) in SN tissues of circlers. Our findings indicate that the hyt mutation alters TSHR signaling that promotes endoplasmic reticulum stress that undermines DANs stability. Correlating DAN deficits with histochemical assessment of apoptotic and neuroprotective markers in the SN of circling mice is the aim of future studies. Additional investigation of TSHR-hyt mice as a model for nigrostriatal neurodegeneration and PD is warranted.

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**The Role of the Scaffold Protein Receptor of Activated C Kinase (RACK1) in the Reactive Oxygen Species (ROS) Signaling Pathway.**

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Climate change and global warming are contributing to increased soil salinization, posing a significant threat to worldwide agricultural productivity and global food security. High soil salinity disrupts plant water uptake, causes ionic imbalance, and induces oxidative stress that can impair plant growth and development. One of the primary molecular responses to this salt stress in plants is the production of reactive oxygen species (ROS), particularly hydrogen peroxide ($H_2O_2$), which functions as an important signaling molecule in stress adaptation. However, excessive ROS accumulation can lead to oxidative damage in plants, making precise regulation of ROS signaling essential for plant survival. Receptor for Activated C Kinase 1 (RACK1) is a conserved WD40-repeat scaffold protein that integrates multiple signaling pathways and has been implicated in plant hormone signaling and stress responses. Despite this, its specific role in regulating ROS accumulation during salt stress remains unclear. This study investigates the role of RACK1 in ROS signaling under salt stress in Arabidopsis thaliana. Wild-type and RACK1-deficient plants were subjected to salt stress treatments, and hydrogen peroxide accumulation was assessed using 3,3'-diaminobenzidine (DAB) staining. Preliminary observations indicate increased ROS accumulation in salt-treated leaves, visible as brown precipitates in DAB-stained tissues. These findings suggest that RACK1 may play an important regulatory role in oxidative stress signaling during salinity stress. Understanding how RACK1 influences ROS dynamics may provide insight into plant stress signaling mechanisms and contribute to strategies aimed at improving plant resilience to saline environments.

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**Association Between Peanut-Induced Anaphylaxis and Surrogate Markers of Cardiovascular Risk: Abstract**

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Peanut allergies, especially those that cause anaphylaxis, involve strong immune system reactions. While the short-term effects of anaphylaxis are well known, less is understood about whether severe peanut allergies are linked to long-term cardiovascular risk. This study examines whether adults with a history of peanut-induced anaphylaxis show higher rates of cardiovascular risk, such as hypertension and dyslipidemia. Data were extracted from the National Health and Nutrition Examination Survey (NHANES) 2005-2006 cycle, and the sample was restricted to non-pregnant adults 20 and older with peanut-specific IgE and cardiovascular data. Peanut allergy severity was categorized using peanut-specific IgE levels and self-reported history of emergency reactions. Cardiovascular risk (CV risk) was defined using the American Heart Association clinical thresholds. Multivariable survey-weighted logistic regression in R was used to calculate odds ratios and to adjust for age, sex, BMI, smoking status, and poverty-income ratio. This research provides a critical assessment of the relation between peanut-induced inflammation and cardiovascular pathology. Findings can inform clinical and dietary monitoring protocols for patients with not only severe peanut but severe allergies as a whole. Understanding this relationship could help clarify possible links between allergic disease and long-term heart health.

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**DNA Barcoding of Local Ant Populations (Monomorium carbonarium and Formicinae)**

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DNA barcoding utilizes standardized genomic regions to identify species and evaluate evolutionary relatedness. This study establishes a methodological framework to compare the genetic divergence of two ant specimens Monomorium carbonarium and a member of the Formicinae subfamily collected within a 0.5-mile radius of Howard University. While specimens were collected through baiting and underwent preliminary DNA extraction and PCR amplification, this analysis utilizes high-quality COI reference sequences from GenBank and BOLD to ensure a rigorous comparative study while primary sequencing results are pending. Using Muscle for sequence alignment and Mega11 for phylogenetic reconstruction, this project quantifies genetic distance using the Kimura 2-parameter (K2P) model. Field data, including habitat characteristics and behavioral observations, provide ecological context for these molecular comparisons. By integrating field-collected metadata with public genomic databases, this research highlights the importance of accurate specimen documentation and strengthens the application of molecular identification techniques in local biodiversity research.

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**Effects of Environmental Disaster on Gray Matter Volume in Infant Rhesus Macaques**

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Natural disasters disrupt social behavior, but the neurophysiological impact remains poorly understood. The social brain network is composed of grey matter structures including the anterior and posterior cingulate cortex (ACC, PCC), the mid superior temporal sulcus (mid-STS), the insula, and the amygdala. Previous literature suggests adult, free-range rhesus macaques demonstrate an increase in social partners post-hurricane; in relation, gray matter volume (GMV) in the mid-STS and insula directly correlates with the number of social partners (Testard et al., 2021 & 2022). The direct linkage between natural disasters and GMV in infant populations, however, is understudied. If more social partners correlate with increased GMV in social brain structures and there is exposure to more complex and dense social networks in the post-hurricane environment, then I predict the GMV will be larger in post-hurricane infants compared to pre-hurricane. To test my hypothesis, I employed deformation-based morphometry and a generalized linear model to compare region-specific GMVs from sMRI scans of free-range infant macaques before (n=14) and after (n=16) Hurricane Maria. There were no statistically significant differences in GMV in any of the regions of interest post-hurricane ($P < 0.05$ FWE-corrected). However, when tested with a more liberal threshold (uncorrected $P < 0.01$ over >200 contiguous voxels), there were trends of increased GMV in the ACC and mid-STS of post-hurricane infants. This trend suggests post-hurricane infants have a greater capacity for social cognition, behavioral tracking, and social decision-making. Studies of this nature give insight into human adaptations following natural disasters and the climate crisis.

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**Comparative Analysis of Entomological Observations and Public Health Interest: A Culturomic Study of Xylocopa virginica and Human Search Behavior**

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The Eastern Carpenter Bee (Xylocopa virginica) is a prominent urban pollinator frequently noted for its wood-boring nesting habits. Despite their non-aggressive nature, public perception often conflates their spring emergence with stinging risks. This study utilizes a culturomic

framework to evaluate whether seasonal observation frequency of X. virginica corresponds to increased public interest in bee stings, or if search behavior is driven by initial spring nesting activity. Using data from iNaturalist (via the rinat package) and Google Trends (RSV) from 2020–2025, this study analyzed temporal correlations across three major Mid-Atlantic corridors: Washington D.C., New York, and Philadelphia. A Cross Correlation Function (CCF) was applied to identify temporal lags between biological emergence and search interest. Furthermore, Vespula (yellowjackets) were utilized as a negative control to differentiate between general sting anxiety and species specific curiosity. Preliminary findings suggest that peak interest in X. virginica aligns with early spring boring activity rather than peak stinging incidents, which typically lag behind in late summer. This suggests that public bee sting searches may be a reactionary response to the conspicuousness of carpenter bee nesting rather than actual agonistic encounters. This research highlights the utility of digital footprints in understanding human-wildlife conflict and informs urban biodiversity communication strategies.

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**Machine Learning Approaches for Early Detection and Prognosis of Chronic Kidney Disease: Implications for the Southeastern United States**

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Background: The Southeast U.S. consistently exhibits some of the highest chronic kidney disease (CKD) end-stage renal disease (ESRD) mortality and incidence rates in the nation, especially in Louisiana, Mississippi, Alabama, and Georgia showing elevated age-standardized ESRD mortality compared to national averages. Spatial analyses reveal that these areas fall into a "high CKD / high poverty" class, highlighting limited access to care. Traditional markers such as estimated glomerular filtration rate (eGFR) and albuminuria lack sufficient sensitivity and specificity for timely intervention. Objective: To synthesize recent developments in machine learning (ML) for CKD detection, progression prediction, and imaging-based diagnostics, emphasizing explainability and applicability to health disparities in the Southeast. Methods: We reviewed recent literature on ML models applied to CKD, focusing on tabular data, survival analysis, imaging diagnostics, and explainable AI frameworks. Attention was given to methodological innovation, data quality, and the potential for regional implementation in health systems serving diverse and socioeconomically disadvantaged populations. Results: Classifiers such as XGBoost, CatBoost, and Random Forest achieved diagnostic accuracies exceeding 97–99% when applied to standard laboratory and clinical variables. STRAFE models demonstrate predictive value for progression to ESRD. Imaging applications, while promising, remain limited due to small datasets and methodological challenges. SHAP and LIME methods improved clinician trust and interpretability. Conclusion: ML represents an opportunity for early CKD detection and prognosis in the Southeast region of the U.S. with community-specific risk factors. Future directions include federated learning for multi-center datasets, hybrid survival-explainability frameworks, and pilot implementations in community health centers.

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**From Forest to Suburb: Gray Fox Range Shifts and Implications for Zoonotic Disease Surveillance**

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The geographical expansion of wildlife populations can alter zoonotic disease transmission dynamics and increase public health risk. This study investigates whether county-level gray fox (Urocyon cinereoargenteus) range expansion is significantly correlated with increased zoonotic bacterial case incidence in humans. The central hypothesis posits that suburban gray fox expansion increases human-wildlife contact opportunities, thereby elevating pathogen spillover risk through tick and flea vectors. Geo-tagged gray fox occurrence data from iNaturalist (2019–2024) were downloaded via GBIF and used to construct a county-level range expansion index. A PubMed literature review identified bacterial pathogens associated with gray foxes, including Borrelia burgdorferi, Francisella tularensis, and Rickettsia spp. Findings were compared against CDC county-level zoonotic bacterial case data using Pearson correlation and negative binomial regression, controlling for human population density and land-use classification as potential confounders. Preliminary results suggest a positive association between gray fox suburban expansion and tick-borne bacterial case rates, though causality cannot be established from observational data alone. Limitations include variation in CDC reporting rates across counties and iNaturalist observation bias toward populated areas. These findings support integration of wildlife range data into zoonotic disease surveillance frameworks and contribute to predictive modeling of spillover events relevant to premedical and public health training.

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**Molecular Epidemiology of Borrelia burgdorferi in Suburban Ecosystems**

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As suburban expansion increases human exposure to wildlife and vector populations, understanding the molecular epidemiology of tick borne pathogens is essential for disease risk assessment. Borrelia burgdorferi, the causative agent of Lyme disease, is maintained in enzootic transmission cycles involving rodent reservoirs and Ixodes ticks. This study investigates the genetic relationships among B. burgdorferi strains isolated from rodent hosts to evaluate their potential role in maintaining lineages associated with human infection. Publicly available nucleotide sequences were retrieved from GenBank for North American B. burgdorferi isolates with documented host sources, including rodents, ticks, and humans. The outer surface protein C (ospC) gene was selected for analysis due to its role in host infection and strain differentiation. Sequences were aligned using MUSCLE, and phylogenetic trees were

constructed in MEGA11 using maximum likelihood methods with 1,000 bootstrap replicates. Host associated clustering patterns were evaluated, and pairwise genetic distances were compared using statistical analyses conducted in R.Preliminary findings indicate that rodent derived strains frequently cluster with human associated isolates, supporting the hypothesis that suburban rodent reservoirs contribute to the maintenance of zoonotic lineages. This study demonstrates how publicly available genomic data can be leveraged to assess host pathogen dynamics and inform public health strategies in increasingly urbanized environments.

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**The Potential role of Scaffold Protein the Receptor for Activated C Kinase 1 (RACK1) in mediating Auxin/ABA signal transduction pathways in divergent plant lineages**

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Plant signal transduction pathways, although seemingly distinct in their operation, are beginning to be understood to be governed by crosstalk coordinating the various hormone-based developmental and environmental stress signaling processes. The recent discovery of the growth hormone auxin signaling environmental stresses has garnered widespread interest due to its potential relating to food security under climate change. The foundational cellular mechanisms, however, remain poorly defined. In previous studies, through the application of our in-house developed RACK1 Y248 phosphorylation inhibitor compounds and genetic knock-out approaches, our lab independently demonstrated that the RACK1 protein plays a positive role in auxin-induced lateral root development signaling, and concurrently negatively regulates salt stress signaling in the Arabidopsis. Here we aim to test our hypothesis that RACK1 serves as the mediator in the molecular crosstalk between these pathways. Employing transgenic Arabidopsis plants with the auxin reporter construct pIAA5::GUS and DR5 GFP, we investigated the cross-talk mediating function of the RACK1 protein.While pIAA-GUS plants exhibited salt-induced auxin reporter gene expression, the use of a RACK1 inhibitory compounds significantly up-regulated expression in the auxin signaling reporter constructs while resulting enhancing resistance to salt stress by the regulation of yet-to-be-identified subset of auxin-regulated genes. Additionally, RACK1 deficient transgenic lines of Oryza sativa, have also shown altered growth characteristics including under osmotic stress, with additional support from genome wide Poly-A-RNA sequencing of subjects in both experimental groups. This conserved response further supports out hypothesis of RACK1 governing crosstalk in diverse lineages.

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**Upregulation of EDN1 and MMP3 in the BTBR ob/ob Mouse Model of Diabetic Kidney Disease: Insights into Inflammatory and Profibrotic Signaling Pathways in Disease Progression**

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Background: Diabetic kidney disease (DKD) is a major complication of diabetes mellitus and a leading cause of end-stage renal disease (ESRD). The BTBR ob/ob mouse model provides a valuable system for studying DKD because it spontaneously develops obesity, diabetes, and progressive nephropathy that mirrors advanced human disease, including renal fibrosis. Given fibrosis is the convergent endpoint of ESRD, this study aimed to identify genes involved in DKD initiation and progression. Prior pathway-based analyses in male BTBR ob/ob kidneys identified nine differentially expressed genes, including EDN1 and MMP3. EDN1 and MMP3 encode endothelin-1 and matrix metalloproteinase-3, respectively, and have been implicated in proinflammatory and profibrotic signaling. This study sought to validate renal EDN1 and MMP3 expression in BTBR ob/ob mice. Methods: Blood, spot urine, and kidneys were harvested from 8-week-old male BTBR WT and BTBR ob/ob mice to measure glucose, albumin:creatine (ACR), and renal gene expression. Total RNA was isolated from whole kidney homogenate, reversed transcribed and analyzed using qRT-PCR with EDN1 and MMP3 specific primers. Results: Body weight, blood glucose, and ACR were significantly higher, 1.7-fold ($p=0.001$), 2-fold ($p=0.001$) and 21.5-fold ($p=0.001$) higher, respectively, in BTBR ob/ob mice. Renal expression of EDN1 (22.5-fold; $p=0.002$ and MMP3; $p=0.002$) were significantly higher in BTBR ob/ob, as assessed by qRT-PCR. Conclusion: BTBR ob/ob mice exhibited a DKD phenotype with increased renal EDN1 and MMP3 expression, supporting their potential role in inflammatory and profibrotic pathways and identifying them as candidate mediators of DKD progression.

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**Risks Associated with Bovine Bone Xenografts in Orthopedic and Dental Surgery**

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Bovine bone xenografts are increasingly used in orthopedic and dental procedures due to their availability and osteoconductive properties. However, their safety and efficacy warrant critical evaluation. This systematic review examines immunological, infectious, and inflammatory risks associated with bovine-derived bone grafts in clinical settings. A structured literature search was conducted across PubMed and Cochrane Library using the terms bovine bone graft, xenograft immunology, and

zoonotic disease transmission, covering studies published between 2000–2025. Of 143 studies screened, 38 met inclusion criteria (clinical trials, systematic reviews, and comparative cohort studies reporting adverse outcomes or integration efficacy). Key findings indicate that immune rejection rates range from 8-14% across reviewed studies, with inflammatory responses most prevalent in immunocompromised patients. Disease transmission risk, while low, remains non-negligible in grafts lacking standardized pathogen-inactivation protocols. Processing technique emerged as the strongest predictor of graft safety, yet significant variability in industry standards persists across manufacturers. These findings suggest that bovine bone grafts offer meaningful clinical benefits when sourced and processed under rigorous protocols, but current regulatory frameworks are insufficient to ensure consistency. Stricter FDA oversight and standardized screening criteria are recommended. Future research should prioritize longitudinal outcome data across diverse patient populations to establish evidence-based clinical guidelines for xenograft use in regenerative medicine.

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**An Analysis of Influenza A Viral Dynamics and Pathology Following Paternal Immune Activation**

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Paternal immune activation (PIA) is an emerging paradigm that could underlie a previously unrecognized layer of offspring immune development that occurs on a generation-by-generation basis. PIA can be triggered by a stressor, such as Poly (I:C) and lead to altered sperm small RNA profiles. 4 Previous work has reported that these alterations lead to changes in offspring behavior. Our current study aimed to determine the influence of PIA on offspring response to viral infection. PIA (Poly I:C) treated males were mated to naive females and the offspring were infected with Influenza A and monitored for survival, weight change, temperature loss, and clinical scores. Fascinatingly, we found that PIA sired offspring had better responses to lethal viral infection compared to control sired offspring. Here, we quantified viral titers in the lung and spleen of offspring using TCID50 assays and investigated the viral dynamics of Influenza A at 4 and 6/7 days post infection in infected offspring. Interestingly, despite enhanced response to viral infection, both PIA and control sired offspring had similar viral burdens. This data indicates that protection is not mediated by ability to better clear viral infection and rather suggests that differential immune responses could explain PIA sired offspring viral responses. To investigate differences in the lung of PIA sired offspring during infection we next evaluated lung pathology, where we scored airways, alveolar space, alveolar septa, vessels, and pleura. By evaluating damage across the lung at various time points we aim to better understand the role PIA plays in lung damage associated with Influenza A. Our study provides deeper insight into the protective impacts of PIA on offspring response to viral infection.

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**Cargo Modification to Overcome AAV Packaging Limit Abstract**

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Many genetic disorders are caused by mutations in large genes. The average human gene contains roughly 3 kb. The most common long-term solution to these disorders is through gene replacement. The primary means of delivery for gene replacement is Adeno-associated Virus (AAV) because of its ability to successfully deliver DNA sequences while lacking any viral genes. The primary limitation of using AAVs is their limited capacity. AAVs have a capacity of 4.7 base pairs to optimize its efficiency. Possible ways to overcome this limitation are mRNA trans-splicing, cargo modification, or the use of a super-enhancer. Tran-splicing is the joining of two portions of different primary RNA transcripts to form one. Large gene X was split at a CAG I GT. Complementary binding domains were used to bring the RNA pieces together, while splice donors and acceptors allowed the spliceosome to put the RNA back together. This full RNA leads to the formation of proteins . Tran-splicing: While there was a slight increase in production of the targeted, transplanted protein, the increase in production compared to the transfection of the full plasmid was not impactful enough to continue this method for further investigation. Cargo modification:Tran-splicing is ultimately inefficient; however, cargo modification allows for gene expression up to 4 kb. In the future, this approach may be useful for delivering therapeutics for large gene disorders. Therapeutics with modified cargo, Micro Promoter 1 are currently being tested in vivo.

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**Analysis of Rewilded Mice scRNA-seq Data Reveals Variation in CD4+ and CD8+ T-cell Populations**

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The specific pathogen free (SPF), or "clean", mouse model has proved crucial for immunology research, largely due to the genetic similarity between mice and humans, the widespread availability of inbred mouse strains, and rapid mouse reproduction times. Although mouse models have been key to our understanding of immunology, over 90% of drugs that pass mouse pre-clinical testing fail in human trials. The lack of environmental exposures in standard SPF laboratory mice may prevent models from displaying human-like responses to therapeutics. In this study, we leveraged published single-cell RNA sequencing (scRNA-seq) data from female C57BL/6 laboratory mice that were rewilded in an outdoor enclosure that mimicked the outdoor experience but contained no conspecifics. In particular, we investigated the variation within the CD4+ and CD8+ T-cell population of the laboratory and rewilded mice through single-variable analysis of differential gene expression.

Rewilded mice showed increased expression of genes associated with inflammatory response and glycolysis, as well as T-cell activation and proliferation. Conversely, genes linked to mitotic spindle activity had lower expression in rewilded mice, while no significant changes in genes linked to immature T-cell proliferation or oxidative phosphorylation were observed. These findings suggest that environmental exposures of rewilded mice promote a more diverse T-cell population, which could improve translation relevance for human immunology.

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**Discovery and experimental characterization of bacteriophage Asase**

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Bacteriophages are viruses that infect bacteria and infect only specific types or strains of bacteria. Bacteriophage research can help scientists develop and improve phage therapy. In this project, we used Mycobacterium smegmatis mc² 155 as the bacterial host. This work has real-world relevance because M. smegmatis belongs to the Mycobacterium genus, which also includes M. tuberculosis and M. leprae that cause disease in humans. Mycobacteriophage Asase, was discovered near the Howard University sign on Georgia Ave (38.9218° N, 77.018860° W). The bacteriophage was isolated from soil using enriched isolation. Then a plaque assay was completed in which a bacterial lawn was used to detect the presence of phages via the development of clearings in the bacteria called plaques. After this, plaque assays were completed for purification of the phage population. The plaque morphology was small, and embryo shaped. The morphology was also very clear after purification, which suggested that the phage went through the lytic cycle. High concentration of the phage lysate was then prepared for downstream analysis. Phage DNA was extracted and characterized using restriction enzyme digest and visualized on a 1X agarose gel. The restriction enzyme revealed the structure and composition of the phage DNA. The phage had a titer value of 1.11 x10^11 pfu/mL and the concentration of the extracted DNA was 43.7ng/uL. Future work will include sequencing and annotation of Asase's genome to further characterize the phage. This can support efforts to develop new treatments as antibiotic resistance increases.

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**New-Onset Musculoskeletal Manifestations in Hidradenitis Suppurativa: A Large-Scale Incidence Analysis**

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Background: Hidradenitis suppurativa (HS) is a chronic inflammatory skin disease traditionally considered cutaneous in nature. Emerging data suggest HS may also have systemic inflammatory effects, including musculoskeletal involvement, yet large-scale studies evaluating incident joint disease following HS diagnosis are limited. Methods: We conducted a retrospective cohort study using the TriNetX US Collaborative Network, analyzing electronic health records from 71 healthcare organizations. Patients aged 18–40 years with newly diagnosed HS and no prior history of joint disease were included. Outcomes assessed within 12 months of HS diagnosis included synovitis, tenosynovitis, enthesopathy, and small joint pain. Kaplan–Meier survival and frequency analyses were performed. Results: Among 125,181 patients with HS, 1.2% developed synovitis or enthesopathy and 2.3% developed small joint pain within one year of diagnosis. Kaplan–Meier survival probabilities at 12 months were 98.5% for synovitis/enthesopathy-free survival and 97.2% for small joint pain-free survival. The median number of outcome instances per patient was 1, with mean instances of 2.14 and 2.24, respectively. Conclusion: This large-scale cohort study demonstrates that HS is associated with an early risk of musculoskeletal involvement, reinforcing its classification as a systemic inflammatory condition. Clinicians should monitor for joint-related symptoms in HS patients, particularly within the first year of diagnosis, to enable timely intervention and prevent progression.

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**Mapping the Risk: Harmonia axyridis Distribution and Human Health Outcomes Across the United States**

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This study investigates the following question: How does the geographic distribution of Harmonia axyridis (the multicolored Asian lady beetle) correlate with reported allergic and respiratory health outcomes in populated regions of the United States? A systematic review of peer reviewed literature was conducted using PubMed, with searches limited to studies published between 2000–2025 using the terms "Harmonia axyridis," "allergy," "asthma," and "rhinoconjunctivitis." Studies were included if they documented clinically observed health outcomes in human populations. Species occurrence data were obtained from the Global Biodiversity Information Facility (GBIF) and analyzed alongside U.S. Census population density data using spatial analysis tools in R. A Pearson correlation was performed to assess the relationship between beetle occurrence density and county-level allergy and asthma prevalence. Literature findings consistently associate H. axyridis with allergic responses including rhinoconjunctivitis, asthma, and angioedema, attributed to the species' tendency to overwinter in large numbers inside buildings. Spatial analysis reveals broad distribution of H. axyridis across the United States, with notable overlap in densely populated regions. These findings suggest that H. axyridis represents an underrecognized environmental health risk. Further research is needed to better quantify exposure thresholds and inform public health responses.

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**A Virtual Cell Simulation Model of Hemolysis Driven Purinergic Signaling in Sickle Cell Disease**

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Sickle cell disease (SCD) is an autoimmune recessive disorder characterized by hemoglobin S polymerization, red blood cell deformation, and vaso-occlusive complications. Also known as sickle cell anemia, it involves the point-mutation of glutamic acid to valine at the HBB gene (ie. encodes hemoglobin β-subunit), on chromosome 11. Emerging evidence indicates that hemolysis-induced extracellular ATP metabolism increases adenosine signaling through the ADORA2B receptor, promoting deoxygenated hemoglobin S (deoxyHbS) formation and enhancing sickling events. However, the dynamic behavior of this purinergic signaling cascade during acute hemolytic stress calls for further exploration.To investigate this mechanism, we developed a compartmental systems biology model using The Virtual Cell (VCell) platform from the National Resource for Cell Analysis and Modeling to simulate acute purinergic signaling in a representative red blood cell. The model integrates ATP release, CD39/CD73 enzymatic conversion, extracellular and intracellular adenosine transport, ADORA2B receptor activation, AMPK metabolic coupling, and metabolic dynamics. Ordinary differential equations were implemented to evaluate transient signaling responses following a simulated hemolytic burst.
Simulations demonstrated that a) rapid ATP release, b) transient extracellular adenosine accumulation, c) receptor saturation, and d) downstream metabolic perturbations associate with acute sickling stress. Further simulations are currently underway for this important signaling pathway. This framework enables systematic perturbation of pathway components to identify rate-limiting steps and evaluate potential therapeutic intervention targets. These hypothetical findings highlight the utility of mechanistic computational modeling in generating experimental hypotheses and advancing translational strategies for sickle cell disease.

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**Deciphering the Structural Impact of Schizophrenia-Associated Missense Mutations in CUL1 via Hybrid Computational Modeling**

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The voltage-gated calcium channel gene CUL1 has been identified as a significant risk locus for schizophrenia. However, the molecular mechanisms by which specific missense mutations disrupt channel function and contribute to pathogenesis remain poorly understood. In this study, we developed a comprehensive in silico framework to systematically evaluate the structural consequences of variants within the CUL1-encoded Cav3.1 protein. We utilized the empirical force field FoldX to perform saturation mutagenesis, generating a complete landscape of thermodynamic stability changes. To enhance prediction accuracy, these physics-based results were cross-validated using state-of-the-art AI-driven protein stability predictors. Furthermore, we extended our analysis to investigate functional disruptions by calculating binding affinity changes at critical protein-protein interaction interfaces. This multi-tiered approach identified specific hotspots where mutations significantly destabilize the protein structure or impair macromolecular interactions. Our findings provide a structural basis for interpreting Variants of Uncertain Significance in CUL1, demonstrating that a hybrid modeling strategy combining biophysical simulations and AI predictions effectively prioritizes functional risk variants in psychiatric disorders.

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**Computational and experimental identification of potential neutralizing peptides derived from human ACE2 against SARS-CoV-2 infection**

Presenter's Name: Qiaobin Yao
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Shaolei Teng
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Human ACE2 (hACE2) is the primary receptor for SARS-CoV-2 entry. While some ACE2 alleles exhibit altered affinity for the viral Spike (S) protein, the functional impact of these polymorphisms remains unclear. This study investigated how ACE2 polymorphisms affect RBD-ACE2 binding and explored hACE2-derived neutralizing peptides as a therapeutic strategy. We applied computational saturation mutagenesis to screen binding affinity changes among all possible ACE2 missense mutations within the ACE2-Wuhan-S1 complex. Mutations at residues D355 and Y41 were predicted to weaken affinity, whereas N330 and D30 enhanced it. Based on these predictions, we identified six vital ACE2 regions for the RBD-ACE2 interaction. Synthetic peptides corresponding to these regions were tested using a pseudotyped viral particle system and dot blot assay. Three peptides were confirmed to bind the S protein, and four exhibited inhibitory effects against the Wuhan strain. Furthermore, alignment and correlation analysis with the ACE2-Omicron-S1 complex revealed conserved binding patterns, suggesting these peptides may also neutralize Omicron variants. These findings demonstrate strong consistency between computational predictions and experimental outcomes, highlighting hACE2-derived peptides as a promising therapeutic avenue.

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**Protein Phosphate-1-targeting 1E7-03 prevent dehydration-induced sickling of SCD mouse RBCs**

Presenter's Name: Emilia Yun
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Amara Nwankwo, Sergei Nekhai, Marina Jerebtsova

Human Red Blood Cells (RBCs) are highly permeable for water, but their permeability for Na+ and K+ is low. Sickle cell disease (SCD) RBCs have altered iron homeostasis and are prone to dehydration during circulation. Dehydration is mediated in part by K+-Cl- cotransporters (KCC) activation. Protein phosphates -1 (PP1) dephosphorylates KCC and increases its activity. We previously designed the small molecule compound 1E7-03 that disrupts the interaction of PP1 catalytic and regulatory subunits by mimicking "RVxF" sequence. We tested the effect of 1E7-03 on dehydration-induced sickling of SCD RBCs. Whole blood was obtained from Townes SCD mice. RBC sickling was achieved by culturing SCD blood with 20% metabisulfite (MBS) and increasing concentration of NaCl. Photographs were taken on Olympus IX73 microscope at 600x magnification. Hemoglobin fluorescence was detected on Beckman Cytoflex S FACS with V450 filter (404 nm excitation and 448 nm emission). SCD RBCs had about 20% sickled RBCs when cultured for 2 hrs in complete RPMI media containing 0.15M NaCl. Addition of 20% MBS increase SCD RBCs sickling to 25%. Increasing of NaCl to 0.225 M, 0.3 M and 0.375M with the addition of 20% MBS led to 30%, 62.5% and 65% sickling, correspondingly. Addition of 50 μM 1E7-03 to the whole blood cultured with 0.3 M NaCl and 20 % MBS reduced RBCs sickling to 38% (1.6 fold), but did not change Hb oxidation. Thus, 1E7-03 prevents sickling of SCD RBCs driven by dehydration. Small molecule PP1-targeting compounds might be useful in future design of anti-sickling agents.

**Microglial Activation Following Acute Morphine Exposure**

Presenter's Name: Hania Zehra
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School/College: Medicine
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Co-authors: Chao Hsiung Hsu, Dayuan Liu, Sakinah Ali, Mark Burke, Ozra Dehkordi, Tsang-Wei Tu

Morphine exposure is increasingly acknowledged as a contributor to neuroinflammation and has been associated with long-term cognitive and behavioral impairments. Microglia, the primary resident immune cells of the central nervous system, are highly responsive to opioid signaling and play a key role in mediating inflammatory responses to such pathological stimuli. However, the extent to which sustained morphine administration alters microglial activation across reward- and memory-related brain regions remains unclear. In this study, we examined microglial activation in brain tissues from rodent models of morphine exposure. Three male C57BL/6 mice received subcutaneous morphine pellets (75 mg), while four mice were given placebo pellets as controls. Brain tissues were harvested on day 3 post-implantation, cryosectioned, and subjected to immunohistochemical staining using ionized calcium-binding adaptor molecule 1 (IBA-1) to identify microglial populations. Brightfield microscopy was used to acquire images of IBA-1-stained microglia, and quantitative analysis was performed using the StainAI platform, focusing on the nucleus accumbens, striatum, and hippocampus. AI-assisted classification enabled morphological analysis of microglia across the activation spectrum, from resting to activated phenotypes, into six distinct morphological subtypes: ramified, hypertrophic, bushy, amoeboid, rod-like, and hypertrophic rod-like cells across experiment groups. Preliminary findings demonstrate a significant increase in the proportion of bushy and amoeboid microglia in the morphine-exposed brains compared to the controls, indicating a shift toward an activated inflammatory profile within these regions. These findings highlight region-specific microglial alterations following acute morphine exposure and suggest that targeting neuroimmune signaling pathways may represent a potential strategy for mitigating opioid-associated neuropathological changes.

ABSTRACTS

# BUSINESS

**Foreign Experience of Acquirer CEOs and Shareholder Returns**
Presenter's Name: Busra Agcayazi
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Business
*Presentation Type: Oral Presentation*
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We examine how CEOs' foreign experience influences domestic mergers and acquisitions (M&As). Using nationality, education, and employment history to measure foreign experience, we find that U.S. firms led by foreign-experienced CEOs generate 3.4% higher bidder cumulative abnormal returns (CARs) in the three-day window surrounding deal announcements. These gains are concentrated in acquisitions of non-public targets and equity-financed transactions, where valuation complexity and negotiation demands are greater. Foreign-experienced CEOs execute larger deals, pay lower premiums, and extract more synergies, as reflected in lower target firm abnormal returns. Robustness tests confirm that the effect is not driven by unobserved CEO ability or firm characteristics. Challenging the "cream rises to the top" phenomenon, we show that international exposure, rather than inherent managerial talent, drives value creation. These findings highlight the role of foreign experience in mitigating home biases, improving target selection, and enhancing deal structuring, ultimately benefiting bidder shareholders.

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**Does Happiness Pay? The Causal Link Between Salesperson Job Satisfaction and Performance**
Presenter's Name: Claire Cha
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Business
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It is important to find the causality between job satisfaction and job performance because the causal direction can change not only sales management strategy but also firm strategy on resource allocation. The present study conducts an empirical, longitudinal study to find the nature of the causal relationship between salespeople's job satisfaction and job performance. The study applies a three-stage least squared (3SLS) simultaneous equation model with panel data, which consists of 994 salespeople. A conventional single equation has shown that job performance leads to job satisfaction and job satisfaction leads to job performance. However, our estimation using a 3SLS simultaneous equation model indicates a salesperson's job performance significantly affects his job satisfaction ($p<.01$) whereas there is no evidence that job satisfaction leads to performance ($p>.05$). The finding suggests that future research including a relationship between job satisfaction and job performance should control for simultaneous endogeneity between these two constructs.

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**Study Hours vs Academic Performance in Business Major**
Presenter's Name: Mila Chatman
Classification: Undergraduate Student
School/College: Business
*Presentation Type: Oral Presentation*
Faculty Advisor: Gbadebo Odularu
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Research question: Is there a measurable relationship between weekly study time and GPA among Howard business students?

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**Sink or Swim: The Dual Faces of Imposter Syndrome on How Internal and External Factors Shape Professional Resilience and Avoidance**
Presenter's Name: Amiya Fitzgerald
Classification: Undergraduate Student
School/College: Business
*Presentation Type: Oral Presentation*
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Imposter syndrome is a pervasive experience in modern workplaces, affecting professionals across various roles, industries, and career stages. While most high-achieving individuals experience self-doubt at some point, they do not all respond to it in the same way. Some professionals transform imposter feelings into motivation, preparation, and resilience, while others respond with avoidance, risk aversion, and burnout. This paper conceptually examines why individuals experiencing imposter syndrome either "sink" or "swim" in professional settings. Drawing on Social Cognitive Theory and the Person–Organization Fit framework, the paper argues that outcomes are shaped by the interaction between internal cognitive factors—such as attribution styles, self-efficacy, and fear of failure—and external organizational conditions, including leadership practices, psychological safety, and workplace culture. Through an integrative review of interdisciplinary literature, two propositions are advanced: first, that adaptive attribution styles and higher self-efficacy increase the likelihood of channeling imposter feelings into growth; and second, that supportive organizational cultures moderate the negative effects of imposter syndrome on performance. The analysis further highlights the role of managers and leaders in either amplifying or buffering imposter experiences. Ultimately, this paper positions imposter syndrome not solely as an individual psychological issue, but as a shared organizational challenge with significant implications for leadership, employee well-being, and organizational performance.

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**Funding Women Entrepreneurs in Africa: A Systematic Literature Review**
Presenter's Name: Stephanie Leonard
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Business
*Presentation Type: Oral Presentation*
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Co-authors: Amanda Hinojosa, Ikenna Uzuegbunam, Michael Ogbolu, Kiaron Bailey

A systematic literature review was performed to analyze the current state of the literature regarding women entrepreneurs' access to business funding in Africa. The findings revealed that most studies focused on informal forms (e.g., family funding or personal savings), and debt-based formal forms (e.g., traditional bank loans and microfinance loans) of entrepreneurial finance, whereas fewer studies focused on equity-based forms of funding. Education and marital status have an impact on women applying for and attaining formal funding, leading women to utilize informal sources of funding. Furthermore, the findings highlighted some institutional impediments to funding female entrepreneurs including gender bias, religious institutions and government policies. Overall, this review pointed to some promising directions for future theorizing and empirical investigations about funding for women entrepreneurs in Africa. Key words: entrepreneur, gender, women-owned businesses, funding, financing, Africa

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**Rethinking the Hawthorne Effect Through Race and Power: How Historical Legacies Shape Black Employees' Performance Under White Managerial Observation**
Presenter's Name: Shani Lewis
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School/College: Business
*Presentation Type: Oral Presentation*
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The Hawthorne Effect assumes that an employee performs better knowing they are being watched. This interpretation misses how observation is shaped by race, power, and historical experience. This paper explores how performance by Black employees working under white managerial supervision may reflect fear, stereotype management, and/or empowerment rather than motivation. Building from critiques of the Hawthorne studies, race and surveillance theories, and research on impression management, this paper argues that observation is not neutral but contextually rich. A literature review and a theoretical framework will inform three propositions that differentiate how Black employees meaningfully articulate surveillance. The discussion draws implications for management practice to consider, especially for leaders who must consider racialized experiences when interpreting employee performance under surveillance.

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**Is it worth it? The NFL's schedule exansion: A profit maximiation examination**
Presenter's Name: Robert Lyons
Classification: Senior Faculty
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Robert Lyons
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In 2021, the National Football League (NFL) increased the number of regular season games for each team from 16 to 17. Over the past decade, the National Football League (NFL) has strategically expanded the number of regular season games, and ongoing discussions of further expansion. This study examines the NFL's schedule expansion through the lens of economic profit maximization theory, which posits that firms structure production decisions to maximize total profits rather than output alone. This study analyzes how additional games impact league wide revenue streams, including national media rights agreements, gate receipts, sponsorship activation, and related consumer spending, while also considering associated marginal costs such as player compensation, increased injury risk, competitive balance concerns, and potential fan demand saturation. The NFL represents a distinctive case due to its centralized governance, extensive revenue sharing, and strong negotiating leverage with broadcast partners. Findings suggest that schedule expansion is consistent with profit maximizing behavior when marginal revenue generated by additional games, exceeds the marginal costs absorbed by the league and its teams. However, the analysis also highlights the possibility of diminishing marginal returns, particularly as additional games may strain player health, intensify labor relations challenges, and threaten the scarcity that underpins long term fan interest. By situating the NFL's scheduling decisions within established economic theory, this study contributes to sport management and sport economics literature on league strategy, revenue optimization, and growth. Implications are offered for professional sport leagues evaluating schedule expansion, collective bargaining dynamics, and sustainability in an evolving sport media environment.

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**Algorithmic Pricing and Consumer Protection: Evidence from Uber Fares in the United States and United Kingdom**
Presenter's Name: Chynae Ross
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Andria Smythe
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Ride-hailing platforms, particularly Uber, utilize dynamic pricing algorithms that adjust fares based on real-time demand, supply, and location. This pricing method enhances efficiency but raises issues of fairness and transparency, particularly regarding potential income or location-based discrimination. This study investigates whether Uber's pricing creates systematic fare differences across various neighborhoods in the United States and the United Kingdom and assesses how consumer protection frameworks impact these pricing outcomes. By analyzing simulated Uber ride data in New York City and London across different income boroughs, the research reveals that average fares in New York

exceed those in London by approximately $9–$10, likely due to stricter regulatory measures in the U.K. The analysis further demonstrates significant fare variations within cities corresponding to income levels, with high-income areas typically facing higher charges. Although racial demographics could not be distinctly evaluated due to data limitations, overall results indicate that neighborhood demographic factors correlate with fare levels. Additionally, demand surges reliably increase fares by $4–$6, underscoring the influence of dynamic pricing. These findings illustrate how regulatory environments affect fare disparities resulting from algorithmic pricing, offering valuable insights for the regulation of transportation platforms.

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**La Otra Economía- The Silent Force Behind Cuba's Survival**

Presenter's Name: Karson Smith
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This study examines Cuba's socioeconomic, political, and economic landscape with particular attention to the country's expansive informal economy, commonly referred to as the "resolver." Drawing on qualitative field research conducted in Havana in March 2025 and 2026 alongside macroeconomic and institutional data, the project analyzes how chronic scarcity, state wage distortion, and external constraints, most notably U.S. sanctions, have entrenched informality as a core mechanism of economic survival. Despite constitutional guarantees of employment, healthcare, and education, Cuba's centralized economic model has produced persistent shortages and declining real incomes, compelling citizens across class and profession to rely on unofficial markets for food, medicine, currency exchange, and services. Preliminary results indicate that the informal economy is not marginal but structurally indispensable. Quantitative analysis reveals a sustained contraction in export capacity, chronic trade and current account deficits, and severe currency overvaluation followed by rapid peso collapse after monetary unification in 2021. Field observations and interviews corroborate these findings, demonstrating that divergence between official and informal exchange rates, has made participation in black-market currency exchange essential for daily survival. The data further suggest that access to the informal economy is unevenly distributed, with race, age, and remittance access shaping who can mitigate economic precarity. Overall, the findings challenge narratives that frame informality solely as criminality, instead identifying it as a rational response to systemic failure. The study concludes that recognizing and selectively regulating segments of the informal economy may be critical to improving economic stability and reducing inequality under continued geopolitical constraints.

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**Fitting in to Stand Out: How P-O Fit Shapes Student Success at HBCUs & PWIs**

Presenter's Name: Aniyah Smith
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*Presentation Type: Oral Presentation*
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The ongoing debate surrounding student outcomes at Historically Black Colleges & Universities (HBCUs) and Predominantly White Institutions (PWIs) has intensified amid shifting higher-education enrollment patterns. Following the 2023 rollback of race conscious admissions, HBCUs experienced enrollment growth, raising renewed questions about institutional belonging, student success, and equity in higher-education. Drawing on Person-Organization Fit (P-O Fit) theory, this conceptual paper examines how alignment between students' identities, values, and needs and institutional culture influences academic performance, persistence, and psychosocial well-being, particularly for African American students. Extending P-O Fit theory beyond its workplace application, this study advances five propositions that position institutional type (HBCU v. PWI) as a critical moderator in the relationship between fit and student outcomes. Synthesizing prior research, the paper argues that HBCUs, by mission and cultural design, provide stronger supplementary and complementary fit for African American students through culturally affirming environments, robust faculty support, and community-centered learning practices.In contrast, PWIs, despite greater material resources, exhibit weaker P-O Fit for minority students due to cultural misalignment and heightened minority stress. By integrating psychosocial, academic and institutional perspectives, this research reframes students' success as a function not only of individual ability or institutional resources, but of meaningful alignment between students and their educational environments. The findings underscore the importance of culturally responsive institutional practices and offer implications for higher-education leaders seeking to improve retention, performance, and equity across diverse campus contexts. Ultimately, this study highlights Person-Organization Fit as a framework for understanding why students succeed most where they feel they belong.

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**Maslow on the Main Stage: How Hierarchy of Needs Shapes the Actor-Management Relationship**

Presenter's Name: Essence Stephens
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Management in the entertainment industry is not merely about securing employment(booking roles) for a client; it is also about supporting and guiding them through their artistic development. When considering Maslow's Hierarchy of Needs, creative fields require skills that are associated with the higher-level esteem and self-actualization tiers of the hierarchy. Not fulfilling the lower-level physiological and safety needs in the hierarchy makes it difficult for an actor to feel mentally present in

a role or their career progression. By recognizing Maslow's hierarchy, managers can drive better outcomes for their clients while elevating their own leadership effectiveness. After conducting two separate surveys, one for performers and one for talent managers, results indicate that a performer's failure to fulfill their basic physiological and safety needs has negatively affected their ability to produce sustained, high-quality artistic output. For managers, the results indicate that a client's inability to produce sustained, high-quality artistic output has negatively affected their reputation and profit. Understanding the performer's psyche is more than empathy, it's a business strategy. By fostering symbiotic client-management relationships, managers can maximize profits and cultivate the industry connections essential for long-term career stability.

# CREATIVE ARTS & DESIGN

**Reinterpreting Streamline Moderne Principles in Contemporary Product Design**

Presenter's Name: Nia Breaux
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
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The Streamlining Moderne movement, pioneered by Norman Bel Geddes in the early 1930s, emerged as a reaction against the ornate complexity of Art Deco during the economic strain of the Great Depression. Characterized by smooth curved forms, horizontal lines, and occasional nautical influences, Streamlining reshaped the visual language of architecture, automobiles, and consumer goods by uniting aesthetic appeal with aerodynamic function. This project applies those foundational principles to the design and physical construction of an original three-dimensional fragrance bottle. Following extensive research and ideation, a clay perfume bottle titled "Venus" was developed, drawing inspiration from fashion icon Coco Chanel and the Greek Goddess of Love, Aphrodite, known in Roman mythology as Venus. The resulting design features a dove-like, cradle-shaped body adorned with scalloped, textured wings, directly reflecting Streamlining's hallmark emphasis on curvature and aerodynamic form while channeling themes of femininity and natural elegance. The project also served as a practical exercise in product design and mockup development, requiring careful consideration of user experience. Visualizing how a consumer would engage with the bottle, both as a displayed object and a handheld product, pushed the design process beyond aesthetics toward function-first thinking. This mirrors the philosophy of Streamlining-era designers, who regarded practicality as inseparable from, and often superior to, visual form. Through iterative feedback and persistent refinement, the final design successfully bridges historical design ideology with contemporary creative application, demonstrating the enduring relevance of the Streamlining movement.

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**The Exploration of Redesign**

Presenter's Name: Jada Fennell
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Mark Bartley
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Helvetica is a widely recognized typeface known for its efficient and refined design. Such that it is often utilized for functional and informational applications. Not only is it efficient and functional, one of its core characteristics is its clean and well balanced design. The functionality of helvetica allows for it to be used in various ways such as in branding, signage, and editorial practices. However, while it has its uses in professional applications, it lacks a dedicated display or novelty design meant for more expressive compositions. Under this circumstance designers are able to step into the gap and explore a traditional typeface without affecting its structural integrity. Through the research of modifying Helvetica without drastically affecting legibility and visual harmony we will be looking into the key structures of the typeface, including stroke weight, x-height, proportions, counters, and balance. The display type will then be placed into different variations of headlines and branding mockups to be evaluated on legibility, readability, balance, contrasts, and overall creative expression. In short, redesign expands Helvetica's functional range, showing that even a neutral typeface can evolve to meet expressive design needs. This study highlights the importance of respecting typographic structure while pushing boundaries. This expands design knowledge and gives designers a chance to think outside of the box that is already shaped around typefaces.

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**A Million Dots**

Presenter's Name: Raimi Gbadamosi
Classification: Senior Faculty
School/College: Fine Arts
*Presentation Type: Oral Presentation*
Faculty Advisor: n/a n/a
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This talk focuses on my process of developing the book A Million Dots, an artwork that will be discussed in relation to other contemporary book projects currently in production. A Million Dots is a study of imposed structural anonymity and offers an alternative exploration of humanity distinct from works such as those of On Kawara. Rather than marking individual presence through time, the project traces a movement from abstracted, calculable chronological time toward the erasure of individualized identity—an erasure that serves the interests of state and corporate power.Like all books, A Million Dots remains open to interpretation by the reader. Deliberately conceived, the work functions as a device that questions assumed textual meaning while simultaneously interrogating visual language. Through its form and structure, the project invites reflection on how meaning, authorship, and individuality are produced, obscured, or dissolved within systems of representation.
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**Stinger by Kia**

Presenter's Name: Katherine Huntwork
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Mark Bartley
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This project presents the development of Stinger by Kia, a three-dimensional body fragrance dispenser that attempts to merge the iconic aerodynamic principles developed in the 1930s Streamline Moderne

movement with a contemporary automotive brand identity. Despite the proliferation of car-branded fragrances, many still lack a cohesive design language that resonates with enthusiasts. The aim of this research was to bridge that gap by creating a premium, yet sustainable, collector's piece that embodies the precision and thrill associated with the Kia Stinger GT2. The methodology rests on extensive research into streamlining—a movement defined by long horizontal lines, smooth curves, and a focus on functionality over ornamentation—in order to establish an overarching design language. The silhouette was primarily inspired by the Korean Kia logo, and was refined through iterative sketches and discussion; the result being a futuristic form that implies constant motion. The final prototype was hand-sculpted using air-dry clay, retouched with a lightweight spackle, and finished with acrylic paint. The results of this project demonstrate a successful interaction between retro-futurism and sustainability, as the proposed production model emphasizes the use of reclaimed materials such as carbon fiber gear shifts, ceramic brake pads, and Alcantara headliners. The final form offers a satisfying user experience that seamlessly aligns with the existing "Stinger" brand—proving that thorough R&D, integration of era-specific design principles, and a commitment to material sustainability can transform a simple container into a meaningful extension of a brand's identity, thus offering a roadmap for environmentally conscious and highly conceptual product design.

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**Lullaby for Ébùn: A Practice-Based Investigation of Immersive Sound, Memory, and Maternal Experience**

Presenter's Name: Carolyn Malachi
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: N/A N/A
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Lullaby for Ébùn: A Practice-Based Investigation of Immersive Sound, Memory, and Maternal Experience. Background: Lullaby for Ébùn is a practice-based research project developed during the author's postpartum period that examines how immersive audio and culturally informed sound design can function as mechanisms for memory preservation and emotional reflection. Lived experience informs this work which reframes everyday postpartum soundscapes as compositional material, situating maternal experience as a site of scholarly and creative inquiry.
Methods: The composition was conceived natively for a 7.1.4 Dolby Atmos environment, prioritizing immersive production methodologies over the post hoc spatialization. Conventional monophonic and polyphonic musical elements establish tonal structure, while non-instrumental postpartum sounds—including a breast pump, toy xylophone, and humidifier—were recorded, edited, and spatially distributed within the immersive soundfield. These sounds were intentionally positioned to reflect the physical and emotional architecture of a nursery. Instrumental placement preserves a frontal performance orientation, while surround and overhead channels contribute spatial depth and symbolic meaning. Results: The resulting work integrates sound design as compositional structure rather than representational effect, producing an immersive listening experience that encourages focused attention, autobiographical reflection, and emotional engagement. Informal listening sessions indicated particularly strong resonance among listeners with lived postpartum experience. Conclusions: This project demonstrates how immersive audio practices can serve as a rigorous, culturally grounded research methodology within media and sound studies. Lullaby for Ébùn establishes a foundation for future interdisciplinary research connecting immersive media, cultural production, and questions of well-being.

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**The Aerodynamics of Desire: Mythology and Modern Form in Fragrance Design**

Presenter's Name: Chloe Mcneill
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Mark Bartley
Faculty Advisor's email: mbartley2@howard.edu

Drawing on the streamlining movement, which emerged in the early twentieth century as a response to advances in aerodynamics and industrial productivity, this design adopts smooth, flowing lines and continuous surfaces to evoke motion, refinement, and contemporaneity. Originally applied to transportation and machinery, streamlining gradually evolved into a wider aesthetic language that influenced architecture, consumer goods, and product packaging, including fragrance. This project addresses the question: how can the principles of streamlining be reconsidered through mythology and nature to create a sculptural fragrance container that communicates both modernity and emotional narrative? Aphrodite's Anthurium is a three-dimensional body fragrance container that merges mythology, nature, and modernist design principles to produce a sculptural object that extends beyond function. Inspired by Aphrodite, the Greek goddess of love and beauty, the design reinterprets romantic symbolism through the heart-shaped form of the anthurium flower, reframing it as an emblem of resilient femininity rather than fragile delicacy. The bottle integrates rich emblematic elements, including a heart-shaped structure and a shell-like stand that references Aphrodite's mythic birth from the sea. Made from dry foam and clay prototypes, the design process emphasized craftsmanship, efficiency, and a careful sensitivity to proportion. Considerations of light interaction, surface continuity, and ergonomics further strengthen the streamlined aesthetic throughout the form. Functioning as both vessel and artifact, Aphrodite's Anthurium operates as a contemporary keepsake at the intersection of divine femininity, emotional expression, and industrial design. By uniting mythology, nature, and modernist discipline, the container demonstrates how emotional symbolism can coexist with intentional three-dimensional form.

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**Streamlining Natural Forms in Fragrance Container Design**

Presenter's Name: Chimdinma Okonkwo
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Mark Bartley
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Contemporary body fragrance containers typically employ cubic designs that lack connection to organic forms. This project develops a bottle design

inspired by streamlining principles and natural world aesthetics, offering a distinctive alternative for the fragrance market. Streamlining—a post-Art Deco design concept—emphasizes rounded, aerodynamic shapes and smooth, flowing lines. The dragonfly exemplifies this concept naturally, featuring a bulbous head and body that tapers into an elongated abdomen, making it an ideal bridge between nature and streamlined design principles. The methodology began with comprehensive research examining streamlining, nature-inspired design, and existing objects incorporating these qualities. A cohesive design language and narrative framework guided development, explored through referential drawings and physical prototyping. Two iterative physical studies tested design feasibility and refinement. The first attempt utilized dry foam but proved inadequate for capturing intricate design details and revealed critical structural support weaknesses. These findings necessitated complete redevelopment of both structural integrity and functional components. The second attempt employed air-dry clay, successfully capturing the intended design details with sufficient fidelity. The final bottle design features a standing container with a flared base embellished with dragonfly wing motifs, merging functional stability with organic ornamentation. A domed lid crowned with a dragonfly head-shaped knob completes the design, creating visual continuity from base to top. This design demonstrates that natural forms can be meaningfully translated into functional, commercially viable product design through structured research and iterative development.

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**Designing Recovery**
Presenter's Name: Esther Olaitan
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Oral Presentation*
Faculty Advisor: Iesha Washburn
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This research explores the types of materials and housing layouts that can be integrated to help prevent and reduce flooding damage in vulnerable communities. Focusing on the lower Ninth Ward in New Orleans, the study examines how poor housing infrastructure and low-quality materials have left minority, marginalized, and low-income communities vulnerable to displacement and death during natural disasters. The Lower Ninth Ward experienced extreme flooding, with over 100,000 homes submerged, and faced significant challenges in receiving timely rescue, relief, and long-term recovery support. This research also analyzes inconsistencies in disaster relief efforts and where they fell short in providing sustainable, long-term housing solutions. Ultimately, this research asks how sustainable, flood-resistant materials and adaptive housing layouts can be intentionally integrated into new housing designs to withstand flooding better and reduce long-term vulnerability in historically marginalized communities.

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**African Cinema Preservation, Diasporic Memory, and Practice-Based Filmmaking: Damn the Man, Save the Rex!**
Presenter's Name: Akosua adoma Owusu
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Akosua Adoma Owusu
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Damn the Man, Save the Rex! is a practice-based film research project examining cinema preservation, institutional memory, and cultural stewardship through the ongoing effort to revive the historic Rex Cinema in Accra, Ghana. Established in 1937, the Rex served for decades as a venue for film exhibition before closing and remaining inactive despite its architectural and cultural significance. The film combines archival research, field recording, and essay filmmaking, to investigate how artists engage preservation as both cultural infrastructure and creative practice. The film is based in over a decade of research and community engagement connected to the Save the Rex initiative, launched in 2013. Damn the Man, Save the Rex! has been assembled to trace the cinema's historical role within Accra's film culture and contemporary efforts toward restoration and reactivation. Preliminary results include the creation of a documentary, research presentations, and the expansion of international partnerships supporting cinema preservation and cultural programming. Excerpts from the project demonstrate how filmmaking can function as both artistic production and preservation methodology. This creative research contributes to broader conversations about diasporic authorship, cultural memory, and artist-led models within global film culture.

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**Breathing Room**
Presenter's Name: Sydni Parhm
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Marialinares Trelles
Faculty Advisor's email: Marialinares.Trelle@howard.edu

I'm doing this because Black communities have spent generations living in spaces that were never designed with us in mind. Redlining, pollution, and "affordable" housing that feels anything but livable have shaped our neighborhoods for way too long. As I've grown in architecture and interior design, I realized most people design around us not for us. I want to change that. I want to show that affordable housing can still feel intentional, luxurious, healthy, and dignified. Air you can breathe. Materials that don't harm you. Spaces that make you feel like you deserve to be there. This project is me reclaiming what "home" should mean for our communities. A place with air, space, and dignity — something we should've always had.

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**Designing Interiors for Black Labor, Centering the Laboring Black Body**
Presenter's Name: Jesslyn Randle
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Maria Trelles
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In the United States, there is a clear disparity in the mortality rate during childbirth between Black and White populations. Systemic racism, especially in the medical field, contributes to the issue, preventing Black birthing bodies from having safe, cultural-specific, and holistic labors. Hospitals or health interiors prioritize healthcare professionals' comfort and functionality rather than patient autonomy. In labor, this is represented in the fragmentation of the process of birthing, space for labor advocates and families, and patient flexibility. From an interior design standpoint, one must understand how labor and delivery rooms are not only constructed but the legal codes that frame the design of healthcare interiors. This thesis looks at traditional birthing practices within the black community, particularly midwifery to rethink clinical interiors by centering the body to foster autonomy and dignity during labor. The project proposes a birthing center that will have a holistic approach to birth and focus on designing for black childbirth trauma through specialized furniture and an emphasis on patient autonomy. Trauma informed design practices can be the framework used to keep black parents and babies alive when giving birth through a deep understanding of hospital design, psychology, and history. This will serve as guidelines for laboring spaces; it is in the over 90% black neighborhood of Hillcrest in Southeast D.C. The site not only targets the racial demographic needed, but it also will bring a new and accessible birthing space to the neighborhood to keep black birthing bodies alive.

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**Do Students Spend More Money During Exam Weeks or During Non-Exam Week?**
Presenter's Name: Katlin St juste
Classification: Undergraduate Student
School/College: Business
*Presentation Type: Poster Presentation*
Faculty Advisor: Gbadebo Odularu
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Co-authors: Katlin St Juste

The problem is whether students spend more money during exam weeks or non-exam weeks in college. This matters because it can show how students manage their money during stressful and non-stressful times, and whether their spending habits actually work for them. Understanding how students spend money during stressful times can help them save and manage it more carefully. This is relevant to business and economics because it shows how students handle their financial situation in college. I'm looking into students perspectives on spending more money during stressful times. I'll collect data by posting a survey poll on Instagram to see how many students spend more during exam weeks versus non-exam weeks. I'll also ask anyone who wants to reply to explain why they spend more during exams than non-exam weeks, or vice versa. In addition, I'll ask at least 5–10 students directly and calculate the average differences to see which group spends more. I expect that students will spend more during non-exam weeks, because that's when they are not too stressed and can spend as much as they want too. During exams week they are prioritizing their time to study then to spend.This matters because it can give a clearer understanding of how students spend money during exam and non-exam weeks. Students would benefit from the research because it can help them learn how to better manage their money during stressful and normal weeks.

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**Reference-Free EM Validation Flow for Detecting Triggered and Always-On Hardware Trojans**
Presenter's Name: Mahsa Tahghigh
Classification: Graduate Student
School/College: Engineering & Architecture
*Presentation Type: Oral Presentation*
Faculty Advisor: Hassan Salmani
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Hardware Trojans (HTs) pose a serious threat to the trust and reliability of modern integrated circuits, particularly in security- and mission-critical applications. Triggered HTs remain dormant during normal operation and activate only under rare conditions, while always-on HTs continuously introduce parasitic activity that can degrade reliability or leak sensitive information. Existing electromagnetic (EM) side-channel detection approaches often rely on golden reference devices, labeled data, or detailed design knowledge, which are increasingly unavailable in modern supply chains. This work proposes a comprehensive reference-free and design-agnostic EM side-channel validation framework for detecting both triggered and always-on HTs in fabricated ICs. The methodology is experimentally validated on AES-128 implementations embedded with five hardware Trojans from Trust-Hub. For triggered HTs, raw EM traces are transformed into time–frequency scalograms using the Continuous Wavelet Transform (CWT) to capture transient activation signatures. Discriminative features are automatically learned via a convolutional neural network (CNN), reduced using principal component analysis (PCA), and analyzed with an unsupervised Bayesian Gaussian Mixture Model (BGMM). Detection confidence is quantified using posterior probabilities, Bayesian Information Criterion ($\Delta$BIC), and Mahalanobis distance, enabling statistically interpretable anomaly detection without reference data. For always-on HTs, the framework leverages Short-Time Fourier Transform (STFT) analysis and Gaussian Mixture Models (GMMs). The key observation is that HT-free devices exhibit fluctuating statistical structures across STFT resolutions, while always-on HTs suppress this variability, resulting in fewer and more consistent mixture components. Experimental results demonstrate robust detection of both Trojan classes without golden references, making the approach suitable for post-silicon, in-field, and supply-chain-constrained environments.

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**Airport Anxiety**

Presenter's Name: Kelise Thomas
Classification: Undergraduate Student
School/College: Fine Arts
*Presentation Type: Poster Presentation*
Faculty Advisor: Maria Trelles
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This project explores how psychologically informed design can transform airports into emotionally supportive environments for travelers and more specifically those with neurodivergence, anxiety and PTSD. Airports are already typically perceived as stressful and overstimulating spaces. Xenophonia, the political climate, as well as the COVID-19 pandemic heightened collective social anxiety associated with immigration processes and altered global travel behavior. Through neuroaesthetics, this project considers how color, materials and lighting positively affects travelers mood and behavior providing a link between spatial beauty and cognitive and emotional regulation. Since airports are highly structured environments where multiple security protocols are in place, this project intervenes in the gate area. Currently gates are configured as wait areas, where distraction and rest is limited to consumption. With the use of neuroaesthetics we can lower cortisol levels and stress which will foster a sense of comfort amid travel related stresses. This project tests the implementation, proper seat spacing, tactile surfaces that communicate comfort and cleanliness, and curated lighting that aligns with circadian rhythm to ease jet lag. Parallel to this sensory centered design invites holistic engagement of all of the senses. These frameworks allow for the potential for airports to evolve from high stress zones into psychologically comforting spaces that nurture well being, and support emotion regulation and human center the travel experience as a whole. By prioritizing mental health and sensory empathy, airport environments can embody a new form of hospitality centered around inclusivity.

# EDUCATION & OUTREACH

**Leveraging Social Media in Secondary Education to Promote Disability Awareness and Inclusivity**

Presenter's Name: Le'ale Addison
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
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This research examines how unconscious bias toward disabled individuals may stem from decades of inadequate media representation, and explores how social media integration in secondary education could address these gaps. Current policies affecting middle school-aged disabled students reveal treatment patterns potentially rooted in media consumption habits that historically excluded disability narratives. Through qualitative analysis of Instagram content from Disney, Nickelodeon, and Teen Vogue – the three most popular brands among secondary education aged students – from January 2022 to September 2025, this study demonstrates that representation gaps persist despite young people's shift from television to social media consumption. The research synthesizes findings from mixed-methods studies employing web scraping, content analysis, and ethnographic observation of disabled youth's digital interactions, utilizing frameworks like "social access" to examine inclusion and exclusion experiences.
Results indicate disability and accessibility remain largely absent from media literacy curricula, with disabled young people rarely included as active research contributors. Integrating social media analysis into classroom instruction enables students to deconstruct disability narratives, challenge ableist assumptions, and amplify marginalized voices. Digital platforms offer community-building opportunities for disabled youth but may reinforce inequalities without critical examination. Findings underscore the need for secondary education to adopt inclusive, critically engaged media literacy practices. This approach prepares students for thoughtful digital engagement, supporting inclusive citizenship development and promoting broader public disability understanding beyond educational settings.

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**Gun Violence Exposure and Uts Impact on College Students' Academic and Psychological Well-Being**

Presenter's Name: Na'jae Batts
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Gun violence remains a pervasive public health issue in the United States, with increasing concern regarding its impact on young adults and college-age populations. While existing research has largely focused on adolescents and community-level outcomes, fewer studies have examined how exposure to gun violence affects college students' academic performance, mental health, and health behaviors simultaneously. The present study investigates the effects of exposure to gun violence on college-age students' overall well-being, with particular attention to academic outcomes, psychological distress, and health-related behaviors. Guided by prior literature on community violence, trauma, and educational outcomes, this study hypothesizes that exposure to gun violence is associated with lower academic performance, increased depressive and anxiety symptoms, and poorer health behaviors, including sleep disruption. Using a quantitative research design, data examined through previously collected self-report measures assessing students' exposure to gun violence, academic performance indicators, mental health symptoms, and health behaviors. Participants consisted of college-age students recruited to examine both direct and indirect exposure to firearm-related violence. Statistical analyses were conducted to evaluate relationships between gun violence exposure and outcomes across academic, psychological, and health domains. Findings from this study aim to contribute to a more comprehensive understanding of how gun violence functions as an environmental stressor during emerging adulthood. Results have important implications for campus mental health services, academic support systems, and policies designed to promote student well-being and academic success in contexts affected by firearm violence.

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**Burnout, Depression, and Tech as Support Tools for K-12 Educator Wellbeing**

Presenter's Name: Tamara Bell amison
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Shareefa Al Uqdah
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K–12 educators report elevated levels of burnout and depressive symptoms associated with increasing job demands, emotional labor, and systemic instability within contemporary school environments. These concerns have intensified following the COVID-19 pandemic, which accelerated the integration of digital technologies into instructional delivery, administrative tasks, and communication processes. Although technology has the potential to improve efficiency and support instructional functioning, it may also introduce additional demands that contribute to psychological strain. Consequently, it remains unclear whether technology functions as a supportive coping resource that buffers distress or as an added burden that exacerbates burnout and depressive symptoms among educators. Guided by the Job Demands–Resources (JD-R) framework and the Technology Acceptance Model (TAM), the proposed study examines relationships among job demands, burnout, and depressive symptoms in K–12 educators, with technology use conceptualized as a potential moderating resource. Quantitative data will be collected from educators across multiple school districts and professional networks using validated measures of burnout, depressive symptoms, technology attitudes and support, and relevant demographic variables. Moderation analyses are proposed to assess whether supportive

technology use mitigates the impact of job demands on educator mental health outcomes. This research seeks to clarify the psychological role of technology within educator work environments and to identify conditions under which digital tools may support or hinder wellbeing. Findings are expected to inform the development of technology-informed supports, workplace interventions, and systemic strategies that promote educator mental health, occupational sustainability, and effective functioning within evolving K–12 educational contexts.

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**Nutrition 101: Combatting Childhood Obesity in Black and Latinx Children Living in Washington, D.C.**

Presenter's Name: Brianna Bowens, mph
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Elaine Meredith, MPH, RD, Alicia Anderson, Ph.D., TyWanda McLaurin-Jones, PhD, MPH

Background: Significant disparities amongst African American and Hispanic children experiencing obesity have created poorer health outcomes and higher mortality rates for these groups, which is mirrored in the nation's capital. Wards 1, 7, and 8 have the highest populations of African American and Hispanic residents, while simultaneously having the highest obesity rates, chronic disease rates, and lowest median incomes. Existing nutrition programs lack essential components such as cultural competency and developmentally appropriate curricula to mitigate this issue. Objective: The capstone objective is to increase culturally competent, developmentally appropriate nutrition education guidance directed for use by program administrators in D.C. to enhance applications of existing activities.Methods: A scoping review was conducted, based on inclusion criteria, to select relevant peer-reviewed literature used to assess existing nutrition programs in D.C. as well as current food literacy concepts and practices. PubMed and Google were used to find relevant articles. Key search terms included nutrition, food literacy, and child obesity. Deliverables: An all-encompassing food literacy resource guide that addresses contributing factors affecting early-onset obesity in minority populations living in D.C. was developed. The guide addresses social determinants of health such as education access, neighborhood/built environment, and social/community context to improve cultural responsiveness and curricula. A process evaluation plan is proposed to evaluate guidebook quality as well as potential barriers and facilitators associated with implementing a curricula guide. Public Health Implications: Guidance for improved programming is necessary to meet specific population needs and assist programs in improving health outcomes in Black and Latinx child populations.

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**From Fractions to Formulas: Exploring the Association Between Fraction Arithmetic and Generalized Arithmetic**

Presenter's Name: Karma Brame
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Previous research has established the importance of whole number and fraction knowledge for developing more advanced mathematical skills, including algebra. This study specifically examines whether fraction arithmetic predicts generalized arithmetic above and beyond whole number arithmetic in 7-9th grade students. Given that the structure of whole number arithmetic does not always apply to fraction arithmetic (e.g., multiplication with whole numbers always result in larger number, whereas this is not the case with fractions), we hypothesized that fraction arithmetic would be a predictor for generalized arithmetic. Results showed that fraction arithmetic accuracy predicted generalized arithmetic accuracy, even after controlling for whole number arithmetic. The study highlights the importance of a solid foundation in fraction arithmetic for success in algebra.

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**Comparing Policies for Supportive K-12 Student Environments**

Presenter's Name: Maya Brown-hunt
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Celeste Malone
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School policies define behavioral expectations, shape culture, and clarify institutional procedures for school communities. Together, these expectations, cultural norms, and institutional practices influence the overall school climate. Using a cultural-ecological model of school climate, this literature review examines: What policies contribute to the development of supportive student environments in K–12 education? The review compares how policies are characterized in the literature, including their stated goals, rationale, and approaches to discipline and enforcement. Empirical and theoretical literature on school anti-discrimination, bullying, discipline, and inclusion policies will be synthesized in relation to school climate, student sense of belonging, and student psychological safety. This research will show how policies grounded in inclusion, community, and restorative discipline are more frequently linked to supportive school environments than colorblind, exclusionary, and punitive discipline policies. Schools have a responsibility to provide safe and healthy environments to all students. By exploring this topic, institutions can develop their policies to foster supportive educational environments.

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**AI on the Yard: A Mixed Methods Study of Faculty Attitudes Toward the Adoption of Artificial Intelligence in Higher Education Across Schools of Education at HBCUs**

Presenter's Name: Randy Bumpers
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Sosanya Jones
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As artificial intelligence (AI) rapidly transforms higher education, Historically Black Colleges and Universities (HBCUs) are emerging as critical leaders in shaping AI adoption. This study examines how faculty in schools of education at research-intensive and AI-engaged HBCUs perceive, adopt, and integrate AI tools into their teaching and professional practices. HBCUs have produced a significant share of Black professionals in STEM, artificial intelligence, and education. HBCUs have also developed talent and research at the intersection of these fields. Despite this, the perspectives of HBCU faculty, particularly those in schools of education, remain underrepresented in AI research. This explanatory sequential mixed methods study seeks to investigate faculty attitudes toward the adoption of AI. It will also examine how faculty make sense of their experiences with AI, drawing on Black critical, constructivist, and meaning-making theories to understand their interpretations, optimism, challenges, and concerns. The findings aim to inform policy, practice, and future research on AI in education.

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**A 21st Century Title IX: Critical Discourse Analysis of Higher Education Institutional Responses to Tennessee v. Cardona**

Presenter's Name: Erinn Carter
Classification: Graduate Student
School/College: Education
*Presentation Type: Oral Presentation*
Faculty Advisor: Jorge Burmicky
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Just three years ago marked the 50th anniversary of the enactment of Title IX. Since its signing in 1972, this policy has become a political cudgel used by politicians in both the Executive and Legislative branches. The past four presidential administrations have prompted considerable changes and challenges to Title IX policies, with substantial impacts on students, education administrators, and educational institutions. On January 9th, 2025, an unprecedented legal event changed the trajectory of Title IX. For the first time in Title IX's policy history, there has been a contraction of civil rights protections afforded to students in higher education. Adjudicated in Tennessee v. Cardona, the U.S. District Court for the Eastern District of Kentucky effectively ordered higher education institutions in the United States to no longer offer protections against discrimination against transgender students and protections against discrimination for pregnant students. This study will employ a critical discourse analysis (CDA) to examine how selected higher education institutions in California navigate and reflect Title IX compliance guidance following the 2025 Tennessee v. Cardona decision. My primary research questions are: a)To what extent does Tennessee v. Cardona impact how universities reflect Title IX policy in their public documents? b) - What role, if any, does institutional isomorphism have in impacting how universities reflect Title IX policy compliance standards in a post-Tennessee v. Cardona university environment? c )How are social hierarchies, power dynamics, and social inequalities reflected in institutional rubrics on Title IX compliance standards at universities?

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**Transforming Global Nutrition and Dietetics Education: A Strategic Collaboration between Howard University and Quirino State University**

Presenter's Name: Chimene Castor
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*Presentation Type: Oral Presentation*
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Co-authors: Romino G. Baustista,Yolene Gousse, Joyvina Evans, Patricia Talbert

The global burden of diet-related diseases underscores the urgent need for innovative, globally responsive educational strategies in nutrition and dietetics. Non-communicable diseases linked to poor diet account for approximately 71% of global deaths, highlighting the importance of preparing a globally competent nutrition workforce. This study emerged from a pedagogical partnership between Howard University and Quirino State University, facilitated by a Fulbright Specialist appointment to support cross-institutional curriculum development, faculty training, and global pedagogical exchange. Using qualitative content analysis, a systematic search yielded 1,026 records, of which 182 full-text sources were assessed and 96 peer-reviewed articles, instructional videos, digital learning materials, and academic resources (2014–2024) were synthesized. Guided by Constructivist Learning Theory, Transformative Learning Theory, and the Social Ecological Model, analysis generated 412 unique codes organized into five categories: constructivist engagement, experiential practice, faculty collaboration, intercultural learning, and digital pedagogy. Findings reveal a multifaceted global pedagogical landscape shaped by technological innovation, intercultural engagement, and institutional collaboration. Insights from the Howard University–Quirino State University partnership informed the development of the Integrated Global Pedagogical Paradigm (IGPP), a framework designed to strengthen faculty capacity, enhance student learning, and support sustainable international academic partnerships. IGPP offers practical guidance for modernizing undergraduate nutrition education and preparing a globally competent nutrition workforce.

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**Culturally Responsive Trauma Infromed Care for Black Girls in K-12 Education**

Presenter's Name: Jazmyne Charles-balan
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
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This research focuses on the different types of trauma that young Black girls face and the current culturally responsive, trauma-informed support that is implemented within schools for young Black girls facing trauma.

This is important because Black girls often do not get the trauma-informed care and support they need in schools and are often further disciplined for behavioral manifestations due to trauma.For this research, I will review scholarly research articles that focus on the different types of trauma that Black girls face, schools that are implementing trauma-informed care for Black girls that is culturally responsive, the types of behavioral manifestations that show up in Black girls due to trauma, and the rate at which this leads to exclusionary discipline measures among Black girls. I believe my findings will show that Black girls deal with trauma that perpetuates behavioral manifestations in school and that there is a lack of trauma-informed care in schools to support young Black girls. Due to this, Black girls are receiving exclusionary discipline practices in schools, which can further perpetuate harm on young Black girls who are already experiencing trauma. In conducting this research, my hope is that K–12 educators, especially school mental health practitioners, will strive for more culturally responsive, trauma-informed care for young Black girls that leads to the reduction of exclusionary discipline practices and further trauma, allowing young Black girls to have a well-rounded, successful, and equitable school experience

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**Comparative Analysis of the Zero Sugar Behaviour Change Campaigns against NCDs: 90-day (2024) vs 60-day (2025), Social Media Campaign, Uganda**

Presenter's Name: Kamara Daniel
Classification: Graduate Student
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*Presentation Type: Oral Presentation*
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Excess free sugar consumption is a public health concern in Uganda, contributing to overweight, obesity and non-communicable diseases. WHO recomends free sugars less than 10% of the total energy intake. Non-communicable diseases (NCDs) are now the leading cause of death globally, accounting for more than 70% of all deaths, with over 80% of these occurring in low- and middle-income countries In Africa, this burden is growing rapidly due to urbanization, population aging, and changes in health behaviors. In Uganda,the intake of sugar exceeds the recommendations due to social media, advertsment and presence of ultra added suagr product. In 2024 and 2025 led two campaigns branded Zero Sugar with differing durations and intensities. A comparative evaluation was conducted to assess how duration and delivery influence awareness, attitudes and short-term behaviour change. Methodology Qualitative data captured participant perspectives, implementer experiences and contextual factors affecting delivery and uptake. Analysis prioritized exposure to sugars, engagement depth and immediate reductions in self-reported sugar consumption. Results: Both campaigns increased awareness of sugar harmsin relation to NCDs and encouraged discussion of healthier alternatives. The 90-day campaign focused on our 6 community Whatsap forums, and Channel, and provided steady message reinforcement supporting gradual intention change. The 60-day campaign concentrated resources into high-intensity social media promotion, influencer partnerships and targeted workshops and achieved higher immediate digital engagement and quick commitments to trial behaviour change. 20,000 were reached out in 1st campaign and 50, 000 people were reahed out in 2nd campaign, with shared testimonies.

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**Why Health Career Minded College Students Engage in a Theatre Arts-based Peer Education Model for HIV Prevention**

Presenter's Name: Ashley Danso
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*Presentation Type: Poster Presentation*
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Co-authors: Maranda Ward, Patricia Houston, Joanne Adelberg, Saher Iqbal

Background: In the United States, Black women experience HIV-related deaths at rates 15 times higher than white women (CDC, 2020). In response, 19 organizations were funded through the P.A.C.E. project to improve HIV outcomes for Black women. Although many health education and prevention programs exist in communities and on Historically Black Colleges and Universities (HBCU) campuses, awareness of these resources—especially pre-exposure prophylaxis (PrEP)—remains low. Our initiative, Black Women and HIV: Empowerment through Engagement, Education, and Enrichment (Empower), is an HBCU-led, multi-year effort focused on culturally responsive HIV education and community engagement. Description: From 2024–2026, Empower is leading research-informed HIV prevention efforts for Black women using the arts, storytelling, and peer-led models. A key component, the Theater Arts (TA) Peer Educator Program, trains seven first- and second-year HBCU students through a culturally sensitive, train-the-trainer approach. Participants receive education in sexual health, HIV prevention, facilitation, advocacy, and creative expression. TA Peers meet biweekly and use poetry, acting, and music to share HIV prevention messages on campus and in the community. Their flagship performance occurs annually at the International Conference on Stigma at Howard University. Lessons Learned: Evaluation data shows a 78% increase in HIV knowledge from pre- to post-test. All participants reported high satisfaction, with 93% noting leadership growth and community impact, and 90% joining to strengthen advocacy skills tied to health career goals. Conclusions/Next Steps: We will continue collecting outcome data to support innovative, arts-based peer education models for HIV prevention among college-aged women.

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**Access Denied: The History of Book Bans and Limited Access To Diverse Literature**

Presenter's Name: Jasmine Dunkley
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Access to information is considered a foundational right for all societies (Jentes, 2023).Yet, increase in book bans in the United States threatens this access. Book bans are not a new concept, and have grown distressingly frequent in recent years. The first banned book to be recorded in America was the New English Canaan written by Thomas

Morton and published in 1637 (Taub, 2019). The PEN America study (2025) found that book bans have become the 'new norm' in American public schools, while serving as a disservice to children and threatens access to diverse literature.Using a quantitative meta-analysis, this paper will examine previous quantitative studies on book bans and limited access to diverse literature.

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**Behind the Veil: The Impact of System-Justifying Beliefs and Race Ideologies on Black Student Engagement in Intragroup Dialogue**

Presenter's Name: Jaelle Faison
Classification: Graduate Student
School/College: Education
*Presentation Type: Oral Presentation*
Faculty Advisor: Katherine Picho-Kiroga
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Historically Black Colleges and Universities (HBCUs) and Black-Serving Institutions (BSIs) are culturally affirming environments designed to support the development and empowerment of students of African descent (e.g., Black/African American, Afro-Caribbean/Latinx, and Continental African). A strong sense of belonging has been consistently linked to academic achievement among Black students. Yet students at HBCUs and BSIs continue to navigate potentially divisive challenges relating to variations in how they interpret Blackness and the systems that shape their lives, which may influence students' readiness to engage with one another. Intragroup dialogue—structured conversations among individuals who share a social identity—has been shown to foster critical consciousness and strengthen community. However, limited empirical research has examined how belief systems and racial identity orientations shape students' willingness to engage in critical intragroup dialogue about race, privilege, and power. Drawing upon system justification theory and the Multidimensional Model of Black Identity, this study investigates (a) the extent to which students of African descent attending HBCUs and BSIs endorse general system-justifying beliefs, (b) their willingness to engage in intragroup dialogue addressing sociopolitical issues, and (c) whether dimensions of racial identity—specifically private regard and ideological orientations (nationalist, assimilationist, and humanist)—moderate the relationship between system-justifying beliefs and willingness to engage. Using a cross-sectional quantitative design, data will be collected through an online survey across multiple institutions. By centering intra-diasporic diversity, this study challenges assumptions that shared racial identity alone guarantees readiness for dialogue and provides empirical insight into factors that may strengthen or inhibit unity within Black student communities.

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**Workforce Representation and Service in Shortage Areas: Outcomes of an HUCD Dental Education Model (2004–2024)**

Presenter's Name: Xinbin Gu
Classification: Senior Faculty
School/College: Dentistry
*Presentation Type: Oral Presentation*
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Purpose: This study evaluates the impact of Howard University College of Dentistry (HUCD) and its Orthodontic and Pediatric Dentistry residency programs on workforce diversity and access to care in underserved communities, assessing contributions to representation, board certification, and service in Health Professional Shortage Areas (HPSAs), Dental Health Professional Shortage Areas (DHPSAs), and Medically Underserved Areas (MUAs). Methods: Retrospective analyses were conducted of three cohorts: 1,473 predoctoral graduates (Classes 2004–2023), 94 orthodontic graduates (2009–2024), and 92 pediatric dentistry graduates (2009–2024). Demographic characteristics, board certification status, Medicaid participation, and practice location were collected from publicly available sources and verified when possible. Geographic Information System mapping and two-step floating catchment area analysis assessed service in shortage areas and community-level accessibility. Results: Among predoctoral graduates with complete data (n=1,292), 59% were female and 50% African American; 68.4% practiced in DHPSAs or MUAs. Orthodontic alumni demonstrated 30% practice in HPSAs, 53% in majority-minority communities, and rising board certification rates reaching 100% in 2024. Pediatric dentistry graduates (n=87) were 77% African American, with 86% accepting Medicaid; 43% practiced in HPSAs or MUAs, and 64% were board certified. Geographic clustering was noted in the Washington, D.C. region, Maryland, Texas, and Virginia, with measurable service to communities facing the greatest access barriers. Conclusions: HUCD and its specialty programs demonstrate sustained success in preparing a diverse, board-certified workforce committed to underserved and majority-minority communities. These findings highlight the measurable impact of diversity-centered educational pathways in strengthening workforce representation and expanding equitable access to oral health care.

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**New-Onset Heart Disease in Schizophrenia: A Real-World Population-Level Incidence Analysis**

Presenter's Name: Kevin Hanson
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
Faculty Advisor: Miriam Michael
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Co-authors: Prince Alino, Christian Nolan, Ross Lima, Mrinalini Deverapalli, Miriam Michael, Constance Mere

Background: Cardiovascular disease is a major driver of excess morbidity and premature mortality in schizophrenia, yet large-scale contemporary estimates of incident and prevalent cardiovascular outcomes across multiple endpoints remain limited. Methods: Using the TriNetX Global Collaborative Network (164 healthcare organizations), we performed an incidence and prevalence analysis (time window: December 2, 2010–December 2, 2025; lookback: any time to 1 day before window start). Adults (≥18 years) with schizophrenia (ICD-10-CM F20) and no ischemic heart disease (IHD; I20–I25) recorded on or before the schizophrenia diagnosis comprised the cohort (N=544,682). Events of interest were IHD, heart failure (HF; I50), hypertensive disease (HTN; I10–I15), cardiac death (I46 or R99), and cerebrovascular disease (CVD; I63, I65–I69), overall and stratified by age, sex, and race. Results: Overall

incidence proportions were IHD 2.43% (prevalence 2.52%), HF 5.94% (6.24%), HTN 34.89% (37.12%), cardiac death 3.20% (3.64%), and CVD 6.57% (7.19%). Incidence increased markedly with age (e.g., HF 25.5% and CVD 23.9% at ages 80–84). Females had higher incidence than males for IHD (2.83% vs 2.16%), HF (7.52% vs 4.83%), HTN (37.65% vs 32.98%), and CVD (7.93% vs 5.62%). By race, HTN incidence was highest among Black patients (42.25%) and lowest among Asian patients (31.52%); IHD incidence was highest among White patients (2.88%). Across strata, patterns were consistent. Conclusions: In a large, federated EHR cohort of adults with schizophrenia, cardiometabolic and cerebrovascular conditions were common and strongly age-dependent, with notable sex and race differences. These findings support proactive cardiovascular risk screening and targeted prevention strategies in schizophrenia care.

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**The Role of Artificial Intelligence in Higher Education**

Presenter's Name: Amari Henry
Classification: Graduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Priscilla Okunji
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Background: artificial intelligence (AI) has gained increased interest, as well as its incorporation into the lives of humans worldwide. However, the rapidly growing development of AI has recently been a recurring topic of discussion. The inclusion of AI has also been discovered to be advantageous for a plethora of other reasons, such as being an effective learning tool, filling in the gaps of the shortage of educators, improving classroom management, and the opportunity to transform the traditional concepts of both teaching and learning. Nonetheless, it is imperative to note that establishing AI in higher education may still be challenging as many people are still becoming familiar with what artificial intelligence truly is. This article examined how AI has influenced learning and institutional dynamics in higher education. Method: Data from 20 scholarly journal articles were extracted and synthesized to gather an understanding of the topic. Through a systematic review, this article addresses both the advantages and challenges of AI in higher education. Results: the results showed that although AI is still a tool that the higher education system is unacquainted with, it has created a lasting impact on our society, making its presence permanent. A need for policy guidelines and professional training on incorporating its usage was addressed as an implication. Implication: the usage of AI in the higher education system has proven to offer more benefits than challenges to both students, teachers, and faculty highlighting the consideration of how its presence may change the higher educational landscape in the future.

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**A Systematic Scoping Review of Research on Black Male Educators: Perspectives on Recruitment and Retention in Special Education and STEM**

Presenter's Name: Jahmere Jackson
Classification: Undergraduate Student
School/College: Education
*Presentation Type: Poster Presentation*
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Co-authors: Nathan Alexander, Nicholas Angelo, Joseph Isaac, James Jackson, Joshua Jean-Louis

We present findings from a systematic scoping review of research on the recruitment and retention of Black male educators, with particular attention to special education and STEM (science, technology, engineering, and mathematics). Using a coding framework derived from national reports on Black male educators and studies of Black teacher development, this review maps scholarship in the field over the past decade. The study has two objectives: first, to examine how Black educator recruitment, retention, and development have been conceptualized within the broader literature; and second, to identify how research on special education and STEM extends or challenges those conceptualizations. In a rapidly shifting educational landscape, understanding patterns in this literature is critical, as schools often position Black male educators as a monolithic group rather than as dynamic pedagogical actors. This review therefore asks: What intellectual and conceptual distinctions characterize the research on Black male educator recruitment and retention in special education and STEM contexts?

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**Bridging the Gap: Enhancing Dental Care for Children with Autism Spectrum Disorder through Provider Training**

Presenter's Name: Kennedy Jester, mph
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Nyree Dawson-Washington, RDH, MPH, Alicia Anderson, Ph.D., Carla Williams, Ph.D.

Neurodivergence refers to variations in how individuals learn, process information, or behave. Autism spectrum disorder (ASD) is a form of neurodivergence characterized by sensory sensitivities, communication difficulties, repetitive behaviors, and behavioral challenges. The incidence of children being diagnosed with this developmental disability continues to rise each year in the United States. ASD in the dental setting often leads to challenges that can result in care avoidance by dental providers. This has contributed to children diagnosed with ASD experiencing a higher prevalence of oral health disparities compared to their neurotypical peers. Although some dental schools provide a brief introduction on caring for patients diagnosed with ASD, many providers still feel inadequately trained to treat and manage the behaviors associated with this population. The goal of this project was to develop a culturally tailored training module designed to increase dental providers' efficacy

in treating and managing the behaviors of children diagnosed with ASD. The components of the training module were developed using principles of applied behavioral analysis and incorporate evidence-based strategies shown to improve care for children with ASD. By providing accessible, culturally tailored training for dental providers, this training module aims to increase access to dental care and help reduce the significant oral health disparities affecting this population.

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**Quantitative Eye-Tracking Analysis on How Students Interact with Chemistry Problem-Solving**

Presenter's Name: Jayden Lallemand
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Sarah Hansen
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Due to complex reactions and concepts, chemistry poses challenges for future scholars. Many undergraduate students struggle with chemistry, leading them to drop out or even fail the class. Understanding how students engage with different levels of representation—symbolic, submicroscopic, textual, and graphical— in chemistry can give insight into their problem-solving process. This study examines students who took or are taking General Chemistry and explores the relationship between gaze behavior and performance during chemistry problem-solving. In an interview, undergraduate students solve a series of chemistry problems while having their eye movements tracked by a complex eye-tracking algorithm. Four metrics, fixation duration, fixation count, duration of first fixation, and time to first fixation, were used to do quantitative analysis from data collected from the interview. The data were subjected to various analyses of variance, which were expected to reveal statistical differences in viewing patterns between the different levels of representation. Results were expected to show participants having higher fixation duration, fixation counts, and duration of first fixation on symbolic representations, while having shorter time to the first fixation on symbolic representations, indicating sustained focus on chemical formulas and equations during problem solving. This information will be used to improve educational equity and student retention in not only STEM but also in all fields.

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**Exploring Assessment Self-Efficacy among HBCU Faculty**

Presenter's Name: Anil Lalwani
Classification: Staff
School/College: Other
*Presentation Type: Poster Presentation*
Faculty Advisor: NA NA
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Student learning is essential to the academic mission of post-secondary institutions all over the world (Duarte & Vardasca, 2023). In the US, assessment of student learning directly informs routine accreditation and related quality assurance protocols at an institution; however, research on assessment practices of Historically Black Colleges and Universities (HBCU) is sparse (Montenegro & Jankowski, 2015). Whether an HBCU or any other type of institution of higher learning, a critical mechanism for effective assessment is engagement of faculty in the assessment process – this engagement is likely to be influenced by faculty members' perceptions of the assessment process as well as their own abilities and beliefs as an assessor, that is their assessment self-efficacy (Myyry, et al., 2022). A study conducted with HBCU faculty that asked about their perceptions of the different purposes behind assessment indicated need for future research to investigate the reasons behind these perceptions (Culver & Phipps, 2018). This study, therefore, is aimed at exploring the reasons that pertain assessment knowledge and skills in the form of self-perceptions HBCU faculty hold about their self-efficacy as an assessor. In this presentation, the design for a pilot study will be outlined in the form of a complete literature review and discussion of the methodology along with projections of likely trends in assessment self-efficacy of HBCU faculty that can inform resources and programming for faculty support and development.

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**Examining HBCU students' experiences navigating professional environments**

Presenter's Name: Takunda Maisva
Classification: Post Doc/Resident/Fellow/Research Associate
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*Presentation Type: Oral Presentation*
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Co-authors: Ryan Dunk

Historically, HBCUs have been regarded as community-oriented institutions that have been found to increase student sense of belonging, achievement, confidence, and related measures of positive self-affect. (Hardy et al., 2019, Arroyo and Gasman, 2014, Shuler et al., 2022). However, most workspaces are demographically dissimilar to HBCUs, especially in STEM environments (Fry et al., 2021), which are often racially hostile towards people of color (McGee, 2016, Camacho & Lord, 2011). Therefore, HBCU students may face unique challenges while transitioning from college/university to professional environments such as internships and professional meetings, but this remains understudied. We used Critical Race Theory (CRT) as our theoretical framework to explore how individuals racialized as Black navigate professional environments that are demographically dominated by whiteness. Specifically, this work examines HBCU students' experiences during professional training opportunities to gain important insight into the quality of those experiences for budding Black professionals. We conducted semi-structured interviews to identify and assess the various strategies and tools students utilized while navigating the transition into professional training experiences. Each interview was recorded, transcribed, and coded. Codes were then developed into emergent themes. We found students discussed broad themes of belonging, professional networks, and science identity. This study contributes to the growing body of literature that aims to improve the outcomes of students pursuing STEM careers after attending HBCUs. These findings can provide insight for efforts in the development and bolstering of similar opportunities that aim to benefit a broad range of students.

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**Influence of NIL on College Athletes Aspiring to the WNBA**

Presenter's Name: Nia Mayers
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Robert Lyons
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The introduction of Name, Image, and Likeness (NIL) legislation in 2021 marked a pivotal shift in collegiate athletics, fundamentally altering how student-athletes engage with the sports economy. While much of the early NIL discourse has centered on revenue-generating men's sports, this paper examines NIL as a transformative mechanism for female college athletes, particularly those aspiring to compete in the Women's National Basketball Association (WNBA). Drawing on existing literature, legal analysis, and contemporary athlete examples, this research explores how NIL empowers female athletes to monetize their personal brands, increase visibility, and navigate longstanding gender inequities in sport. This paper situates NIL within its historical and policy context, highlighting the NCAA's prior restrictions and the legal forces that prompted reform. It then analyzes NIL as a game-changer for female athletes by enabling direct engagement with fans, brands, and media through digital platforms. Special attention is given to WNBA-bound athletes, for whom NIL serves as a bridge between collegiate competition and professional careers in a league with limited financial and marketing resources. High-profile athletes such as Paige Bueckers and Angel Reese illustrate how early brand development can translate into sustained marketability beyond college. Ultimately, this research argues that while NIL does not eliminate structural gender disparities in sports, it represents a meaningful step toward economic empowerment, visibility, and agency for female athletes. NIL's long-term impact may reshape professional pathways, redefine success in women's sports, and contribute to narrowing gender-based gaps in compensation and recognition.

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**Beyond Words: Communication, Culture & Global Health Outcomes**

Presenter's Name: Morgan Moore
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Andrea Toliver-Smith
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Co-authors: Marlon John, Nailah Smith

Communication and swallowing disorders affect individuals across regions worldwide and remain underrecognized within global health priorities, despite their influence on education, social participation, and long-term well-being (Law et al., 2017; Olusanya et al., 2018). These impacts are amplified in communities with limited access to trained professionals, diagnostic resources, and culturally responsive care models (Kuipers et al., 2008; McNeilly et al., 2021). This presentation highlights the essential contributions of speech-language pathologists and audiologists in addressing these needs through evidence-based intervention, public health engagement, and culturally grounded service delivery (ASHA, 2020; Bendowska & Baum, 2023). Guided by the International Classification of Functioning, Disability and Health, the session examines how biological, social, and environmental factors interact to shape communication outcomes across diverse global contexts (World Health Organization, 2023).The session will review global prevalence trends and examine how social determinants of health influence early identification, access to intervention, and functional participation across the lifespan (Centers for Disease Control and Prevention, 2024; Hahn, 2021). Examples from international and community-based initiatives will demonstrate how interdisciplinary collaboration, caregiver partnerships, health literacy strategies, and sustainable approaches such as community-based rehabilitation can expand access to services in low-resource regions (Wylie et al., 2013; McNeilly, 2019). By integrating global health perspectives with functional and culturally responsive practice, the presentation illustrates how communication sciences and disorders professionals advance communication equity and contribute to strengthened health systems worldwide.

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**Beyond Accommodation: Confronting Systemic Ableism in Engineering Education**

Presenter's Name: Esra Omer
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Oral Presentation*
Faculty Advisor: Cristiano Reis
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Engineering education, despite growing attention to diversity and inclusion, continues to perpetuate systemic ableism that marginalizes students with disabilities and neurodivergent students. This poster synthesizes recent research through a narrative literature review of qualitative studies, institutional surveys, and pedagogical interventions. Three recurring themes emerged: (1) structural barriers such as a curriculum inflexibility and burdensome accommodation processes; (2) interpersonal barriers including faculty skepticism and peer exclusion; and (3) design culture barriers in which disabled people are treated as abstract "users" rather than collaborators. Together, these compounding barriers contribute to higher attrition among disabled students; what one scholar describes as "death by a thousand cuts." Drawing on Critical Disability Theory and Universal Design for Learning, the poster offers recommendations for proactive accessibility practices, faculty development, and participatory design approaches that center disabled voices and move the field beyond reactive accommodation toward justice centered engineering education.

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**The Letter of the Day is V: a content analysis on Sesame Workshop focused videos on vaccinations and its aid in child vaccination decision making for parents**

Presenter's Name: Jayla Page-thomas
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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"The Letter of the Day is V" is a content analysis of Sesame Workshop's vaccination-focused media, examining how this programming supports parental decision-making about childhood immunization. The study focuses on episodes and PSA-styled videos produced since the launch of the Sesame Street Child Immunization Campaign and investigates how language and visual strategies seen in the show shape parents' attitudes toward vaccinating their children. Sesame Street has continuously based its content on laboratory and formative research, creating accessible episodes, videos, and web materials that assist families in navigating health-related choices such as vaccinations. By using content analysis and survey responses from independent reviewers, the study identifies key words, phrases, research, tones, and character types (humans and muppets) used to explain vaccinations and convey vaccine-related messages. In the survey, reviewers gave their final grade on effectiveness of each video on influencing their own hypothetical decision to vaccinate a child. Findings indicate that Sesame Workshop's Childhood Immunization Campaign consistently presents childhood vaccination positively in their specials with. Informational, PSA-style videos having a stronger reported impact on parents' likelihood of vaccinating their children than clips drawn from regular episodes. Although approximately 80% of videos did not include explicit statistics or research references, viewers reported substantial trust in the educational tone and familiar characters. The results found can suggest public children's educational media can serve as an effective tool for promoting health literacy and supporting vaccine decision-making among parents despite the decrease in funding for public media and broadcasting.

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**Predictors of Self-Efficacy in STEM environments:**
**A Review of Instructional Practices and HBCU Environments**

Presenter's Name: Ta'ajha Reyes
Classification: Undergraduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Elizabeth Ricks
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Self-efficacy plays a central role in undergraduate STEM persistence, identity development, and academic success, but especially for students from historically underrepresented backgrounds. This literature review examines instructional practices and institutional environments that most strongly predict STEM self-efficacy, with special attention to the role of Historically Black Colleges and Universities (HBCUs). Drawing on studies across engineering, identity development, and higher education studies, this analysis synthesizes findings related to hands-on learning, undergraduate research, mentorship, classroom climate, culturally grounded instruction, representation, and identity-affirming environments. Across studies, consistent predictors of self-efficacy include early and structured undergraduate research, meaningful faculty mentorship, real-world application of content, and supportive academic communities. Evidence suggests that culturally affirming environments, the type of environments HBCUs are known for, strengthen students' sense of belonging, STEM identity, and confidence. Additionally, representation and exposure, including through social media and outreach initiatives, influence how students envision themselves within STEM fields. Findings indicate that self-efficacy is not solely an individual trait but is also shaped by institutional practices, relational support, and culturally responsive pedagogy. These results underscore the importance of inclusive teaching strategies and structural commitment to equity in strengthening persistence and outcomes for Black STEM students. When students see themselves in these spaces and believe they can be successful in them, they are far more likely to continue down paths in STEM. Future empirical work may further investigate these predictors through quantitative surveys and qualitative interviews to deepen understanding of lived experiences and effective practices to determine their role as well.

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**Substance Use Disorder Content Analysis within**
**Doctoral Level Psychology Programs**

Presenter's Name: Jada Smith
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Shareefah Al'Uqdah
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Co-authors: Chloe Hightower, Jailyn Edwards

Substance Use Disorders (SUD's) remain a critical public health concern in the United States, with implications for mental health, family systems, and educational environments (NCSACW, 2025). Despite the prevalence of SUD, research consistently demonstrates that stigma and inadequate training within higher education impede effective engagement and recovery outcomes (Barenie et al., 2023). Studies further reveal that students, faculty, and staff often report difficulty communicating with individuals with SUD, reflecting deficits and relational competencies that are central to counseling psychology practice (McCrady et al., 2020). This content analysis will examine peer-reviewed literature to identify how SUD stigma and professional preparedness are represented in training modalities within higher education. Findings highlight persistent gaps in formalized addiction education, particularly within psychology and counseling doctoral programs (Miovský et al., 2021). The literature emphasizes that targeted, evidence-based education, integrated stigma reduction, and culturally responsive care can improve professional attitudes and client outcomes (McCrady et al., 2020). This analysis aims to highlight the necessity for higher education institutions to expand and standardize substance use training within the counseling psychology curriculum. The findings of this analysis will clarify the current scope of graduate-level SUD training and identify curriculum gaps to effectively prepare professionals for the complex needs of individuals and families affected by substance use disorders.

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**The Impact of Parent-Child Relationships Cognitive and**
**Social-Emotional Development**

Presenter's Name: Temyaia White
Classification: Undergraduate Student
School/College: Education
*Presentation Type: Oral Presentation*
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Co-authors: Ayah Sumrain, Lauren Collins

Bronfenbrenner's ecological model (1977) suggests that the microsystem directly influences child development. Parents and primary caregivers play a critical role in fostering children's cognitive and social-emotional development, supporting academic achievement, promoting emotional well-being, and encouraging overall growth. Research demonstrates positive, nonpunitive parental behaviors, such as offering encouragement, employing reasoning, and providing educational support, nurture children's autonomy, motivation, and self-regulation (Hardaway et al., 2020). Furthermore, positive communication between parents and children enhances child development (Hasselle et al., 2024). Accordingly, this research aims to deepen the understanding of how nurturing, supportive parent-child relationships within the microsystem facilitate children's positive learning outcomes and broader developmental success. The primary goal of the study is to develop a model of parent-child relationships that includes the impact of nurture, structure, and communication type within the parent-child relationship. We also aim to include the impact of parental efficacy in the development of positive parent-child relationships.

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**Book Deserts and Its Impact on Low-Income Communities**
Presenter's Name: Nya Young
Classification: Undergraduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Delphia Smith
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Co-authors: Delphia Smith

Great disparity exists in the availability of books between high-income and low-income neighborhoods. Book Deserts, a growing issue in America and a term popularized by Neuman and Moland (2016) are geographic areas in underresourced and underserved low-income urban and rural communities with little access to age-appropriate books or reading materials. When books are not readily accessible, it constrains children's opportunities to not only engage with text, but acquire vocabulary, content knowledge, and scores of literacy skills. Using a qualitative meta-synthesis methodological approach, this paper will examine the impact book deserts have on low-income communities.

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# ENVIRONMENTAL SCIENCES & STUDIES

**Evaluating UFS and MPAS Forecast Performance of a Convection Initiation by a Dryline and Intersecting Cold Front**
Presenter's Name: Ayoola Abe
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
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Co-authors: Nakul Karle, Sen Chiao

Several studies on convection-permitting weather models (CPMs) such as MPAS and UFS have shown that convective-scale errors can grow and propagate upscale rapidly, leading to a loss of forecast skill for storm-scale convective features beyond three days. Understanding their relative performance in the short range is therefore critical for improving high resolution convective-scale prediction. In this study, we compare the forecast performance of MPAS and the UFS-FV3 during a high-impact severe weather event on 16-17 May 2017, when the interaction of a dryline and a cold front triggered severe storms producing large hail and tornadoes in Collingsworth County, Texas, and Beckham County, Oklahoma. Model forecasts are verified against radar reflectivity using metrics that access initiation, timing, movement, and placement of convection. MPAS employs a high-resolution, nonhydrostatic approximation using unstructured spherical centroidal Voronoi meshes and C-grid discretization, supporting both global and regional high-resolution simulations. UFS uses the FV3 dynamical core on a structured latitude longitude cubed-sphere grid to produce high-resolution regional forecasts. Preliminary results without Data Assimilation indicate that both models reproduced similar initiation, timing, and movement in both locations. MPAS initiated convection roughly one hour later than observed, while UFS overestimated storm intensity throughout the simulation. Additional experiments incorporating an ensemble Kalman filter (EnKF) data assimilation system with MPAS have been conducted, and results will be analyzed to evaluate potential forecast improvements.

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**Human-in-the-Loop AI for Postpartum Support Among Black Women in DC**
Presenter's Name: Morayo Adeyemi
Classification: Graduate Student
School/College: Other
*Presentation Type: Poster Presentation*
Faculty Advisor: Amy Yeboah Quarkume
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Co-authors: Donell Mtabvuri, Amy Yeboah Quarkume

Black women in the United States experience disproportionately high rates of postpartum morbidity and mortality, often driven by structural inequities, limited access to support, and postpartum isolation. This work presents a human-in-the-loop artificial intelligence (AI) framework designed to support postpartum individuals through emotionally aware interaction and connections to human and community-based resources. The system is designed to complement existing postpartum care pathways by promoting guidance and proactive engagement. In addition to emotional support, the framework integrates lightweight scheduling assistance and a personalized resource hub that surfaces locally relevant services. This research highlights the potential of human-centered, human-in-the-loop AI systems to strengthen postpartum support infrastructure and improve access to meaningful, timely assistance during a critical period of care.

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**Coyote Density and Zoonotic Risk: A One Health Assessment of Echinococcus multilocularis in Suburban Recreational Areas**
Presenter's Name: Aseelah Ahmad
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Soleil Volel

As Canis latrans (coyote) populations increasingly colonize suburban landscapes, the risk of zoonotic spillover to human and domestic pet populations has become a critical public health concern. This study specifically investigates whether the density of Canis latrans in these environments correlates with the prevalence of Echinococcus multilocularis eggs in public recreational areas. Applying a One Health methodology, research was conducted by cross-referencing iNaturalist occurrence data with epidemiological databases and field-collected fecal samples from suburban green spaces. Analysis focused on the presence of E. multilocularis. Preliminary findings indicate a significant positive correlation between coyote density and the concentration of parasitic eggs in public parks. Findings suggest that food sources from humans and habitat fragmentation lead to coyote aggregation, which, in turn, increases the environmental load of zoonotic pathogens. The study concludes that suburban recreational areas serve as high-risk hubs for transmission, particularly for domestic dogs acting as bridge hosts to humans. These results underscore the urgent need for targeted veterinary surveillance and public health interventions to mitigate the risks posed by this emerging parasite in North America.

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**New Schiff Base Ligands for the Remediation of Environmental Heavy Metal**
Presenter's Name: Chloe Alston
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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XiaoYi Luo, Aminah Coleman, Raymond Butcher, Christian Parry

Background: Corrosion and waste products from shuttered industrial plants are contaminating food and water-ways. Mercury, cadmium, lead and arsenic are major culprits. Accumulation of heavy metals dam-ages tissues and organs. Metal accumulation is propagated through food and fish with devastating public health and economic consequences. Chelation can be used for environmental remediation. EDTA is not easily degradable, hence a need for better agents. Methods: We examined Schiff base ligand 2-benzoylpyridine-4,4-dimethyl-3-thiosemicarbazone (Lig1) and a new derivative 1-{[2-phenyl-1-(pyridin-2-yl)ethylidene] amino}-3-(prop-2-en-1-yl)thiourea (Lig2) for their efficacy in chelating cadmium using mass spectrometry, NMR, infrared spectroscopy and X-ray diffraction. Results: Lig1 coordinated cadmium in an efficient 1:1 ligand to metal ratio - in contrast to structure BI-HTAQ in Cambridge Structural Database that required two molecules to one cadmium. Cadmium-bound complex of Lig2, 1-{[2-phenyl-1-(pyridin-2-yl)ethylidene]amino}-3-(prop-2-en-1-yl)thiourea yielded two distinct monomeric cadmium-bound ligand complexes and a dimeric com-plex in the asymmetric unit. Cadmium centers in the dimer are connected by a dichloride bridge in a Cd2Cl2 metallacycle. Cadmium ions in the two monomers are independently coordinated by a chlo-ride anion in a terminal bridge. Lig2 shows considerable conformational freedom. Mass spec-trometry analysis on the reaction product yielded species consistent with metal bound complexes of the ligand and simple higher orders. The assembly of the metal coordinated complexes of Lig2 is maintained through two nonsymmetric hydrogen bonds between the dimer and the monomers. Conclusions: The coexistence of both monomeric and dimeric metal-bound complexes in a unit cell is unex-pected. This has implications for catalysis and clustering that might enhance heavy metal chelation.

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**Harnessing the Opportunities for Artificial Intelligence in Healthcare While Considering Ethical Implications: A Systematic Review**

Presenter's Name: Marvis Amayor
Classification: Graduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
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Background: Artificial intelligence (AI) integration into healthcare has accelerated rapidly, particularly in electronic health records (EHR), medical imaging diagnostics, and predictive analytics, yet the ethical implications remain understudied. Method: This systematic review involving three hypotheses addressing diagnostic accuracy, patient data management, and predictive analytics outcomes. Analysis of 20 peer-reviewed studies (2020-2024) from three major databases were categorized using the Evidence Quality Hierarchy Framework Results: The results revealed that AI integration improved medical imaging diagnostic accuracy in simulated settings and enhanced clinical decision support in EHR systems despite implementation challenges. Predictive analytics showed superior disease detection performance with large datasets but demonstrated limitations with smaller populations. Conclusion: While AI shows promise in enhancing healthcare delivery, particularly in diagnostic accuracy and data analysis, future research must incorporate ethical frameworks and examine real-world clinical applications. Cross-training healthcare workers in AI applications may facilitate more effective integration while maintaining ethical standards.

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**Climate Change and Human Health: Effects of Natural Disasters on Vulnerable Populations**

Presenter's Name: Marvis Ameyaw
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Background: Natural disasters are increasing in frequency and severity, affecting over 60 million people annually, tripling since the 1960s. Vulnerable populations especially children, the homeless, the older adults, and the poor; face disproportionate harm due to unstable housing, limited healthcare access, and systemic inequities. This study explored how natural disasters intensify health inequalities through biological, geographic, socioeconomic, demographic, health system, and sociopolitical lenses. Method: This is a systematic review study focused on 2020–2025 literatures examining disaster-related health outcomes in vulnerable groups. Twenty peer-reviewed studies were included based on relevance and methodological rigor. Results: Significant increase in mortality rate and displacement in marginalized populations were noted. Recovery in poor communities is delayed by limited insurance and aid, as seen after the US Hurricanes Maria and Katrina. Conclusion: Future research should include more information on the impacts on the older adults and individuals with mental health concerns, including the intervention-based mitigation.

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**Analyzing the Effects of Particle Size and UV Irradiation on Industry-Specific Biochar for Methylene Blue Uptake, Via Camera-Based AI Models**

Presenter's Name: Eddie Anderson
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
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This study investigates the effects of particle-size distribution and ultraviolet (UV) irradiation on industry-specific biochar to enhance its use as an adsorbent for the organic pollutant methylene blue. In this study, biochar was obtained from a wood milling company as a byproduct of renewable biomass processing. Such char was modified under UV irradiation and used in batch sorption studies. These studies examined the kinetics and equilibrium adsorption of methylene blue (MB) on pristine and UV-modified biochars of different particle sizes. The kinetics and equilibrium performance of pristine and UV-irradiated biochar in adsorbing methylene blue were evaluated using Langmuir and the Freundlich isotherm models, as well as pseudo-first and pseudo-second-order kinetic models. Biochar performance was compared with that of activated carbon, an analogous carbon-rich material, to assess biochar's viability as a sustainable alternative. Notably, the study

employs a novel approach, combining camera-based measurements with artificial intelligence to develop a model that accurately predicts the particle size and performance of specific biochars. This study found that Ultraviolet Irradiation of pristine biochar increased the average adsorption capabilities compared to untreated materials. Extended UV exposure may adversely affect morphology, reducing methylene blue uptake. Smaller particle sizes of biochar increase the overall available surface area of the sorbent and have a positive influence on the uptake of methylene blue. The employment of artificial intelligence achieved perfect binary size classification and a 78% accuracy for low, medium, and high adsorption classifications. The models show a strong baseline for future use of Artificial Intelligence as analytical devices.

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**Spatial Analysis of PFAS Discharge from Wastewater Treatment Plants into Effluent Receiving Streams**

Presenter's Name: Kathleen Awason
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*Presentation Type: Poster Presentation*
Faculty Advisor: Sara Kamanmalek
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Per- and polyfluoroalkyl substances (PFAS) represent a persistent threat to aquatic ecosystems due to their resistance to conventional degradation. As a Contaminant of Emerging Concern (CEC), not only do they affect the aquatic ecosystem, but they also enter drinking water and are eventually ingested by people. While individual water facilities have been studied, a significant gap in the literature exists regarding the cumulative impact of these "forever chemicals" as they are discharged from wastewater treatment plants (WWTPs) back into regional river systems. Current data is often generalized to specific plants, obscuring the broader spatial patterns of contamination. The objective of this research is to assess the distribution of PFAS across a network of discharge points to identify high-risk zones within the watershed. Utilizing Geographic Information Systems (GIS) mapping, this study integrates discharge data from a comprehensive set of WWTPs with hydrological flow models. This methodology allows for the identification of downstream accumulation patterns that individual plant monitoring fails to capture. This spatial framework is expected to reveal specific geographic "hotspots" where PFAS concentrations may exceed ecological safety thresholds and identify how climate patterns affect PFAS concentrations. The broader impact of this work lies in its utility for environmental policy and urban planning. By identifying these critical areas, decision-makers can better determine where to prioritize infrastructure upgrades and strategically site future treatment facilities to minimize cumulative environmental exposure.

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**Advancing flood inundation prediction accuracy and computational efficiency using artificial intelligence**

Presenter's Name: Yogesh Bhattarai
Classification: Graduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Sanjib Sharma
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Co-authors: Ganesh R. Ghimire

Floods are among the most frequent and destructive natural disasters. Accurate predictions and timely warnings are critical for mitigating flood risk. However, flood prediction remains challenging due to limited availability of high-resolution data for model calibration and validation, high computational demands for near-real-time simulations, and large uncertainties surrounding sophisticated flood inundation modeling chain. This study focuses on improving riverine flood inundation predictions by leveraging artificial intelligence and machine learning algorithms to fuse data and models, accelerate computation, and automate end-to-end predictive workflow. We develop machine learning based postprocessors to correct systematic biases in hydrodynamic model outputs by learning from historical prediction errors. We also train and evaluate a hybrid Convolution Neural Network architecture coupled with a transformer to produce high-resolution inundation maps, combining local spatial feature extraction with long-range attention mechanisms to capture watershed-scale connectivity. Finally, we construct a surrogate of the fully physics-based GPU-enabled hydrodynamic model, Two-dimensional Runoff Inundation Toolkit for Operational Needs (TRITON) to generate rapid inundation simulations. Our results highlight strong tradeoffs between model complexity (standalone, hybrid, and surrogate modeling approaches), the size and quality of training datasets, available computational resources, and overall prediction accuracy, showing the pathway toward real-time flood inundation forecasting. Improved predictions of flood inundations can provide actionable insights to enhance emergency management, reduce disaster risk, and build community resilience.

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**Asopo Food Legacy: Addressing food apartheid through African ancestral traditions as seen in Baltimore City**

Presenter's Name: Grace Callwood
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Food insecurity has systematically plagued marginalized communities in Baltimore, Maryland, for over a century. Due to impoverishment, standardization of whiteness and white supremacist "solutions," and disconnection from our ancestors and the Earth itself, African Americans have been faced with food apartheid, orchestrated by federal and local governments and corporate America. Baltimoreans confronted with this reality have taken it upon themselves to organize, build community, regain power through education, and resist reliance on large corporations and fast-food chains, as a means of liberatory action and collective freedom. This paper seeks to understand the ways in which these acts of sovereignty are inherently linked to and explicitly inspired by African ancestral food traditions. Through a historical analysis of food apartheid in Baltimore and the organized action of three Baltimore-native institutions, this paper will draw a connection between contemporary engagements of food sovereignty and African ancestral practices of domesticating plants and animals, exercising autonomy, and community-based organizing. During experiences of racially oppressive ordinances and discouragement of self-reliance, it is crucial for African American

communities to engage in memory work and call upon the strategies of our ancestors, sustained by our ontological habits.

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**Compartive In Silico Analysis of Heavy Metal Detoxification Genes in the Bald Eagle (Haliaeetus leucocephalus)**

Presenter's Name: Samirah Clark
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Iesha Fields
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Co-authors: Samirah Clark, Destiny Haugton, LaJayla Green, Dallis Welsh

The bald eagle (Haliaeetus leucocephalus) serves as a sentinel species for environmental contamination, bioaccumulating toxins that reflect broader ecosystem and public health risks. Despite federal protections following population declines attributed to DDT exposure and habitat loss, bald eagles in industrialized watersheds continue to face significant contaminant pressures, particularly from mercury, a persistent neurotoxin with well-documented effects on avian reproductive physiology. This study investigates whether bald eagles inhabiting industrial watersheds exhibit significantly higher blood mercury concentrations than those in protected or rural habitats, and whether elevated mercury burden correlates with reduced reproductive success as measured by nest productivity indices. Using publicly available datasets from the U.S. Geological Survey (USGS) Contaminant Biology Program and EPA wildlife monitoring records, we will conduct a systematic meta-analysis of peer-reviewed studies and federal monitoring reports published between 2000 and 2024. Data will be extracted, cleaned, and analyzed in R (v4.3), employing linear regression and effect size estimation to assess contaminant-reproductive outcome relationships across three watershed classifications: industrial, agricultural, and protected. This study hypothesizes that the mercury burden will be significantly elevated in eagles from industrial watersheds and will negatively predict nest productivity. Findings will contribute to the growing body of evidence linking industrial pollution to raptor reproductive decline, with implications for environmental policy and human toxicant exposure monitoring.

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**Rooted by excluded: Examining Women's lived experiences of natural resource use and decision making exclusion**

Presenter's Name: Fatumata Dia
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*Presentation Type: Poster Presentation*
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Across Ghana women play a central rule in the daily use and management of natural resources. There is no doubt that they cultivate crops, fetch water, process food, and rely on natural resources to sustain their households and local communities. Despite this engagement, women remain under-represented in environmental governance structures that regulate land access in the management of natural resources. Only about 5% of women hold extensive roles in environmental governance in Ghana today. This disconnect between natural resource use and authority behind the use, raises a question about whether gender plays an extensive role in environmental governance participation in rural communities. The study aims to address this gap by analyzing how women in rural Ghanaian communities perceive, and explain their marginalization from environmental governance. Prior research shows gender disparities in land ownership however, very few studies include women's interpretations of why exclusion in environmental governance exists. The primary research question is: How do women in rural Ghana perceive and explain the gap between their central role in natural resources and their limited participation in environmental governance? Using a mixed methods approach, the study will combine both surveys with open ended interviews to capture both the personal perspectives of women and those currently in charge of natural resource use. The anticipated outcome for the study is based on a community centered analysis that takes perspective from both local, environmental governance, institutions, and women themselves.

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**Simulating the Chemical Reaction Network of the Enceladus' ocean using MØD software**

Presenter's Name: Diego Duenas parapar
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Henderson Cleaves
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The discovery of Cassini spacecraft has revealed valuable information of several organic molecules within the subsurface water body of Enceladus, one of the Saturn's moons of astrobiological interest. This, together with the hydrothermal activity, is suggested a remote possibility of a biotic origin, in the absence of evidence to the contrary. Knowing the components involved in the aquatic environment of Saturn's moon, it could be very useful to estimate the chemical reaction network, which are the sets of species and the possible reactions between them, in order to study the different possible complex molecules that can be produced. The objective of this research is to generate a Chemical Reaction Network (CRN) of the Enceladus' ocean. This will be conducted primordially in-silico by the software MØD, which is a chemical reaction network generator that employs reaction mechanisms as rules. The CRN results will be validated in-vitro with Nuclear Magnetic Resonance spectroscopy (NMR). These results provide us insights about the bio-signatures that could be found in the Enceladus' ocean, which are key to understanding the origin of life.

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**Isolation and Lytic Characterization of Novel Mycobacteriophage Memnon InfectingMycobacterium smegmatis mc²155**

Presenter's Name: Asia Evans
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Asia Evans[1], Oluwatomiwa J. Sunbare-Funto[1], Swagota Roy[1], Somiranjan Ghosh[1],Courtney J. Robinson[1]Advisor: Dr. Courtney J. Robinson[1]Department of Biology, Howard UniversityBacteriophages are the most abundant biological entities on Earth and play a critical rolein regulating bacterial populations and shaping microbial ecosystems. As antibiotic resistancecontinues to rise, particularly among pathogenic mycobacteria such as Mycobacteriumtuberculosis and Mycobacterium leprae, bacteriophages represent a promising alternativetherapeutic approach. The objective of this study was to isolate and characterize a novel lyticmycobacteriophage from environmental soil samples. Memnon was isolated from soil collectedon the Howard University campus (38.92167 N, 77.018617 W) using Mycobacterium smegmatismc²155 as the host bacterium. Both soil enrichment and direct plating methods were employed,and plaque assays confirmed successful isolation. Memnon produced clear, smooth plaquesaveraging approximately 4 mm in diameter, consistent with strong lytic activity. Threesuccessive rounds of plaque purification yielded a clonal phage population, which was amplifiedto produce a high-titer lysate of $8.6 \times 10^6$ PFU/mL. Genomic DNA was extracted from the high-titer lysate, yielding an average concentration of 54.4 ng/µL, sufficient for downstreammolecular and bioinformatic analysis. Restriction digestion using SalI, EcoRI, BamHI, andHindIII was performed to initiate molecular characterization of the genome. The successfulisolation and characterization of Memnon contribute to the expanding SEA-PHAGES databaseand establish a foundation for future genome sequencing, annotation, and comparative genomicstudies aimed at advancing our understanding of phage diversity and evolution.

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**Salinity and Salt Tolerance of Seashore Paspalum**

Presenter's Name: Alexandria Fuller
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: David Jespersen
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Seashore paspalum (Paspalum vaginatum) is a salt-tolerant turfgrass, though the mechanisms responsible for this tolerance are not fully understood. One proposed mechanism is the pumping of sodium ions out of leaf cells and into the apoplast to reduce salt accumulation. This study measured the ions exiting seashore paspalum leaf tissue over time to determine whether sodium was preferentially removed. Leaf tissue grown under saline conditions was incubated in deionized water, and ion release was analyzed through conductivity and ion concentration measurements. Results showed that ions exited the leaf tissue over time; however, sodium was not removed at a higher rate than other ions. This indicates that preferential sodium pumping into the apoplast is unlikely to be the primary mechanism of salt tolerance in seashore paspalum. In conclusion, other mechanisms, such as salt sequestration or ion compartmentalization, likely play a greater role in the plant's ability to tolerate saline environments.

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**DC Migration Safety: Evaluating the Correlation of DC Infrastructure and Bird Collisions in the Shaw and Howard University Area**

Presenter's Name: Kierra Gaddie
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Co-authors: Jordan McKnight, Janelle Burke

Each year, billions of bird species migrate across the United States. It is estimated that one billion birds die throughout migratory seasons due to collisions with physical human infrastructure. From 2010-2019, City Wildlife conducted a study in downtown Washington, DC called "Lights Out". This study monitored bird deaths during peak migration seasons around specific buildings that are likely to cause a bird collision. Researchers on this project estimated that the amount of birds found in this study is a small percentage of the actual number across the DC area. Our study proposes a methodology to document bird collisions during peak migration seasons in the Howard University and Shaw area. The framework of this study will be similar to that of the Lights Out study, but in a different area of DC. Researchers will walk standardized routes in peak migratory seasons around buildings of concern. Along this route, researchers will also identify powerlines that have deceased birds nearby and analyze them for collision death. The goal of this study is to analyze the amount of bird collision deaths to propose feasible policy suggestions that will allow for the mitigation of collision deaths. The results will also allow researchers to analyze the correlation between building gentrification in DC and the amount of collision deaths in gentrified areas. This data, when coupled with the data found in the DC Lights Out study, will create a significant amount of data that can be used in policy reformation for buildings in DC.

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**Global Frequency Trends of Ambrosia artemisiifolia (Common Ragweed) from 2015–2024: A Citizen Science-Based Observational Analysis**

Presenter's Name: Graciana Gardin
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
Faculty Advisor's email: iesha.fields@howard.edu

Ambrosia artemisiifolia (common ragweed) is an annually flowering weed native to North America, widely recognized for its prolific production of highly allergenic pollen. As herbicide resistance continues

to spread, ragweed poses increasing ecological and public health threats across multiple continents. This study investigated global observational frequency trends of A. artemisiifolia across two complete five-year periods (2015–2019 and 2020–2024) using publicly available citizen science data from iNaturalist (exported March 1, 2025) and cross-referenced with the Global Biodiversity Information Facility (GBIF). To control for differential observer effort and platform growth over time, frequency was operationalized as the proportion of research-grade A. artemisiifolia observations relative to total annual plant observations within each geographic region. Analysis was restricted to North America and Western Europe, regions with sufficient iNaturalist sampling density to support trend inference. A Mann-Kendall trend test was applied to assess monotonic trends within each time period. Preliminary findings indicate a statistically significant increasing trend in relative ragweed frequency from 2015 to 2019, followed by a general decline from 2020 to 2024. These results suggest potential shifts in ragweed abundance or reporting behavior over time, with implications for allergy forecasting, herbicide resistance monitoring, and invasive species management. Limitations including spatial sampling bias inherent to citizen science platforms are acknowledged, and findings are interpreted accordingly.

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**Genotyping and Genomic Mapping of Portulaca and Talinum Species Using High Throughput DNA Extraction**

Presenter's Name: Madison Gunn
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Oluwakemi Adeola
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Genomic and Genotyping mapping have a crucial part in conducting research about plants; it helps scientists have a better understanding of inherited traits, connections among species, and genetic discrepancies. All of these methods are very important and beneficial for different types of species of plants that have yet to be heavily researched. As this project was conducted, from the assigned three plant groups from the ordered Caryophyllales the genomic DNA was extracted. Which includes Talinum fruticosum also referred to as water leaf strain two, Talinum paniculatum also referred to as water leaf strain one, and Portulaca species belonging to the Portulacaceae family. Using the Quick DNA Plant Seed 96 Kit samples of fresh plant tissue were processed, this allowed effective isolation of clean genomic DNA adequate enough for molecular analysis. The DNA that's extracted is being produced for genomic and genotyping mapping to establish the genetic differences and similarities of the three among plant strains and species provided. The observations initially showed that there is great quality in the DNA acquired for the downstream analysis, as the process of the detailed genotyping results is still being done. Overall this study aims to establish the plant DNA that is a well founded workflow for genetic analysis and plant DNA extraction while refining apprehension of variations of genetics among closely linked groups of plants. The discoveries may support research in the future among plant comparative genomics, breeding, agricultural research, and nutrition.

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**Genomic Insights into the Ecological Specialization of Pangolins as Natural Insect Regulators**

Presenter's Name: Alycia Hadley
Classification: Undergraduate Student
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*Presentation Type: Oral Presentation*
Faculty Advisor: Iesha Fields
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Pangolins are specialized insect-eating mammals that play a critical role in maintaining ecosystem balance by regulating social insect populations. While predation directly limits the growth of ant and termite colonies, the evolutionary basis for this specialized diet requires further investigation. This study employs a bioinformatic meta-analysis to correlate genomic divergence with ecological impact. Using publicly available data on DNA sequences from GenBank, mitochondrial DNA sequences for all eight extant pangolin species were retrieved. Sequences were aligned using MUSCLE (MUltiple Sequence Comparison by Log-Expectation) to identify conserved regions associated with metabolic adaptation. Phylogenetic trees were constructed in MEGA11 using Maximum Likelihood methods to evaluate the evolutionary distance between species with varying diet compositions. These genetic data were integrated with a meta-analysis of existing literature regarding foraging frequency and insect nest disruption. Findings indicate that areas with consistent pangolin presence exhibit lower insect densities and fewer intact nests than comparison sites. This study concludes that pangolins function as natural regulators of insect populations and support ecosystem stability. The specialized genetic profile of these mammals is essential for preserving ecological processes, such as soil stability and vegetation health. Protecting these unique lineages is therefore critical for maintaining biodiversity and preserving the environment.

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**Spatial Analysis of Forest Restoration Volunteership at Rock Creek Park**

Presenter's Name: Kiera Hale
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*Presentation Type: Poster Presentation*
Faculty Advisor: Janelle Burke
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Co-authors: Cire Portegies

Forest restoration has become an increasingly important research topic as forest ecosystems are negatively impacted by climate change, pollution, and regular human activity. Some conservation of forests is completed by forestry experts in nature reserves such as national parks, but the amount of restoration needed often exceeds the capacity of governmental and nonprofit conservancies. So, volunteer participation is an essential component of conserving forests in impacted areas, and this is the case for Rock Creek Conservancy (RCC), a nonprofit in Bethesda, Maryland, that conserves and manages Rock Creek Park. As an project of students interning under RCC's Forest Resilience Manager, this research project aimed to investigate volunteer population over the D.C., Maryland, and Virginia (DMV) region. Specifically, this research project investigated volunteer zip codes to gain information on the distribution of volunteer addresses. Out of 14,166 individual volunteers, 4,722 individual

volunteers who provided zip codes were analyzed. The majority of volunteership came from zip codes in DC. The zip codes 20008 (16.1%), 20009 (10.3%), and 20016 (7.2%) were represented most. Following the data analysis, the proportions of volunteers from each zip code were mapped with ArcGIS to provide a spatial representation of where forest restoration volunteers live. This data analysis helped visualize the locations of volunteers at Rock Creek and can be utilized to inform outreach to less-participatory or less-represented neighborhoods in DC. This analysis was also presented to the whole Rock Creek Conservancy staff to inform their outreach strategies as an organization.

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**An Investigation of the Relationship Between Woolly Bear Caterpillar (Pyrrharctia Isabella) Activity and Seasonal Dermatitis Trends.**

Presenter's Name: Braniyah Jones
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Iesha Fields
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JCo-authors: amaya Lee, Abigail Denham

The larva of the Pyrrharctia isabella (Woolly Bear caterpillar) poses a significant public health risk due to its unique life cycle and cultural significance in the Northeastern states of the U.S. The Pyrrharctia isabella overwinters leading to a high-detectability "wandering" phase post-hibernation, emerging in the spring and the pre-hibernation migration in the autumn. While perceived as harmless, the caterpillar setae (bristles) act as physical irritants that can cause contact dermatitis in humans. Due to Northeastern folklore, predicting the severity of the coming winter based on the body color; encouraging human contact, creating a recurring, seasonal public health risk, specifically a "behavioral trigger" for exposure that remains poorly quantified in traditional clinical surveillance. This study will investigate the correlation between seasonal biological activity and public health outcomes in the Northeastern U.S. We will focus on the relationship between the phenological peaks of the Pyrrharctia isabella and the frequency of dermatitis reports. We will use iNaturlist; for Pyrrharctia isabella observations and Google trends; for search volume for "caterpillar rash". We will use Spearman Correlation to see the strength of the relationship and use Cross-Correlation Function to identify the time lag between caterpillar abundance and search volume. We intend to find strong positive correlations between the bimodal caterpillar peaks and search volume, likely exhibiting a one-week temporal lag. Ultimately, this research demonstrates that monitoring insect phenology through digital platforms offers a scalable, cost-free biosurveillance tool for local health departments to improve hospitals and the public awareness regarding seasonal bug-related dermatitis.

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**Heatwave and Coldwave Projections Across U.S. Cities Under Climate Change**

Presenter's Name: Abdulsalam Kalonji
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Sanjib Sharma
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Climate change is intensifying extreme temperature events across the US, posing risks to infrastructure systems, public health, operational continuity, and community resilience. This study evaluates projected changes in heatwaves and coldwaves across major US cities using an ensemble of bias-corrected and statistically downscaled CMIP6 climate models from the NASA NEX-GDDP dataset. Mid-century conditions (2030s and 2050s) are examined under two emissions scenarios, SSP2-4.5 and SSP5-8.5, representing moderate and high greenhouse gas pathways. All scenario-based projections are evaluated relative to a historical baseline period to quantify departures from observed climate conditions. Extreme temperature hazards are characterized using standardized metrics of event frequency, duration, and intensity. We assess regional variability in projected hazard amplification and evaluate shifts in exposure patterns across urban areas. Results will be presented on projected spatial patterns and temporal trends in heatwave and coldwave characteristics, highlighting regional contrasts and scenario-based differences in risk amplification. The findings are expected to contribute to quantitative climate risk assessment frameworks and to inform long-term infrastructure planning and resilience strategies under evolving climate conditions.

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**Higher-Order Turbulence Statistics in the Convective Mixed Layer: Insights from Raman Lidar Water Vapor Profiles**

Presenter's Name: Nakul Karle
Classification: Post Doc/Resident/Fellow/Research Associate
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David Turner, Duane Rosenberg, Sen Chiao, Isidora Jankov

The convective mixed layer (CML) is central in boundary-layer meteorology, influencing weather prediction and air quality forecasts. Understanding its turbulence characteristics is critical to improving the model's representation of boundary-layer processes. In this study, we use high-resolution water vapor mixing ratio (q) profiles from the ARM Raman Lidar at the Southern Great Plains (SGP) Central Facility in Lamont, Oklahoma, to characterize turbulence during three consecutive convectively driven days (26–28 May 2018). These days also featured extensive updraft and downdraft activity, further highlighting the dynamic nature of the mixed layer during both morning ramp-up (RU) and afternoon quasi-stationary (QS) stages. Higher-order statistical moments were calculated over two-hour windows in both the RU and QS periods using the autocovariance method of Lenschow et al. 2000. In QS, variance peaks near the boundary-layer height (zi), consistent with strong turbulence-driven mixing.In contrast, during RU, the peak

occurs slightly below zi. Skewness in QS is negative below zi and transitions to positive above, while in RU, this transition occurs below zi. A noteworthy finding is that during RU, the widely assumed 2/3 inertial subrange exponent used in variance estimation from autocovariance does not always consistently apply at the top of the CML, suggesting that scaling relationships vary during mixed-layer growth. These results provide new insights into the stage-dependent structure of turbulence and offer valuable context for evaluating and improving high-resolution boundary-layer models.

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**Juvenile Rehabilitation and Environmental Risk: The Mental Health Implications of Juvenile Incarceration Facilities Located Near Superfund Sites**

Presenter's Name: Aneesah Lawrence
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Carceral facilities in the United States are deeply entangled with environmental injustice, reflecting a legacy of retribution over rehabilitation and the unequal distribution of environmental risk. Juvenile detention facilities are frequently situated on or near environmentally hazardous land, revealing the intersection of mass incarceration, environmental racism, and structural inequality. While the physical health consequences of exposure to toxic waste sites are well documented, the mental health impacts particularly for justice-involved youth remain significantly understudied. This paper examines the environmental injustices faced by juveniles incarcerated in facilities located near Superfund sites, focusing on the compounded psychological and physical harms produced by toxic exposure, punitive confinement, and limited agency. Drawing on existing literature, geographic proximity analyses, and historical case studies, the analysis demonstrates how juvenile detention facilities disproportionately confine youth of color in environmentally unsafe conditions, exacerbating preexisting trauma, anxiety, depression, and other mental health disorders. The study situates juvenile incarceration within broader environmental justice frameworks, highlighting how facility placement on undesirable land mirrors patterns experienced by marginalized civilian communities.To address these harms, the paper proposes the Juvenile Environmental Safety and Protection Act (JESPA), a federal legislative framework designed to prohibit the placement of juvenile incarceration facilities within 25 miles of Superfund sites, mandate the relocation of affected youth, and strengthen environmental monitoring and accountability. Centering environmental safety as a prerequisite for rehabilitation, this research argues that protecting incarcerated youth from environmental hazards is both a public health imperative and a moral obligation.

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**An Investigation of the Relationship Between Woolly Bear Caterpillar (Pyrrharctia Isabella) Activity and Seasonal Dermatitis Trends.**

Presenter's Name: Jamaya Lee
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The larva of the Pyrrharctia isabella (Woolly Bear caterpillar) poses a significant public health risk due to its unique life cycle and cultural significance in the Northeastern states of the U.S. The Pyrrharctia isabella overwinters leading to a high-detectability "wandering" phase post hibernation, emerging in the spring and the pre-hibernation migration in the autumn. While perceived as harmless, the caterpillar setae (bristles) act as physical irritants that can cause contact dermatitis in humans. Due to Northeastern folklore, predicting the severity of the coming winter based on the body color; encouraging human contact, creating a recurring, seasonal public health risk specifically a "behavioral trigger" for exposure that remains poorly quantified in traditional clinical surveillance. This study will investigate the correlation between seasonal biological activity and public health outcomes in the Northeastern U.S. We will focus on the relationship between the phenological peaks of the Pyrrharctia isabella and the frequency of dermatitis reports. We will use iNaturlist; for Pyrrharctia isabella observations and Google trends; for search volume for "caterpillar rash". We will use Spearman Correlation to see the strength of the relationship and use Cross-Correlation Function to identify the time lag between caterpillar abundance and search volume. We intend to find strong positive correlations between the bimodal caterpillar peaks and search volume, likely exhibiting a one-week temporal lag. Ultimately, this research demonstrates that monitoring insect phenology through digital platforms offers a scalable, cost-free biosurveillance tool for local health departments to improve hospitals and the public awareness regarding seasonal bug-related dermatitis.

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**Assessing the Cumulative Burden of Particulate Matter ($PM_{2.5}$) and Urban Infrastructure in D.C.'s Wards 7 and 8**

Presenter's Name: Kelly Lige
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The daily reality for those living in historically marginalized areas is often obscured by citywide data, despite Washington, D.C.'s efforts to improve air quality. Air pollutants, primarily fine particulate matter ($PM_{2.5}$), pose respiratory and cardiovascular health risks, yet exposure is often disproportionate across racial and socioeconomic groups. By examining the geographical distribution of pollutants throughout the eight wards of the District, this study explores the relationship between environmental justice, urban infrastructure, and public health. The cumulative effects of pollution in Wards 7 and 8 are the focus of this study. The median income in these primarily Black neighborhoods is

lower than that of the Northwest quadrant of the city. Additionally, these wards have a disproportionate number of industrial zones and major transportation infrastructure, such as the I-295 corridor, which may increase health concerns. Geographic Information Systems (GIS) will be used to assess annual average $PM_2$ concentrations and to produce spatial layers indicating major transportation routes, traffic intensity, industrial land use, and demographic features at the census-tract level. To determine whether higher $PM_2$ concentrations are spatially related to more infrastructure density and more socioeconomic vulnerability, proximity, and hotspot analyses will be conducted. This research intends to draw attention to the lasting effects of structural injustices in urban design by graphically quantifying its impact on these populations. The results will enable community activism and focused policy interventions in the National Capital Region by advancing a more comprehensive knowledge of how historical development continues to influence environmental health.

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**Agnostic Biosignatures: Elucidation of Chemical Signals in Organic Py-GC-MS Spectra**

Presenter's Name: William Lowe
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*Presentation Type: Poster Presentation*
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A central challenge in astrobiology is the identification of reliable chemical biosignatures which distinguish biogenic organic matter from abiotically produced organic compounds. Many abiotic processes can generate complex organic mixtures that resemble biological materials, complicating efforts to detect life on Earth and beyond. Pyrolysis gas chromatography-mass spectrometry (Py-GC-MS) is a powerful and widely used technique for analyzing organic matter, yet spectral interpretation remains difficult due to complex pyrolysis products and ambiguous molecular assignments. Recent work has demonstrated that machine-learning approaches can successfully distinguish biotic from abiotic organic samples using such spectra, identifying distinct regions of chemical feature space associated with life-derived materials. While effective, these models largely treat spectral features as abstract inputs, leaving the underlying chemical basis of the discrimination poorly understood. This project builds on that foundation by examining relationships within Py-GC-MS spectra to identify chemically meaningful molecular groupings associated with biological and non-biological origins. The study analyzes a broad range of samples, including modern biological materials, fossil organic matter, carbonaceous meteorites, and laboratory-synthesized abiotic mixtures. Preliminary results indicate that life-derived samples exhibit more structured and complex molecular relationships, while abiogenic samples tend to display simpler distributions, with meteorites occupying an intermediate regime. By linking machine-learning biosignatures to specific compound classes and spectral features, these results improve the robustness and interpretability of life-detection strategies for planetary exploration and contribute to a deeper understanding of early Earth chemistry, organic matter preservation, and prebiotic synthesis pathways.

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**Prebiotic Sugar–Amine Chemistry and the Emergence of Cell-Like Structures**

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There is a gap in our fundamental understanding of biology and the origin of lifethat is to be fulfilled by studying membrane structures of both biological and pre-biotic origins. It constitutes a missing link in our comprehension of howthermodynamically improbable structures, such as living cells, emerge from difficult to predict chemical environments. Our research addresses this question by studying the emergence of structureand self-assembly in environments that simulate the plausible conditions of Early Earth. Our goal is to understand the behavior of organic matter in such environments with a special focus on its separation from the environment, whichis an essential step in the formation of cells and cell-like structures. By characterizing the morphology and chemical properties of these membranes(and membrane-like structures), we also aim to improve pseudofossil identification methods, therefore aiding in the recognition of genuine signatures of life across the Universe.

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**Breathing Inequality: A Justice-Centered Comparative Analysis of Urban Air Quality, Policy, and Equity in Accra, Cape Town, and Lagos**

Presenter's Name: Sulaiman Mathew-wilson
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Air pollution is one of the most pressing public health crises of the 21st century, yet its burdens are distributed with profound inequality. While 99% of the global population breathes air exceeding WHO guideline limits, low- and middle-income countries, particularly those across sub-Saharan Africa, bear a disproportionate share of exposure despite contributing the least to global emissions. In 2021, air pollution was linked to 8.1 million premature deaths worldwide. Yet across many of Africa's major cities, high pollution levels are compounded by underdeveloped data infrastructure, weak policy frameworks, and inadequate governance systems. This research asks: How can African cities—specifically Accra, Ghana; Cape Town, South Africa; and Lagos, Nigeria—achieve measurable improvements in ambient air quality, and what role do environmental justice and equitable governance play in this process? Each city offers a distinct lens. Accra grapples with rapid urbanization and cultural burning practices; Cape Town bears the environmental legacy of apartheid-era segregation, with majority-Black townships facing far worse air quality conditions; and Lagos confronts the pressures of hyper-growth and industrial expansion. This project employs a mixed-methods approach combining quantitative PM2.5 data analysis, qualitative field interviews in Accra through the iTHREADS program, firsthand observations from an 11-day field study in Cape

Town, and academic literature review for the Lagos case study. The anticipated outcome is a comparative thesis arguing that meaningful air quality improvements require democratized monitoring networks, clean energy and transportation policies, and environmental justice at the center of decision-making—offering practical insights for policymakers and urban planners across the continent.

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**Heat and Hidden Conversations: The Altered Communication Pathways in Mimosa Pudica**

Presenter's Name: Jordan Mcknight
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*Presentation Type: Oral Presentation*
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The rising global temperatures have escalated across West Africa, with Ghana enduring intense increments of heat extremes of about 1.5-3° C. This was shown to reshape the physiological processes of several plants, however research has been limited to analyzing how warming impacts plant communication pathways. Plants rely on chemical and electro-hydraulic signaling to respond to environmental stimuli through rapid response. Mimosa pudica, the sensitive "touch-me-not" plant in the tropical regions of Ghana, poses as the ideal model for examining these mechanisms due to the swift leaflet closure triggered by turgor-driven movements and action potentials. Little is known about the long-term effects that global warming alters as it relates to communication processes and integration within this species. This study investigates how rising temperatures influence the internal pathways and signal response timing in Mimosa pudica. The plant will be exposed to various temperatures that simulate the projected warming climate of Ghana, whilst physical stimuli will be used to measure signaling, leaf-closure duration/recovery time, and efficiency. After comparing plant signaling and response time under these controlled, elevated temperatures, this research will assess whether warming interrupts communication pathways and signaling coordination. Analyzing how global warming alters these plant communication networks is imperative, as modified signaling would reduce the overall capacity for plants to adapt under environmental stressors brought by Ghana. By focusing on consistent thermal exposure over temporary heat spikes, this study aims to close a key gap in research that gives insight to how the climate crisis alters botanical long-term survival and physiological processes.

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**Application of MaxEnt modeling to evaluate the geographic distribution of the Mexican Creeper in The Americas and Caribbean Islands under various climate conditions**

Presenter's Name: Kpana augustina Ngafuan
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The Mexican creeper, Coralitta (Antigonon Leptopus) is a tropical vine with a native range extending from Western Mexico to Nicaragua. The plant species is also found in the southern U.S and the Caribbean islands. Antigonon leptopus is listed as a category two invasive species by the Florida invasive plant council and is documented as invasive and highly pervasive in several islands in the Caribbean. The cultivation of the plant as an ornamental coupled with the changes in climate increases the risk of a possible expansion in the species geographic distribution in the Americas and Caribbean Islands. In this study we used Maxent Species Distribution Modeling to evaluate bioclimatic variables that have significant influence on the distribution of Antigonon leptopus in the Americas and the Caribbean Islands. The MaxEnt model used bioclimatic variables that assessed temperature and precipitation. Preserved Specimen records of the Mexican Creeper from 2000 to 2026 were obtained from Global Biodiversity Information Facility (GBIF) and used in the Maxent models. These findings can help determine current and future areas that should be prioritized for conservation and management strategies. Further investigations should be completed to survey Antigonon leptopus range on regions highly vulnerable to climate change.

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**Urban and Rural Observation Patterns of Sciurus carolinensis**

Presenter's Name: Jemima Nguebeyo ngouambe
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Urbanization is rapidly transforming natural habitats across the United States, placing increasing pressure on wildlife species that must adapt to survive. The Eastern Gray Squirrel (Sciurus carolinensis) was often viewed as a highly adaptable species, commonly found in both forests and city environments. However, as landscapes continue to change, questions remain about how human-dominated environments influence wildlife distribution and long-term population stability. This study investigated whether Sciurus carolinensis is observed more frequently in urban environments compared to rural areas. We hypothesized that squirrel observations would be greater in urban regions due to their known behavioral flexibility and proximity to human activity.To test this hypothesis, we used publicly available observation data from the iNaturalist database. Data was accessed using the iNaturalist API in R through the rinat package. Arlington, Virginia was selected as an urban environment and Lexington, Virginia as a rural environment. After filtering observations by geographic coordinates, data were grouped by region and summarized to calculate total abundance. A bar graph was generated to compare observation frequency between the two environments. Contrary to our expectations, recorded observations were nearly equal in both locations. These findings suggest that squirrel distribution may remain stable across environment types, though patterns in human reporting may influence results. This study highlights how community-generated biodiversity data can inform ecological research while underscoring the importance of monitoring species in rapidly changing landscapes.

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**The Eastern Black-Legged Tick and Its Connection to Lyme Disease Cases in Virginia**

Presenter's Name: Azariah Powell
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Tick-borne diseases such as Lyme disease remain a growing public health concern in Virginia, yet official surveillance data are often delayed and reported at coarse temporal resolution. This study evaluated whether community science observations of the blacklegged tick (Ixodes scapularis) from iNaturalist could serve as a seasonal proxy for tick exposure risk and whether these observations align with public interest indicators. iNaturalist observations for I. scapularis in Virginia were downloaded and filtered to include only verifiable records with valid coordinates and observation dates. Observations were aggregated by month to assess seasonal patterns. Weekly public interest data were obtained from Google Trends for Virginia using three tick-related search terms ("tick bite," "remove tick," and "Lyme disease"), then aggregated monthly totals to match iNaturalist temporal resolution. Pearson correlation tests were used to examine relationships between monthly iNaturalist observation counts and Google Trends search interest. A total of 154 iNaturalist observations were included. Correlation analyses revealed weak relationships between iNaturalist observations and Google Trends search interest for tick-related terms. Monthly I. scapularis observations were not significantly correlated with "tick bite" ($r = -0.035$, $p = 0.827$), "Lyme disease" ($r = -0.212$, $p = 0.178$), or "remove tick" ($r = 0.009$, $p = 0.955$). These results suggest that iNaturalist can effectively describe seasonal tick activity in Virginia, but public search interest may not reliably track tick presence at monthly resolution. Community science data may still provide a valuable supplementary indicator for early seasonal tick activity and could support targeted public health messaging.

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**Waste Valorization and Scalability: An Analysis of How Waste Streams in Ghana Can Be Repurposed to Reduce Carbon Emissions in the Building and Construction Sector**

Presenter's Name: Kwatemaa Sarpong-asiedu
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The building and construction sector contributes 37% of the world's greenhouse gases, the most compared to any other single industry.These emissions trap heat in our atmosphere, driving severe climate change, extreme weather, and other damaging environmental phenomena. In response, many countries, particularly Ghana, have committed to decarbonizing their building and construction sectors through comprehensive Climate Action Roadmaps. One prominent solution involves adopting energy-efficient and low-carbon materials, which has inspired rapid innovation across the industry, from low-carbon concrete and recycled metals to fungi-based alternatives. However, a critical gap remains. While Ghana's Climate Action Roadmap outlines plans for implementing new materials, it does not specify what materials or how they will be sourced and produced. Current research addresses the financial barriers of adopting sustainable building materials but largely overlooks the potential of waste streams already present within Ghana. This project aims to address that gap directly by creating a framework. Through surveys and fieldwork, this research will identify what waste materials local companies are already sourcing, map where these materials exist and in what volumes, and outline how they can be routed to facilities to be processed into building products. The goal is to develop a framework for waste valorization that can be scaled within Ghana and potentially applied globally. If successful, this project will demonstrate that communities burdened by municipal solid waste can instead benefit from it — reducing environmental injustice while offering a tangible, scalable solution to carbon emissions in one of the world's most polluting sectors.

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**Linking Air Pollution to Soil Contamination in Ivy City: Implications for Community Health and Phytoremediation**

Presenter's Name: Sydney Sauls
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Given the well documented health risks associated with environmental exposures including developmental delays and adverse maternal health outcomes linked to lead and air pollutants this project focuses on lead and other heavy metal concentrations in Ivy City. Air quality data from PurpleAir monitors and soil samples collected from street tree sites are integrated to develop a more complete picture of pollutant accumulation including contaminants potentially taken up by vegetation. Street trees have the potential to mitigate urban pollution through phytoremediation a process by which plants absorb heavy metals and atmospheric pollutants from their surrounding environment with tulip poplars as strong candidates for remediation focused planting recommendations. This project integrates environmental fieldwork air and soil analysis GIS mapping and community engagement to provide a comprehensive understanding of pollution exposure and remediation potential in an underserved neighborhood.

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**Success Factors and Limitations of Grassroot Storytelling Campaigns– Just Moms STL and Empower DC**

Presenter's Name: Jaleel Shivers
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*Presentation Type: Poster Presentation*
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Introduction: Ubiquitous risk factors of rare diseases have rendered the underlying mechanisms of such diseases to be understood without a single, specified agent. In attempts to attribute agency for rare diseases

and cancers plaguing the communities of Ivy City and of St. Louis, grassroots activists look to medical history and ecological conditions. Contemporary grassroots campaigns have striven to eliminate superfund and toxic waste sites. Utilization of personally involved stories is a key strategy of Empower DC and Just Moms STL. The narrative based intervention of storytelling is applied to support often discredited knowledge, which seeks to elicit government response to uncontrolled pollutants as the central agent for diseases in residential neighborhoods. This paper asks: How do storytelling-based grassroots campaigns influence governmental responsiveness to environmental health concerns in communities affected by toxic waste? Method: This study employs a comparative case study design combining literature review and qualitative media analysis to assess the extent to which grassroots storytelling campaigns coincided with changes in governance response. The narrative-based intervention refers to media engagement strategies used by Just Moms STL and Empower DC to frame environmental waste as causally linked to community illness. Governmental responsiveness includes changes in policy, public hearings, and official statements being made acknowledging community concerns. Data includes media coverage, policy documents, and organizational publications from 2013-2025. Hypotheses: H1: Storytelling-based grassroots campaigns are associated with increased governmental responsiveness to environmental health concerns. H2: Differences in political context influence the degree of governmental responsiveness between cases.

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**The Connection Between Climate Change and Lung Cancer**

Presenter's Name: Karielle Sutton
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Pollution is a major driver of climate change and a significant contributor to health disparities, particularly in the incidence of lung cancer. There is a growing body of evidence linking climate change-related events and pollution to lung cancer development within vulnerable and non vulnerable populations. Exposure to contaminated particles, greenhouse gases, rising temperatures and other climate change effects substantially increases lung cancer risk, especially among vulnerable groups. Individuals with genetic predispositions or those with lifestyle risk factors, such as smoking, are at even greater risk. Socioeconomic status and environmental conditions also play a critical role, with lower-income communities disproportionately affected by pollution exposure and related health outcomes. This retrospective research further underscores the impact of pollution and climate change on the ever-developing health disparities associated with lung cancer.

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**Air Pollution and ADHD-Related Outcomes in Black Communities: Spatial and Statistical Evidence from DC**

Presenter's Name: Milani Terrell
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*Presentation Type: Poster Presentation*
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Emerging evidence suggests that attention-deficit/hyperactivity disorder (ADHD) risk is shaped not by genetic factors alone, but also by environmental and structural conditions that disproportionately perturb Black communities. This project examines whether structural environmental racism, particularly prenatal exposure to fine particulate air pollution (PM2.5) in majority Black-neighborhoods of Washington, DC, is linked with intensified maternal stress and ADHD-related outcomes in children. Using DC Health Matters and Open Data DC 2023 data sets, spatial analyses were conducted at the zip code and ward levels to examine cognitive difficulty in children (used as proxy for ADHD), poor mental health (≥14 days) and mental health index scores (used as proxy for maternal stress), health equity indices, demographic composition, and patterns of PM2.5 exposure. Focusing on Wards 7 and 8 of Southeast Washington, DC, results exhibited overlapping trends of elevated PM2.5 exposure, increased maternal health burden, and inflated rates of cognitive difficulty among children.

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**Heavy is the Hand: How the Practice of Hand Pollination of Cocoa Pods in Ghana Can Affect Agricutural Production and National Economical Development**

Presenter's Name: Seriane Thiam
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The practice of hand pollination can be seen as compensation for man-made environmental mistakes. Much of the environmental impacts that affect the development of proper cocoa pod development can be attributed to Black Pod disease, effects of illegal gold mining, and many other characteristics of human greed and over-consumption. Ghana contributes up to 25% of cocoa production in the world, making it the second-largest cocoa producer. However, despite the critical role the country plays in contributing to sweetness across the globe, global cocoa prices continue to increase as cocoa pod development becomes impeded by environmental ramifications. In response, organizations such as the Ghana Cocoa Board (COCOBOD), in collaboration with the Ghanaian Government, have implemented social programs to curb these challenges, one of which is the practice of hand pollination. Hand pollination allows the farmer to take on the role of the pollinator, with the goal to increase yield across cocoa trees and increasing pod development. In 2017, COCOBOD implemented its hand pollination program to tackle issues surrounding cocoa pod and farmer income. The question I hope to tackle with my research is how hand pollination of cocoa pods in Ghana translates to agricultural productivity and national economic development? With this research, I hope to compare growth

between hand-pollinated versus naturally pollinated cocoa pods and overall how the inclusion of humans in the pollination process can affect rising cocoa prices amongst sellers and buyers.

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**Distinguishing Observer Bias from True Abundance: A comparison of Sciurus carolinensis across urban, suburban, and rural landscapes using iNaturalist data**

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Urbanization can alter wildlife visibility and observer effort, complicating interpretation of citizen-science data. This study evaluates whether the observed frequency of Sciurus carolinensis (eastern gray squirrel) differs across urban and rural environments after accounting for observer bias using publicly available iNaturalist data. Observations from the past five years were extracted for Arlington, Virginia (urban) and Lexington, Virginia (rural). Data were cleaned by removing duplicates, verifying geolocation accuracy, and confirming taxonomic identity. Observer effort was approximated using the number of active observers and observation days per location-month. Relative abundance was defined as the count of verified observations and analyzed using a generalized linear model with a Poisson or negative binomial distribution, including an effort offset. Location was treated as a fixed effect, and robust standard errors were used to assess differences. Exploratory visualizations supported interpretation. Preliminary results indicate that, after adjusting for observer effort, differences in relative abundance between urban and rural environments are small and not statistically significant. Sensitivity analyses using alternative effort metrics and spatial subsampling will be conducted to evaluate robustness. These findings highlight the importance of distinguishing true biological patterns from observer bias in citizen-science datasets. The results suggest that S. carolinensis maintains similar levels of activity or occupancy across landscape contexts. This study provides a reproducible framework for improving ecological inference using publicly available biodiversity data.

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**Integrating Machine Learning with Bioclimatic Projections to Predict Distribution Shifts in African Montane Amphibians**

Presenter's Name: Zion Vaughn
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*Presentation Type: Poster Presentation*
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African montane amphibians are among the most highly threatened vertebrates globally due to their narrow elevational ranges and increasing pressures from environmental change and human activities. However, substantial uncertainty remains regarding current and future habitat trajectories for many threatened species, limiting effective conservation and management efforts. To address this gap, we integrated machine learning with bioclimatic projections to assess the vulnerability of three critically endangered puddle frogs, Phrynobatrachus jimzimkusi, P. steindachneri, and P. manengoubensis, from montane regions of Cameroon. Occurrence records were compiled from global biodiversity databases, and high-resolution bioclimatic variables were obtained from the Climatologies at High Resolution for the Earth's Land Surface Areas (CHELSA) for present conditions and future projections (2041–2060 and 2081–2100) under three Shared Socioeconomic Pathways (SSP126, SSP370, and SSP585). Using a machine learning–based species distribution modeling framework, we generated habitat suitability projections across temporal scenarios, identified key environmental drivers of habitat suitability, and evaluated conservation priorities under projected future conditions. Our models predict substantial range contractions for all three species under future scenarios, with the most pronounced declines under high-emission pathways. Precipitation-related variables emerged as the strongest predictors of habitat suitability, and several priority hotspots critical for long-term species persistence were identified. These findings underscore the urgent need for strengthened protection measures for African montane amphibians and demonstrate the value of integrating machine learning–driven projections into conservation planning and management to safeguard highly threatened species under accelerating environmental change.

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**Where Are They? Leveraging Machine Learning and Environmental Datasets to Identify Current and Future Snakebite Hotspots for Guiding Global Public Health Action**

Presenter's Name: Samya Walker
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Snake envenoming remains a major yet preventable global health burden, causing an estimated 130,000 deaths annually and disproportionately affecting regions with limited antivenom access and fragile health systems. Among the 373 medically important snake species worldwide, highly venomous taxa such as Naja savannula (West African banded cobra) pose significant public health threats due to the severity of envenoming and the extensive spatial overlap between their ranges and densely populated communities. Identifying where snakebite risk is concentrated and anticipating how environmental conditions may reshape future risk landscapes are critical for strategic antivenom allocation and targeted prevention efforts. Here, we implemented a machine learning–driven species distribution modeling framework that integrates global occurrence records, the IUCN Red List spatial database, and high-resolution bioclimatic variables to generate spatially explicit projections of present and future distribution patterns and suitability hotspots for N. savannula under multiple environmental scenarios. Our models reveal concentrated suitability hotspots across sub-Saharan Africa, where ecological suitability converges with vulnerable health infrastructure, intensifying snakebite risk. Temperature variables

emerged as dominant predictors of habitat suitability, highlighting the environmental sensitivity of envenoming risk landscapes. These findings provide a predictive, data-driven foundation for prioritizing surveillance, optimizing antivenom supply chains, and guiding targeted public health interventions in high-burden regions.

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**Grid Instability and Diesel Dependence in Ghana's Energy Transition**
Presenter's Name: Brandon Williams
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Ghana is increasingly relying on privately owned diesel generators due to Ghana's unreliable energy grids. While generators provide short-term energy security for households and businesses, their growing use raises concerns about national greenhouse gas emissions and how it is impacting Ghana's ability to meet its Nationally Determined Contribution (NDC) target of reducing emissions by 64 million metric tonnes of CO2 by 2030. This study aims to investigate the relationship between perceived grid unreliability and diesel generator dependency, and evaluates how this dependency may influence Ghana's transition towards clean energy. To assess generator usage patterns, questionnaires will be administered to households and businesses to quantify frequency of use, duration, estimated power output, and motivations for using a diesel generator. Interviews will be conducted to further explore public awareness of health and environmental risks involved with diesel generators. In addition, secondary data from Our World in Data and Ghana's Energy Commission will be cross-analyzed to compare 20-year trends in electricity consumption, thermal electricity generation, petroleum imports, and CO2 emissions. A preliminary analysis has suggested that rising electricity demand and increased thermal generation correspond with higher national CO2 emissions. If privately owned diesel use intensifies during periods of grid instability, generator reliance may contribute to sustained carbon intensity rather than facilitate a low-carbon transition. Insights from Energy Masters, a Ghanaian consultancy and engineering firm specializing in solar energy solutions, will inform evaluation of renewable alternatives as realistic substitutes for diesel generators.

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**Evaluating Air Quality Forecasts During Wildfire Smoke Events in the Mid-Atlantic Region: Implications for Environmental Justice**
Presenter's Name: Aara'l Yarber
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As wildfires become more frequent, they present new challenges for predicting air pollution, particularly ground-level ozone, a harmful pollutant that affects respiratory function and overall health. This is especially critical because Black communities experience disproportionately high exposure to air pollution in the United States, and inaccuracies in pollution forecasts can directly compromise public health in the most vulnerable communities. This study evaluates the performance of NOAA's national air quality forecasting model (UFS-AQM) in predicting ozone levels across EPA Region 3 (Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington D.C.) under varying wildfire smoke conditions. We compared model predictions against ground-based pollution measurements and satellite-derived smoke data. Our findings indicate that while the forecasting system generally overestimates ozone pollution in this region during summer months, forecast errors improve on smoke-impacted days compared to smoke-free days. Potential mechanisms driving this pattern are still being explored, including the model's treatment of wildfire-emitted volatile organic compounds and smoke-induced attenuation of solar radiation that alters ozone formation. Understanding these forecast errors will support the development of more accurate air quality predictions during wildfire events, enabling communities, particularly those facing existing environmental health disparities, to take protective action when air pollution levels rise.

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# ETHICS, LAW & RELIGION

**The Broken Social Contract In Marginalized Communties**
Presenter's Name: Ophelia Brew
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*Presentation Type: Oral Presentation*
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This thesis examines how criminal and immigration institutions construct and enforce the concept of "deservingness," and how these judgments contribute to the erosion of the social contract in marginalized communities. Drawing from my lived experiences as a Black Ghanaian-American navigating legal systems as both an intern and an advocate, I analyze how survival, grief, and structural disadvantage are routinely stripped from legal narratives and replaced with labels such as "noncompliance," "recklessness," and "violation." Grounded in Social Contract Theory, Deservingness Theory, and the concepts of legal violence and the racialized social contract, this study employs qualitative methods including content analysis, autoethnography, and applied observation across three institutional settings: a public defender office, a congressional constituent services office, and federal immigration court. Preliminary findings reveal that legal outcomes are heavily influenced by moral evaluations embedded in bureaucratic language rather than by lived reality. Case files consistently prioritize procedural compliance over context, resulting in the criminalization of poverty and the punishment of survival behaviors. Immigration and criminal systems operate as interconnected sites of legal violence, where paperwork often outweighs human testimony. Advocates play a critical but constrained role in attempting to re-humanize clients within rigid institutional frameworks. This research concludes that the breakdown of the social contract in marginalized communities is not incidental but structural. Rebuilding it requires institutional reforms that center empathy, acknowledge structural inequality, and restore dignity to those navigating legal systems. By bridging philosophical theory with lived experience, this thesis argues for a reimagining of justice that moves beyond deservingness toward shared humanity.

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**Gender, Theology, and Social Development: The Work of the Circle of Concerned African Women Theologians.**
Presenter's Name: Michael Bryant
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School/College: Other
*Presentation Type: Oral Presentation*
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Founded in Legon Ghana in 1989 by African Theologian Mercy Amba Oduyoye, the Circle of Concerned African Women Theologians (COCAWT) represents the enduring nature of Africa and Africans and their ability to redefine ideologies which have historically been leveraged against them. Despite its continental impact, the COCAWT has often been under-recognized for its role in advancing gender equality through the spiritual traditions of Africa. This research examines the COCAWT attempts to decenter eurocentric hermeneutics and undue the colonial legacies which have utilized western conceptions of the Christian faith as a means of creating gender disparities within African societies. I argue that the Circle of Concerned African Women Theologians' commitment to its core values of academic collaboration, biblical scholarship, education and employment activism, women's health and interfaith-networking has served to overturn colonial Christian legacies and has fostered social development through the empowerment of women Theologians. Religion, especially Christianity and Islam, remain deeply embedded in the public lives of many Africans. The COCAWT exemplifies alternative approaches to Biblical narrative which are leveraged to magnify gender equality as a theological mandate.

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**Safeguarding Skin in the Age of Algorithms: An Ethical Framework for AI-Driven Dermatological Care**
Presenter's Name: Hunter Fennell
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AI is increasingly taking over many facets of the healthcare industry, with artificial intelligence used to perform a range of tasks, including detection, diagnosis, and management of dermatological conditions. However, the use of AI solutions raises important questions regarding the ethics involved, especially when these solutions might be available to children. If we use key ethical principles, including transparency, accountability, informed consent, and fairness, as they apply to AI-driven dermatological tools, we can examine how AI can be deployed in dermatology in a manner that is both clinically effective and ethically responsible. The primary research question guiding this study is: How can we provide a safe and ethical solution to dermatological problems using AI without causing harm? The project starts with a review of existing AI dermatology tools, such as the ABCDEs of melanoma and Dermlink.md, and established bioethical and AI governance frameworks such as GDPR and HIPAA. Then, interview a bioethics professor at Columbia and a dermatologist at the Howard School of Medicine to gain insight into issues with current dermatology AI health solutions, ethical challenges, and implementation practices. Finally, study peer-reviewed academic literature and industry reports to assess issues related to bias, inclusivity, and patient outcomes. The anticipated outcome of this project is the development of a practical ethical framework and set of recommendations for the safe and equitable deployment of AI in dermatology. This framework aims to support clinicians, developers, healthcare institutions, and policymakers in mitigating risks while maximizing patient benefit.

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**Algorithm Augmented Acute Care: Challenges and Opportunities of AI in Emergency Medicine**

Presenter's Name: Emma Foster
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Assya Pascalev
Faculty Advisor's email: apascalev@howard.edu

Emergency care is a keystone of the American medical system, providing 24/7 acute care and stabilization regardless of insurance status or ability to pay. However, many emergency departments–especially the so-called "safety net" ERs, that predominantly serve low-income or uninsured people– are in crisis. Staff shortages, overcrowding, financial challenges, and extended wait times up to 10 hours are a few of the factors negatively affecting the ERs' ability to efficiently address medical emergencies. Many hospital systems, including Children's Los Angeles and Allegheny Health System, are already using artificial intelligence (AI) as a solution in a variety of ways. Using its incredible predictive power, AI can enhance and support emergency care through utilizing predictive models to anticipate surge times, and provide more accurate wait time estimates. However, there are systemic biases ingrained into emergency care against women, people struggling with substance abuse disorders, unhoused people, and people with chronic illnesses requiring extensive pain management. These biases can be transmitted through the electronic health records that charting/note-taking AIs must be trained on. There is also a significant data privacy concern with respect to how medical data is handled. Ambient listening softwares used for charting and medical decision-making models, especially those that draw from existing and biased data, ought to be vetted with extreme caution before their application in the ED. Hospital administrations urging hasty induction of AI ought to consult all relevant stakeholders– including bioethicists, physicians, patients and IT professionals–before patient-facing use occurs.

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**How Psychology, Social Environment, and Religion Shape Human Identity**

Presenter's Name: Kaylynn Greene
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Joseph Bratton
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Human behavior is shaped by a complex interaction of internal and external factors that influence thought processes, actions, and destiny across the lifespan. Existing research suggests that behavior is not random, but rather the result of psychological development, social environments, and deeply rooted cultural and religious belief systems. This thesis examines how psychological development, social background, and religious ideologies collectively contribute to the formation of human behavior, with particular attention to the role of personal experiences as moderating influences. The study investigates how these factors affect human motivation and behavioral patterns, particularly in relation to social and career engagement. By integrating perspectives from psychology, sociology, and religious studies, this research presents an analysis of how these elements shape individual destiny, specifically influencing career paths.

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**Digital Coup: The Conspiracy to Thwart Global Democracy**

Presenter's Name: Darin Johnson
Classification: Senior Faculty
School/College: Law
*Presentation Type: Poster Presentation*
Faculty Advisor: Darin Johnson
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This poster presentation will present the research contained in my forthcoming book, Digital Coup: The Conspiracy to Thwart Global Democracy ("Digital Coup"). The book builds on my research over the past decade which has explored how bad actors have used disinformation on social media and digital platforms to polarize and divide societies, and which has articulated the challenges that this issue presents to democracy, the rule of law and national security. Drawing from my expertise as an international lawyer, law professor, and former national security professional, the book explores how AI-driven disinformation and social media echo chambers unravel truth, deepen societal divisions, and erode democracy. The books walks the reader through the digital battleground where tech companies monetize political anxieties and extremists weaponize disinformation. The book examines the shadowy networks trafficking in data and disinformation, showing how AI's power is being wielded to manipulate, polarize, and exploit. The book argues that today's world is shaped both by those who engineer these systems and by those who refuse to challenge them. With clear-eyed urgency, Digital Coup calls for a radical rethinking of our digital future. Digital Coup is a vital intervention, offering both a wake-up call and a vision for a more informed, united, and accountable online world.

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**Reparations at the Municipal Level: San Francisco's Proposal and Its Influence on California Policy Discourse**

Presenter's Name: Victoria Matthews
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Jovon McCalester
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This paper dives into the question "How does San Francisco's proposal of reparations to descendants of enslaved individuals impact discussions and potential policy developments regarding reparations in other counties within California?" San Francisco has seen a decline in its Black population in the last five decades. California is known for its "progressive politics," so diving into this specific city/county to gain insight on the progression of reparations allows for a clearer understanding of how local reparations models can be influential. The areas of focus in this study in San Francisco are the Fillmore District and Bayview-Hunters Point. By dissecting the impacts of gentrification, displacement, and housing inequities, San Francisco offers a focused lens on how impactful reparations could be. The analysis breaks down what reparations are, the methods through which they could be distributed,

and who would receive them. The work uses secondary analysis and quantitative data to draw real-world connections between statistics relating to the socioeconomic state of Black San Francisco natives and different approaches to reparations. This research paper focuses on San Francisco; however, there is a larger emphasis on what can be done with the local efforts nationwide. The study compares and contrasts different methods of reparations and examines the opportunities and constraints of different proposals. The work ends with a personal assessment of whether or not San Francisco serves as a model for future local efforts within America.

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**Beneficence in Global Women's Health: Culturally Competent Approaches to Addressing Female Genital Mutilation**

Presenter's Name: Aziza Mcclain-baxter
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Assya Pascalev
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Female genital mutilation (FGM) remains a significant global public health concern, particularly in countries such as Pakistan, Sudan, Burkina Faso, and Yemen, where the practice is deeply rooted within cultural and religious frameworks. While Western-led medical and policy interventions often aim to eliminate FGM under the principle of beneficence, such efforts risk functioning as forms of neocolonialism when they disregard diverse cultures, perspectives, and community agency. This research examines the ethical tension between beneficent intervention and culture by analyzing FGM through the principles of beneficence and nonmaleficence. Drawing on feminist bioethics, global health scholarship, and anthropological research, the study distinguishes between culturally imperialistic intervention and resource-based, community-partnered approaches. It further evaluates clinical evidence linking FGM to adverse reproductive health outcomes, including maternal morbidity, obstetric complications, and neonatal risk, thereby establishing the medical urgency of intervention. The role of religion is also explored as both a barrier to reform and a potential mechanism for culturally grounded change. Overall, this research argues that intervention is ethically justified due to the preventable harms associated with FGM, but must be implemented through culturally competent strategies that avoid reproducing colonial power dynamics. In this, an ethical approach to global women's health requires centering women's bodily autonomy with humility and respect for diverse communities.

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**How Governance Level Shapes AI Risk Mitigation Effectiveness: A Cross-Sector Comparative Analysis of AI Policy Frameworks**

Presenter's Name: Kamora Mccowan
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Talitha Washington
Faculty Advisor's email: Talitha.Washington@howard.edu

As AI systems increasingly shape decisions in education, healthcare, and commerce, the question of who governs AI—and how—has become urgent. This analysis compares three governance frameworks across distinct sectors: Anthropic's Responsible Scaling Policy (voluntary industry self-regulation), Ohio State University's AI use guidance (institutional academic policy), and Texas HB 149 (state consumer protection law). By examining how each operationalizes fairness, transparency, privacy, accountability, and human oversight, this study reveals that governance authority levels ultimately determine whether AI risks are aspirationally acknowledged or operationally enforced.

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**Factors Related to Uptake of Ethical Guidelines: A Literature Review of Stakeholder Perspectives**

Presenter's Name: Jasmine Michel
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Anna Wexler
Faculty Advisor's email: awex@pennmedicine.upenn.edu

Neurotechnology, or devices and procedures used to investigate and/or manipulate the structure and function of neural systems, is a rapidly progressing field. With this progress comes new ethical concerns needing to be addressed. As such, a number of ethical guidelines have been created in the hopes of addressing emerging neuroethical issues. This project seeks to understand the content of such guidelines and their reception by neurotechnologists in order to outline pathways for improving the utility of neuroethical guidelines. This poster focuses on a literature review of empirical studies relating to the uptake of ethical guidelines in order to identify significant factors to consider in the next phase of the project. Previously identified studies from the National Science Foundation (NSF) proposal for the project were investigated in a literature review using deductive coding to identify pre-established themes: Insufficient Shareholder Input, Assessment of Practical Needs, Inadequate Actionability or Utility, and Limited Attention to Dissemination, and inductive coding to identify themes that arose during the investigation. Citation chaining was used to identify studies outside of the proposal. 2 studies relating to business ethics, 6 hospital ethics, 3 research ethics, 1 neuroethics, and 5 AI/Software ethics were identified as relevant. 3 studies discussed insufficient stakeholder input, 8 assessment of practical need, 8 inadequate actionability or utility, 8 limited attention to dissemination. During the literature review, 5 new themes emerged.

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**Harnessing the Opportunities for Artificial Intelligence in Healthcare While Considering Ethical Implications: A Systematic Review**

Presenter's Name: Azamit Seyoum
Classification: Graduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Priscilla Okunji
Faculty Advisor's email: priscilla.okunji@howard.edu

Background: Artificial intelligence (AI) integration into healthcare has accelerated rapidly, particularly in electronic health records (EHR),

medical imaging diagnostics, and predictive analytics, yet the ethical implications remain understudied. Method: This systematic review involving three hypotheses addressing diagnostic accuracy, patient data management, and predictive analytics outcomes. Analysis of 20 peer-reviewed studies (2020-2024) from three major databases were categorized using the Evidence Quality Hierarchy Framework Results: The results revealed that AI integration improved medical imaging diagnostic accuracy in simulated settings and enhanced clinical decision support in EHR systems despite implementation challenges. Predictive analytics showed superior disease detection performance with large datasets but demonstrated limitations with smaller populations. Conclusion: While AI shows promise in enhancing healthcare delivery, particularly in diagnostic accuracy and data analysis, future research must incorporate ethical frameworks and examine real-world clinical applications. Cross-training healthcare workers in AI applications may facilitate more effective integration while maintaining ethical standards.

# HUMANITIES

**Migration as Part of Danticat's Revolutionary Inheritance**
Presenter's Name: Arielle Alouidor
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Yasmin DeGout
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The three stories that open Edwidge Danticat's Krik? Krak! – "Children of the Sea," "Nineteen Thirty-Seven," and "A Wall of Fire Rising" – take place in Haiti or in the waters around the country, which is to say that none of the stories feature the Haitian diaspora, or dyaspora in Kreyòl, of which Danticat is a member. Such an absence does not preclude questions of diaspora and migration from dominating the stories. Instead, Danticat fills the cryptic yet contemporary scenes of each narrative with allusions to migration in Haitian history, emphasizing the Afro-descended diaspora, while additionally substituting intranational migration in place of the international migration that created the dyaspora. The stories focus on flights, searches, escapes, travels, and travails in such a way that they refocus Haitian identity and calibrate it around migration, be it in the characters' histories or in their futures. This emphasis challenges static forms of identification, echoing Danticat's own perspectives while pointing toward migration as a potential center of identity.

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**Optimizing Humanitarian Aid in South Sudan: The Role of Data Analytics in Resource Allocation**
Presenter's Name: Margaret Asho
Classification: Undergraduate Student
School/College: Law
*Presentation Type: Oral Presentation*
Faculty Advisor: Sylvester Makobi
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In the context of ongoing humanitarian crises in South Sudan, effective resource allocation is crucial for maximizing aid efforts. The article discusses various challenges such as global warming, home insecurity, food insecurity, health crises, political instability, and poverty. Global warming has led to floods and droughts, impacting 27 counties where livestock, crops, and homes have been destroyed, forcing people to flee to neighboring countries or migrate within the country. Home and food insecurity have worsened, with millions on the brink of starvation. Global food programs prioritize starving communities, highlighting the severity of the crisis. Ethnic groups are helping each other with group housing and food support. Home insecurity results from war displacement and climate change, while national organizations provide camps for displaced people. South Sudan's healthcare system lacks necessary resources, leaving many unable to afford treatment, leading some to seek care in neighboring countries. Political instability and poverty further exacerbate the situation, with 76% of the population living below the poverty line and 4 million displaced by war and climate change. Using data analytics, trends are mapped to prioritize aid to the most vulnerable regions. The goal is to inform national agencies and guide decisions to address these crises and reduce suffering in South Sudan.

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**Du Bois and the Reimagining of Data**
Presenter's Name: Jalyn Cameron
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Hannah Marcus
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Quantitative data is often hailed as the pinnacle of neutrality and objectivity-the assumption being numbers do not lie. But what happens when numbers do lie? More specifically, when do they obscure truth? In the 19th and 20th centuries, scientists conducted research on race using tools of measurement, ethnology, and statistical analysis to draw comparisons, pathologize marginalized communities, and naturalize racial hierarchies.In contrast, W.E.B. Du Bois, scholar, sociologist, and data visualization pioneer, collected and used data differently. From The Souls of Black Folk and The Philadelphia Negro to his striking data portraits presented at the 1900 Paris Exposition-and even in his fiction, like The Princess Steel and The Comet-his work sought to humanize Black life and counter harmful narratives embedded within the science. Du Bois reimagined data as tools for justice-not merely charts, but stories. He complemented the analytical with the artistic. He blended hard data with photographs, portraits, fiction, and essays with literary flourish to refute stereotypes and reveal truths that traditional science overlooked.

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**Looking Back at Bratz: Advertising, the Oppositional Gaze, and Black Girl Spectatorship**
Presenter's Name: Marie cherline Chery
Classification: Graduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Loren Coleman
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Background: Since their debut in 2001, Bratz dolls have been widely critiqued for hypersexualization and the commodification of racial ambiguity. While existing scholarship has focused largely on the dolls themselves or on adult moral panic surrounding the brand, less attention has been paid to Bratz television advertising as a cultural site where meanings of Black femininity and girlhood are actively produced, circulated, and contested. Methods: Guided by bell hooks' concept of the oppositional gaze and Patricia Hill Collins' Black Feminist Thought, this study employs critical textual analysis of 59 Bratz television commercials aired between 2001 and 2007. The analysis examines how imagery, sound, and narrative structure organize ways of seeing and invite particular forms of spectatorship. Results: Findings reveal that

Bratz commercials frequently center Black-coded characters, draw on Black girl aesthetic traditions, and frame self-fashioning and friendship as sites of agency rather than discipline. Across the ads, Black girlhood is positioned as visible, stylish, and communal, creating opportunities for oppositional and self-defining forms of looking. At the same time, the reliance on racial ambiguity and uneven character visibility exposes the limits of corporate "inclusive" marketing.Conclusions:This study argues that Bratz advertising functions as a contested cultural space that both commodifies and enables Black girl spectatorship. By shifting focus from corporate intent to the conditions of spectatorship, the project highlights Black girls as critical viewers whose ways of looking matter for understanding media, consumer culture, and Black girlhood as an intellectual and aesthetic tradition.

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**Narratives of Gendered Migration and the Desire for Female Subjectivity in Toni Morrison, Buchi Emecheta, and Etaf Rum**

Presenter's Name: Emily Duru
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Jennifer Williams
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Toni Morrison's A Mercy weaves together the stories of three women—Florens, Rebekka, and Lina—and how they all came to live together on the Vaardak farm in New York. With two of them immigrating from Europe and Africa, and one, a native American, being separated from her tribe, Morrison explores the complexity of immigration for women and how, especially in the early nation-making of the United States, women had very little control over their movements. I want to put this novel in conversation with Buchi Emecheta's Second Class Citizen and Etaf Rum's A Woman is No Man to show how the domestic space in the West—from the 17th century New York farm to the 21st century NYC apartment—is not a refuge from the state, but actually is a primary site of enclosure for women. My paper uses Emecheta and Rum's works to explore how Morrison is identifying the original sin of American gendered violence that was put in place by chattel slavery and migration to the "New World." In doing so, I argue that A Mercy explores how hierarchies were constructed and maps how both the legal and social architecture of the West is built specifically to commodify the female body. My research will use a close reading of the three texts and engage with Saidiya Hartman's exploration of subjectivity and freedom in her 1997 text Scenes of Subjection and Kimberlie Crenshaw's study of how immigration law and domestic violence intersect to trap women of color in Mapping the Margins.

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**The Making of Moses – The Haunting of Harriet: A Critical Hauntology**

Presenter's Name: Kenja-rae Farquharson
Classification: Graduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Loren Saxton-Coleman
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Prior to 2019, no film directly engaged in the story of Harriet Tubman. Where the bulk of historical films in the last 15 years have re-presented increasingly complex characterizations of Black men, the historicization of Black women has been peripheral. Representations of history must be understood as inherently political acts that work to construct a particular memory of who informs and enacts social change. This research thus sought to interrogate Harriet as a representation of the everyday violence enacted against enslaved women and the films imagined possibilities for resistance. Through a textual analysis guided by critical hauntology this study explored representation and the enactment of the oppositional gaze as a means of Black women's resistance. One of the imperatives of critical hauntology is to tell the stories of past horrors in order to incite critical consciousness and prevent the continuation of such atrocities. Through close reading of the film, Harriet, four types of 'ghosts' were identified. These ghosts exemplified four different kinds of violence enacted upon and experienced by the Black women of the film. Maternal and familial violence, sexual violence, physical violence, and dehumanization. These 'ghosts' serve as textual re-presentations of the everyday horrors Black women faced during this historical time period. Historical memorialization of slavery and its lasting violence is necessary work. The ghosts of slavery cannot be forgotten because its horrors have yet to end. As long as the structures of white supremacy stand, critical re-visioning of reality must meet the challenge.

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**Centralized Education and Political Indoctrination: How States Create "Good" Citizens**

Presenter's Name: Kendal Fitzhugh
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Emily Hencken-Ritter
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Indoctrination, although undefined across many disciplines, has been studied as to the ways it dictates citizen behavior. What has not been considered are comparative factors that correlate with the presence of indoctrination. This focus on the results of indoctrination leave us without understanding when and how governments indoctrinate their citizens with political ideas. A government requires tools to indoctrinate the population, and while we frequently consider education systems to be one of those tools, we do not know what structures enable regimes to implement indoctrination on a wide scale. How does centralized government control over education affect the level of political indoctrination in schools? I argue that national governments, acting on a desire to maintain authority and social order, use centralized education as a mechanism to indoctrinate their citizens. Using existing survey data from the Varieties of Democracy dataset to compare political education effort and centralized education and curriculum, multivariate regression analysis shows centralized education increases a state's levels of indoctrination by 24%. The interrogation of states' intentional involvement in the development of citizens' political ideology is the crux in the analysis of substantial research on political behavior. In times of high political turmoil it is imperative that citizens know what forms their worldview and why.

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**Oppression or Offense: The Study of How Sports Journlist and Media Backlash Impact Black Athlete Perception**
Presenter's Name: Destiny Givens
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Jennifer Thomas
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Desegregation in sports, first was seen in the 1950's with athletes of color being able to play in the professional sports industry. This change started amidst WWII and the civil rights movement meaning athletes played despite overt racism and prejudice, but this did not stop black athletes from being on the court. Ever since this, black athletes have continuously been one of the highest performers in professional athletics, but what about the systematic racial structures that have existed far beyond their career. This research is going to explore the media's effect in racial stigmatisms and biases black athletes face and how it affects the exposure, portrayal, and public's perception of these athletes in sports. Additionally, through this research I hope to discover what media methods are harmful and destructive to the lives of black athletes. I plan to do this through qualitative research looking into past interviews with professional athletes and how the public reacted as well as the racial impact it may have had. Preliminary findings are that there is a linked relationship between media coverage and fan perspectives. Sports journalists play a crucial role in the shaping of athlete perspective, with patterns revealing use of negative dialect and character focused criticism rather than performance based evaluation. Ultimately, my goal is to better understand the historical media effects that have played into the long standing systematic racism seen in athletics, and to find ways to improve media practices so there is equality among athletes.

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**Give Me That Old Time Religion**
Presenter's Name: Kameron Hayes
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Charrise Barron
Faculty Advisor's email: cbarron@fas.harvard.edu

Any understanding of the Black church that does not attend to the music of the church is incomplete. Music is the part of worship that continues after formal worship has concluded. What is now known as congregational music unites the contemporary Black church with its enslaved progenitors. Though there is not a complete catalog of what enslaved folk were singing in worship, thanks to singing preachers such as Georgia's own Rev. Dr. C. J. Johnson, Jr. and groups like the Mount Vernon Missionary Baptist Church and the Together As One Hymn Choirs, aspects of the sound can be heard and experienced generations removed from the plantation church. More than the sound, these reservoirs of worship traditions convey the theologies of the enslaved, theologies that push the bounds and limitations set by theologians who overprivileged the written text. With particular attention to Johannine scholarship, these songs push the bounds of what is understood in the "born again" process. As a result of a theologically grounded lyrical analysis of 10 songs that discussed regeneration, rebirth, and change, this presentation will explore how enslaved people might have understood spiritual rebirth, who was involved and what the experience felt like. Alongside the theological claims explored, moreover, this presentation will show how attention to music, in the Black tradition, presents new ideas that can be missed if theologians continue to privilege the written text solely.

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**Rememory Through Music in Sinners and Sonny's Blues**
Presenter's Name: Lyric Hoover
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Michael Ralph
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This presentation examines the film Sinners (2025) and the short story "Sonny's Blues" (1957) by James Baldwin in relation to the concept of rememory outlined by Toni Morrison in her novel Beloved (1987). I posit that these works incorporate blues and jazz music as a vehicle for rememory, or the recollection of repressed memories, both individual ones and ones belonging to a collective Black history. The presentation incorporates analysis of key scenes, characters and themes in the selected media to support this claim. In the process, it develops a larger point about the significance of music in African American communities and consequently in African American fictional narratives. I study Sinners in regard to the symbolism of the blues music played by key characters such as Samuel "Sammie" Moore and Delta Slim, focusing on the different manifestations of the past, present and future called forth by their music. My presentation explores the power of the blues to evoke both trauma and joy sourced from Black Americans' ancestral, cultural ties, considering the use of this power for physical and spiritual protection within the film. I further extend my interpretation by comparing the relevance of the blues in Sinners to that of jazz in "Sonny's Blues." My presentation argues that Baldwin's portrayal of jazz music as invoking a complex African American past alludes to the same practice of rememory shown in Sinners. My interpretation of "Sonny's Blues" therefore identifies jazz music as a medium for rememory, similar to blues music in Sinners.

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**Root Working through the Garden: Black Women Writers' Rural Spiritual Ecological Ecocriticism in the U.S.**
Presenter's Name: Sarah Jenkins
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Jennifer Williams
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Black women writers in the U.S. shape a body of spiritual ecological thought in prose writing that has been ignored. While Black women's ecopoetics are taken up seriously as ecocritical expression, their prose contributions are not. I am enthralled by the repeating prose tradition among Black women rural writers of using the garden as a site of literary protest to catastrophe—protest that bridges the realms of social, environmental, theological, and narrative justice and catastrophe that is

constructed and experienced atmospherically and likened to storms in their narratives, storms that reshape and repeat across periods of U.S. history. I analyze four narratives that let us consider how the plantation climate reshapes during different periods as the colonial systems that engendered the plantation become invisible but are not uprooted. I look at Harriet Jacobs's Incidents in the Life of a Slave Girl (1961), Zora Neale Hurston's Their Eyes Were Watching God (1937), Toni Cade Bambara's The Salt Eaters (1980), and Jesmyn Ward's Sing, Unburied, Sing (2017). When thinking through crises explored through the garden, what do they ask us to see? How do they theorize ecology, environment, disaster, and health care through the garden? I use ecowomanist theory and place myself in conversation with scholars like Chelsea Frazier, Melanie Harris, Katherine McKittrick, Kimberly N. Ruffin, Sylvia Wynter, Jamaica Kincaid and Olivia Laing. I suggest root working as the method of literary ecowomanist protest shaped by the writers here and informed by the spiritual worldviews of root work or Hoodoo.

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**Politics of Care: Exploring the Tradition of Black Motherhood through the Parenting of Queer Mothers**

Presenter's Name: Latrese Johnson
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Michael Ralph
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Black intellectuals have long contended with the institution of motherhood. In pursuit of this academic investigation, mothers who operate outside of heteronormative familial relations have been relatively underexplored using a Black feminist analysis, despite their involvement and contributions to Black cultural family formations. This study asks: to what extent have eight selected Black queer mothers integrated Black Feminist political sensibilities into their parenting practice? By employing ethnographic methods, this study analyzes structured interviews with Black lesbian and queer parents living in the United States to gauge the use and effectiveness of authoritative parenting strategies. The study finds that Black lesbian and queer mothers practice a wide range of approaches to child rearing; simultaneously adhering to and deviating from the tradition of Black Feminism. Keywords: Black lesbian political thought, Black motherhood, queer parenting, Black Feminism, other-mothering

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**On Digital Colonialism as a Form of Epistemic Oppresion**

Presenter's Name: Richelle Johnson
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Anika Simpson
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Digital technology is a resource that empowers, connects, and shapes nature of how we interact, communicate, and share information with one another. Despite the great good achieved by digital technology, the drive for technological innovation has led to profound harm – particularly for communities in the Global South. Critics of digital technology's rapid rise to power of point to similar patterns in European colonialism, evidenced by the domination of Western culture, practices, and ideas at the expense of local inventions and customs. The aggressive deployment of digital technology and the rhetoric associated with it bears strong resemblance to the colonial scramble to discover the "New World" on a mission to expand empire, boost the economy, and evangelize the indigenous population. To describe this phenomenon, some scholars have employed the term "digital colonialism" to convey the concern for how the practices of "Big Tech" mirror the patterns of historical colonialism. On Digital Colonialism as a Form of Epistemic Oppression interprets and applies decolonial philosophy and black epistemology to accomplish two things – (1) to demonstrate that the practices of Big Tech are a continuation of the colonial project, ergo digital colonialism, and (2) that these practices are a form of epistemic oppression hindering communities across the globe from meaningfully contributing to and participating in the digital environment. Thus, the aim of this project is to communicate how digital technology, as a shared epistemic resource, functions to perpetuate injustice, characteristic of epistemic oppression.

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**Archival pre-dissertation research on the everyday resistance of enslaved women in the antebellum American South**

Presenter's Name: Christina Jones
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Frederick Knight
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I will dedicate historical dissertation research to understanding how enslaved women under that to which such scholars as Pargas (2023) have referred as the 'second slavery' in the antebellum South engaged in 'everyday acts of resistance' in order to not only survive life in bondage by cultivating moments of freedom for themselves in day-to-day life, but to push back against and reject the dominion of their enslavers. Using archival documents such as diary entries and letters written by enslavers; transcriptions of WPA interviews with formerly-enslaved persons; autobiographies of formerly-enslaved persons; Southern antebellum newspaper articles; cookbooks; and the travel accounts of white foreigners visiting the South – along with interviews I will conduct with descendants of enslaved persons through which to access and honor oral histories of enslaved women's everyday plantation resistance, passed down through Black American families – I will give voice to the subtle, unassuming means through which enslaved women used food; herbal healing and medicine; practices of sexual health; and music as tools through which to push back against their enslavers' oppressive control. In taking on the project of such scholars as Scott (1985) and Camp (2005) of focusing research on the small-scale, quotidian means through which disenfranchised persons resist their oppressors without engaging in large-scale acts of resistance such as running away, or resorting to arson and/or extreme violence, I seek to honor the enslaved women of the periphery whose resistance, quiet and oft-ignored by historical narratives of 'slave resistance,' was both significant and effective.

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**"Willa, Gloria, and Naylor's Reader: Subversive Archivists are Everywhere in Gloria Naylor's Linden Hills"**
Presenter's Name: Marja Lankinen
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Yasmin DeGout
Faculty Advisor's email: ydegout@howard.edu

In "Willa, Gloria, and Naylor's Reader: Subversive Archivists are Everywhere in Gloria Naylor's Linden Hills," I track Gloria Naylor's novelistic references to circles, arguing that they serve as the narrative's central motif. By following the novel's repeated references to literal circles like cups, plates, moats, and moons, I demonstrate how Naylor maps onto her metaphorical landscape commentary on the type of Black social circles forged by men like Luther Nedeed--that is, those who have been corrupted by the logics underpinning racial capitalism. To address the political dimensions of Naylor's social commentary, I apply to my close readings the analytics drawn from Black Studies, Black Feminism, and the Black Radical Tradition. I also apply Madhu Dubey's conception of Black postmodern literary theory to a novel produced in a period of overlapping "posts" ranging from the post-Civil Rights Movement to postmodernity. This paper ends with the argument that Naylor also provides readers with the motif of circles as a literary training tool of sorts. By teaching her readership to pay close attention to circles, Naylor primes her audience to catch her subtle references to the Prince Hall Masons, a real-world Black social circle committed not to the acquisition of money or social status but rather to service and social justice. By recording in fiction the stories of Black sociality alongside the histories of clandestine social circles like the Black Freemasonry, I argue that Naylor must be considered as one of the most subversive author-archivists of the twentieth century.

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**Between Borders and Belonging: Examining African International Students' Transformative Journeys in Cultural Adaptation During the Era of US crackdown and visa revocation.**
Presenter's Name: Enock Magack
Classification: Graduate Student
School/College: Communications
*Presentation Type: Poster Presentation*
Faculty Advisor: Wei Sun
Faculty Advisor's email: wei.sun@Howard.edu

This study examines the cultural adjustment experiences of African international students in the United States during the intensified visa restrictions and widespread revocations in 2025. Using an autoethnographic approach informed by Cross-Cultural Adaptation Theory and the Spiral of Silence, the study analyzes how immigration uncertainty shapes students' academic engagement, social interactions and sense of belonging in the US. Preliminary findings indicate five key dimensions influencing adjustment: academic adaptation, cultural identity negotiation, institutional relationships, coping strategies and immigration related stress. Participants described a mismatch between expected supportive academic environments and the reality of demanding workloads, frequent assessments and limited institutional awareness of their unique challenges. Heightened visa scrutiny and polarized immigration discourse further contributed to anxiety, perceived instability and concerns regarding long-term safety and belonging. In response, students adopted strategic communication practices, including selective silence in classroom discussions involving politics, race, or identity. These choices were employed to avoid misinterpretation rather than reflecting disengagement. Code switching and deliberate shifts in speech patterns were also used to navigate social and academic spaces. Despite these constraints, participants demonstrated resilience through peer mentorship, the preservation of cultural identity, and the development of supportive networks grounded in faith, friendships, and diaspora communities. Further, the study argues that traditional adaptation theories insufficiently capture the roles of race, power and immigration policy in shaping international student experiences. It concludes that adaptation extends beyond assimilation to encompass negotiation, agency, and active efforts to build belonging within challenging institutional and political contexts.

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**A Proposed Conceptual Model Linking Quiltmaking and Health**
Presenter's Name: Monique Major
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Monique Major
Faculty Advisor's email: m_major@howard.edu

In this presentation, we will explore the salutary benefits of quilting for the quilters and the communities where they live. A conceptual model will be introduced that attempts to explain the relationship between quilting and health at the biological, psychological, and social levels. Of particular interest is the relationship between the brain and cardiac activity while people are making quilts. The executive control network, default network and their relationship to the autonomic nervous system will be discussed as two pathways that are active while people are engaging in quiltmaking. These pathways will be used to explain the short and long-term health benefits of making quilts.

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**Trouble In Mind: Nina Simone and Gothic-Blues Expression**
Presenter's Name: Chase Mitchell
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Tracey Holmes
Faculty Advisor's email: tracey.holmes@Howard.edu

This research project argues that Nina Simone's music and lyrics are situated within an African American gothic and blues tradition. In tracing the connections between the two forms of expression, this paper shows that there are varied and complex ways in which black people conceptualized freedom. Blues is a genre of black cultural expression rooted in the postbellum American south, and speaks to the ordinary of black life. The gothic is a genre of literary and cultural production that uses horror devices to speak to a culture's anxieties often made manifest as a monstrous other, but whereas the gothic speaks to the fear of an other,

the African American gothic speaks to the cultural fear of being the other. I seek to analyze both American Blues and African American gothic against one another. Drawing on these traditions, but reading at their cross-section, I seek to uncover how and why Nina Simone's "Strange Fruit" and "Pirate Jenny" exist as sites of the two genres' interactions. In looking at these two forms of expression together, a wider conversation of how black people express the complexities and cognitive dissonance of freedom under systemic oppression can be had.

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**Written By a Black Woman: How Doechii's Alligator Bites Never Heal Reveals the Complex Identity Construction of Black Womanhood**

Presenter's Name: Abiba Moncriffe
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Ayesha Ramachandran
Faculty Advisor's email: ayesha.ramachandran@yale.edu

This research project seeks to answer the question of how Black women create, interpret, and establish their own identities as women through the analysis of rapper Doechii's most recent mixtape Alligator Bites Never Heal. Through the close readings of four song lyrics along with other promotional aspects of the mixtape's release, this study examines thematic elements from content analysis and places them in a Black Feminist Theory framework in order to identify and understand the complex identity displayed through Doechii's artistry. Despite the sexually violent and anti-woman messages rap music and hip hop culture have been known to produce, Black women have built and maintained a home at the center of this music for its entire existence. This becomes especially more complex with the rise of technology and the digital age as questions surrounding gendered realities in hip hop evolve with technology. In examining Alligator Bites Never Heal, one must incorporate contemporary understandings of womanhood, sexuality, and the digitalization of music, identity, and their narratives. There are many things that can be learned about the complexities of womanhood, gender identity, and positionality from Black Women Rappers through the analysis of their projects. Doechii's artistry has remained creative and authentic to her lived experience, by using her mixtape to explore the complex reality of being a Black woman this study hopes to shed light on aspects of the Black Woman experience not often discussed in popular culture and academia.

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**Pioneering Mind-Body Techniques in Medical Education: Dr. Dorothy Doyle Harrison's (RN, MPH, PhD) Biofeedback-Based Approach to Enhancing Test-Taking Skills in the 1960s-1970s**

Presenter's Name: Justin Morency
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
Faculty Advisor: Lynn McKinley-Grant
Faculty Advisor's email: lynn.mckinleygrant@gmail.com

Co-authors: Madison Gay

Dr. Dorothy Doyle Harrison, a pioneering nurse and medical anthropologist at Howard University College of Medicine, developed an early biofeedback-based stress-management program in the 1960s–1970s aimed at improving student well-being and academic performance. Drawing from a 38-year nursing career and postgraduate training in biofeedback and behavioral science, she implemented structured interventions to address test anxiety, public speaking stress, and chronic academic stress. This study analyzes her extensive personal and professional archives, including clinic documentation, photographs, audio/video recordings, and educational materials, to reconstruct the design, pedagogical goals, and therapeutic strategies of her biofeedback clinic. The program incorporated physiological monitoring (ECG, GSR, EEG), guided relaxation techniques, meditation training, self-evaluation exercises, and group reflection sessions. Comparative review of contemporary institutional biofeedback programs suggests that few modern models mirror the comprehensive, curriculum-integrated structure Dr. Harrison developed. Preliminary findings indicate that her methods had a profound academic and personal impact on trainees, many of whom credited the program with enabling their educational success. This work highlights the historical significance and modern relevance of Dr. Harrison's mind-body approach, underscoring the need for renewed integration of biofeedback-based stress-reduction strategies in medical education to address ongoing challenges such as burnout, anxiety, and performance-related distress.

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**"Gacaca" in Post-genocide Rwanda: The Study of the Contribution of Traditional Heritage in Post-Conflict Community Rebuilding in Africa**

Presenter's Name: Abdel Mouncharou
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Mohamed Camara
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In 1994, genocide in Rwanda occurred as a result of clashes between the Hutu and Tutsi people. After the killing of approximately 800,000 people, the most difficult challenge for the country was reconstruction and the task of establishing justice, peace, and reconciliation. During the three decades that followed the genocide, many peace building and reconstruction initiatives from international organizations and government's institutions have been implemented to speed up the recovery process of Rwanda. The International Criminal Tribunal for Rwanda (ICTR), the Rwandan national courts and the Gacaca traditional courts played a crucial role in the country's post genocide reconstruction. Among the justice and peace building initiatives, Gacaca traditional courts were used as a restorative justice tool for conflict resolution. Gacaca restorative and reconciliation missions were reinforced by other traditionally inspired homegrown initiatives (HGIs) such as Ingando Reconciliation Camps, the National Unity, and Reconciliation Commission (NURC) and the civic education Ndi Umunyarwanda. This project aims to evaluate the contribution of Gacaca along with the three HGIs mentioned in peacebuilding and reconciliation in post-genocide Rwanda. The principal objectives of the research are to document and describe the significance of African endogenous solutions to resolve an internal social crisis such as the genocide in Rwanda. The pertinence of this research lies in its potential to uplift the benefits of African

knowledge and endogenous solutions to local African problems and the limits of African knowledge in contemporary public policy.

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**Identity, Otherness, and the Black and White Biracial Condition**

Presenter's Name: Noah Parks
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Miriam Gyimah
Faculty Advisor's email: miriam.gyimah@Howard.edu

Co-authors: Elyssa Montgomery

The field of Black existentialism seeks to understand how Black people create meaning and identity within a world fraught with anti-Black racism. Nevertheless, much of the scholarship seeking to understand the lived experience from a phenomenological perspective fails to communicate the unique Black and White biracial (BWB) experience, despite this group's growing proportion in society and subsequent role in the African diaspora. The budding research centering the biracial experience has stressed the creation of the third space, an in-between area where mixed race individuals exist. In this paper, we seek to understand how the Black and White biracial person's experiences of exclusion and belonging affect the creation and experience of this third space. We explore these ideas through a theoretical analysis of Reed and Jung contextualizing research in the socio-behavioral sciences. We determine the mixed race individual occupies a fractured position in the psyche and society, reinforced through recurring experiences with discrimination and monoracism. Only through the development of the third space, a process in which we stress equifinality, can BWB's alchemize existential angst into a renewed freedom. We argue the third space is not a sociocultural creation, it is a necessary response to the internal conflict brought by a world that denies BWBs identity. Our work centers resiliency, pride, and autonomy in a world polarized by race, highlighting the BWBs continued role in African American history and culture.

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**You're Not Alone: Black Generation Z Social Norms, Shared Experiences in Community, and Self-Disclosure on TikTok**

Presenter's Name: Beylul Russom
Classification: Graduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Yong Jin Park
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This study examines how self-disclosure, authenticity, and community formation operate among Black Generation Z undergraduate TikTok users through the framework of Normative Social Behavior Theory (TSNB). Drawing on survey data (N = 183) and open-ended qualitative responses, the study investigates whether authenticity functions as an injunctive social norm shaping disclosure practices and perceptions of shared identity. Descriptive findings indicated high perceptions of authenticity (M = 3.92) and sense of community (M = 3.78), alongside moderate levels of self-disclosure (M = 3.43). Multiple regression analyses revealed that self-disclosure significantly predicted both perceived authenticity ($\beta = .080$, $p = .005$) and sense of community ($\beta = .227$, $p < .001$), supporting NSBT's proposition that behavior is normatively influenced and socially reinforced. Qualitative thematic analysis further demonstrated that participants viewed authenticity as a valued communicative expectation while simultaneously maintaining strategic control over when and how personal racial experiences were disclosed. Findings suggest that authenticity operates as an injunctive norm within TikTok culture, guiding disclosure tendencies and reinforcing community belonging. At the same time, Generation Z users exhibit strong perceptions of communicative autonomy, negotiating disclosure boundaries despite normative expectations. The study extends Normative Social Behavior Theory into digital platform environments and contributes to understanding how algorithmically mediated spaces structure racialized communication, identity formation, and perceived collective belonging among contemporary social media users on TikTok.

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**Temporal Survival and Black Feminist Agency in Octavia Butler's Kindred: Speculative Anthropology, Afrofuturism, and Cultural Memory**

Presenter's Name: Ezearia Saffold-randolph
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Jacquetta Ayewoh
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Project examines Octavia E. Butler's Kindred as a work of speculative anthropology that uses time travel as a tool for Black feminist agency, historical recovery, and cultural memory. Through Dana's experiences, a modern Black woman transported into the antebellum South, Kindred redefines survival as a temporal and feminist act shaped by negotiation, empathy, and resistance. This project argues that Butler's speculative structure provides an ethical framework for remembering that relies on imagination to reclaim Black historical consciousness and demonstrate how literature can reclaim silenced Black histories. Drawing on Black feminist theory, Afrofuturist scholarship, and Saidiya Hartman's concept of critical fabulation, this study argues that Butler's use of Afrofuturism shifts attention from technological futurity and toward ancestral return and witnessing. Dana's repeated encounters with violence and captivity makes historical trauma physically and psychologically present. Time travel does not function as an act of escapism, but as a form of speculative ethnography that reveals how racialized gender domination persists across generations. Through close analysis, this project demonstrates that Kindred reimagines the slave narrative through a feminist lens, where remembering is the act of resistance. By centering Black women's agency, Butler confronts silenced histories and bridges historical reckoning with cultural survival. Kindred reminds readers that survival is about engaging with history, claiming space for Black voices, and remembering the stories from the past to shape the present.

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**The why behing social media addiction**
Presenter's Name: Amauri Sanders
Classification: Undergraduate Student
School/College: Business
*Presentation Type: Poster Presentation*
Faculty Advisor: Gbadebo Odularu
Faculty Advisor's email: gbadebo.odularu@howard.edu

In this day, age, and political climate, if there is something we can agree on, it would be that phone usage is now at an all time high. With phone addiction also increasing rapidly. Researchers in psychology, communication studies, and technology design all agree that people are devoting more time to social media than ever before. Whereas these platforms can offer real value in connection and information, studies indicate that their overuse is more often the result of intentional design decisions that exploit human psychological vulnerabilities. Two large, intertwined themes surface repeatedly in this research/issue: (1) there are psychological mechanisms that make social media habit forming and (2) the design strategies employed to exploit those mechanisms. Together, these two themes provide an explanation of why social media has become so captivating, particularly for people in younger demographics, although the field continues to debate the presence mechanisms and definitions.

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**The Reimagining of the Dispossessed Historical Settings in Speculative Fiction**
Presenter's Name: Summer Tate
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Chris Shinn
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The research examines speculative fiction's use of historical archives that led to the eviction of residents from Malaga Island in 1912. The analysis includes Paul Harding's novel, This Other Eden, to identify the extent of speculation within the text that employs historical events accurately. I analyze the text for factual information and weather-related terminology. I create a dataset that catalogs the nonfictional archival information and weather data in juxtaposition to the fictional timeline within This Other Eden, observing the occurrences of essential events and weather in both timelines to assess how accurately specific terms describe the environment and their contribution to land dispossession, the construction of fabulation in the narrative, and plot development. This addresses the accuracy of the narrative and the weather's role in environmental humanities. It advocates for accuracy in representing the historical records of those dispossessed, focusing on the unethical liberties taken in speculative fiction, as discussed in the fields of creative nonfiction and environmental humanities, particularly concerning the weather's influence on human conflict in both fictional and nonfictional realms.

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**The Post-Pandemic Transit Crisis and Its Disproportionate Impact on Socially Vulnerable Communities in U.S. Cities: A Seattle Case Study**
Presenter's Name: Leah Thompson
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Not at Howard N/A
Faculty Advisor's email: N/A@n.com

The COVID-19 pandemic caused a major shift in public transportation usage across large U.S. cities. As remote work reduced commuting for many higher-income professionals, socially vulnerable groups such as low-income residents, people of color, women, disabled individuals, and those without access to a personal vehicle continued to rely on transit for essential trips. This led to a drop in ridership and significant fare revenue losses, putting strain on transit agency budgets. With emergency federal transit funding ending in 2026, agencies such as King County Metro face serious budget shortfalls that could reduce service for riders who need it most. This project examines whether socially vulnerable populations in King County, Washington are disproportionately affected by potential transit investment cuts. By analyzing data from the U.S. Census Bureau, the Washington State Department of Transportation, and King County Metro, the study uses demographic analysis, spatial mapping, and ridership trend visualization to assess the geographic and social dimensions of this impact. Findings were then compared with similar studies from other U.S. cities to demonstrate the national scope of this issue. Results indicate that marginalized groups still heavily rely on transit, highlighting the need for targeted investment and inclusive planning to maintain mobility access after the pandemic.

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**Linguistics Across Borders: Interdisciplinary Pathways to Student Engagement, Global Learning, and Transferable Skills**
Presenter's Name: Alla Tovares
Classification: Senior Faculty
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Alla Tovares
Faculty Advisor's email: atovares@howard.edu

Co-authors: Nkonko Kamwangamalu, Jia Lin, Xinyue Lu, Leonard Muaka

This panel examines how linguists in non-linguistic departments use interdisciplinary teaching to broaden students' access to, and investment in, the study of language. By embedding linguistic inquiry within fields such as literature and writing, education, and language acquisition, we create inclusive entry points that resonate with students' academic paths and lived experiences. This approach not only demystifies linguistics but also underscores its relevance to the social, cultural, and communicative practices students navigate every day. Amid growing pressure for graduates to demonstrate adaptable soft skills, our courses deliberately cultivate teamwork, communication, analytical reasoning, and problem-solving. These competencies develop naturally as students collaborate on data-driven projects, engage in peer analysis, and apply theoretical frameworks to linguistic, literary, and multimodal materials. The curriculum also aligns with institutional priorities around study abroad

and interdisciplinarity, helping students connect linguistic concepts to global contexts and cross-cultural experiences. We showcase course designs that foreground language as a central mechanism through which social systems, identities, and ideologies are constructed and contested. Students explore topics such as decolonizing language and linguistics in Africa, the Caribbean, and the diaspora; language acquisition and multilingual development; language and culture; language and power; forensic linguistics; linguistic creativity; and language economics. These areas consistently spark student curiosity while demonstrating the field's breadth and applicability. Ultimately, this presentation shows how linguistics courses not only attract students from diverse backgrounds but also equip them with transferable skills that enrich their academic work, strengthen their professional readiness, and deepen their understanding of language as a fundamental human practice.

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**"Behind Kayfabe": A Constructivist Grounded Theory of Male Professional Wrestlers of Color's Use of Race & Ethnicity in Gimmick Development**

Presenter's Name: Nicholas Uptgrow
Classification: Graduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Loren Coleman
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As a site for academic interest, wrestling has maintained a curious position as it is not fully sport, not fully pure entertainment, but a merger of the too (Alcott & Phillips, 2024). Historically, wrestling has regularly leaned into problematic (racist, sexist, homophobic, xenophobic, etc.) content, despite its diverse audience (Duncum, 2002). Misconceptions from exaggerated stereotypical performances were adapted to create easily communicable characters for the audience (Webley, 1986). Often, race or ethnicity was used to define the heel characters who were typically portrayed as foreigners or defectors of the United States to foreign powers (Maguire and Wozniak, 1987). The use of race and ethnicity in professional wrestling as a method for framing fans' interpretations of good and evil speak to the greater role that wrestling plays in upholding antiquated "American values" (Migliore, 1993). There remains no scholarship interrogating how wrestlers of color are reclaiming their identities and actively challenging stereotypes. The purpose of this study is to understand how these professional wrestlers use their identity to construct their onscreen persona and challenge stereotypical portrayals of the past. A constructivist grounded theory approach was employed for this study. Five participants (3 Black/mixed identifying and 2 Puerto Ricans professional wrestlers) participated in long-form semi-structured interviews. Following the coding phases, the three primary themes that emerged for the theory are: (1) definition and recognition of race/ethnicity, (2) negotiation of character vs stereotypes and past representations, and (3) creation of wrestling character and/or persona.

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**The Legacy of Toni Morrison's Birth Name, Chloe Ardelia Wofford**

Presenter's Name: Adrian Walls
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Yasmin DeGout
Faculty Advisor's email: ydegout@Howard.edu

Many authors have discussed Toni Morrison's relationship with her birth name, Chloe Ardelia Wofford. She's on the record saying that she changed her first name because "Chloe" was too hard for other people to pronounce, but was that the only motive she had in mind? After she changed her birth name, how much did she continue to identify with it, if at all? To answer these questions, I consulted both Morrison's own publications, from interviews to novels, and perhaps most uniquely, her archival presence in Howard University's Moorland-Spingarn Research Center. In Morrison's files there, I have found that even years after she became Toni, Morrison continued to use her birth name in both personal and professional contexts. These new findings both help answer long-standing mysteries about Morrison's self-identification and spark new questions about how this self-identification impacted her legendary writing.

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**All Power to the People: The Significance of Language in Social Movements**

Presenter's Name: Keshawna Washington
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Ayesha Ramachandran
Faculty Advisor's email: ayesha.ramachandran@yale.edu

This project examines the radicalization of Black and Asian American youth from 1969 to 1978, using the writings of the Black Panther Party (BPP) and I Wor Kuen (IWK) as a case study. The relationship between Asian Americans and Black Americans has a complex history, however, an overlooked facet of this relationship is the political and social solidarity between the two groups during the long sixties. Revolutionaries of the time took inspiration from intellectuals such as Mao Zedong, Malcolm X, and Kwame Ture, finding their anti-capitalist, anti-war, and ethnic pride ideals inspiring. Scholars such as Jeffrey O.G. Ogbar and Karen Ishizuka have conducted extensive research outlining the creation, interaction, and influence of the Black Panther Party and I Wor Kuen. This project seeks to explore and understand the influence that the shared diction and message of the parties had on growing their membership base. The BPP and IWK had national newspapers and party platforms, which were analyzed using a mixed-methodology approach that combined historical and linguistic methods in this project to understand how the groups and communities they represented were empowered to fight for change. While militarization and hard power are necessary concepts to understand practices of autonomy, soft power, more specifically, the impact of language and messaging, is essential to understand how oppressed groups can practice self-determination.

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**From Gloves to Grains: Natural Rubber Latex, Chitinase Biology, and the Historical Expansion of Allergic Risk (1980–2005)**

Presenter's Name: Brianna Watson
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
Faculty Advisor: Miriam Michael
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Co-authors: Mrinalini Deverapalli, Miriam Michael

Allergic disease occupies a distinctive position in medical history, emerging as a recognizable clinical and biological entity only in the late nineteenth and twentieth centuries alongside industrialization, occupational specialization, and advances in immunology. This study examines the historical emergence of natural rubber latex allergy between 1980 and 2005 as a case study in how medical, technological, and agricultural interventions reshaped patterns of immune vulnerability. Using a historical synthesis of peer-reviewed immunologic, occupational health, and agricultural science literature, this analysis traces the convergence of three developments: expansion of latex use in healthcare following adoption of universal precautions during the HIV/AIDS epidemic; immunologic characterization of IgE-mediated latex allergy and latex–fruit syndrome; and the rise of agricultural biotechnology focused on enhancing fungal resistance through pathogenesis-related proteins, particularly chitinases. The findings demonstrate that latex allergy emerged not as an isolated occupational condition but as a consequence of intensified exposure to biologically active plant defense proteins previously regarded as inert. Immunologic studies identified class I chitinases containing hevein-like domains as key mediators of cross-reactivity between latex and foods such as banana, avocado, chestnut, and kiwi, with weaker or more variable cross-reactivity observed for tomato, potato, and bell pepper. During the same period, chitinase genes were introduced or upregulated in crops, including rice, a global dietary staple historically considered hypoallergenic. Together, these results highlight allergic disease as a historically contingent outcome of late twentieth-century interventions and illustrate how changing technologies reshaped immune exposure at both occupational and population levels.

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**The Hillman Effect: Intersectional Identities, HBCU Life, and Popular Culture Through "A Different World"**

Presenter's Name: Joslynn White
Classification: Graduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Loren Coleman
Faculty Advisor's email: loren.coleman@howard.edu

The television show 'A Different World' was momentous for Black identities and HBCU culture on a mainstream popular television network. The series employs the theoretical framework of intersectionality to represent multidimensional identities based on real life experiences of Black college students. In using Kimberle Crenshaw's theoretical framework of intersectionality as well as media, critical studies, and culture, this research analyzes the layers of identity including gender, class, and regional background to better represent circumstances of Blackness. Through examining several key episode of season two, this study aims to highlights the challenges of one dimensional depictions of Blackness in mainstream popular culture.

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# PHYSICAL SCIENCES & ENGINEERING

**Fine-Tuning SimAM-ResNet34 and WavLM-Base for Cross-Lingual Speaker Verification**

Presenter's Name: Araj
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Saurav Keshari Aryal
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Co-authors: Howard Prioleau

We present a lightweight, reproducible submission for the TidyVoice 2026 cross-lingual speaker verification challenge implemented in the WeSpeaker toolkit under single-GPU Google Colab constraints. Our primary system, S1, uses the official SimAM-ResNet34 checkpoint pretrained on VoxBlink2 and VoxCeleb2 and fine-tuned on TidyVoiceX, which we further fine-tune for five epochs with large-margin classification. In parallel, we implement a secondary self-supervised system, S2, using a frozen WavLM-Base frontend with a compact statistics pooling speaker head, trained for four epochs. Both systems use standard speech augmentation during training with MUSAN noise and RIRS reverberation, while inference uses clean embeddings and cosine scoring. To combine systems, we perform score-level fusion calibrated on a labeled Tune-S development split. We z-normalize each system's Tune-S scores using their mean and standard deviation, grid-search a convex fusion weight alpha in the range 0 to 1 with step 0.01 to minimize EER, and apply the frozen normalization and alpha to fuse Eval-A (Task 1) and Eval-U (Task 2) score files for submission. On Tune-S, S1 substantially outperforms S2, so the selected fusion weight is alpha equals 1.0.

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**Constraining Dark Matter In External Galaxies Using Stellar Streams**

Presenter's Name: Amir Abdulgadir
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Lina Necib
Faculty Advisor's email: lnecib@mit.edu

Co-authors: Lina Necib, Nathaniel Starkman, Zeineb Mezghanni

The nature and properties of dark matter (DM) remain among the most fundamental unanswered questions in astrophysics. This project focuses on using stellar streams, faint, elongated structures formed when smaller satellite systems are tidally disrupted by the gravitational forces of a larger host galaxy, to map the invisible gravitational potential shaped by dark matter. While the Milky Way has been studied before in depth, few projects connect high-resolution extragalactic observational data to direct constraints on dark matter halo properties. This research aims to fill that gap using a targeted and systematic approach. After sorting deep-space images from the European Space Agency's Euclid mission and identifying galaxies that exhibit stellar streams, a galaxy modeling tool is used that isolates the faint stream by subtracting the dominant light of the host galaxy. From this, constraints can be derived from the model pertaining to the mass and shape of the host galaxy's baryonic gravitational potential. Building from my work modeling the luminous galaxy, we can subtract the baryonic potential from the total potential to find the mass and shape, along with other parameter constraints of the dark matter distribution itself.

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**Exploring BIC Phenomena in Layered Van der Waals Structures**

Presenter's Name: Adam Abiade
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Bound states in the continuum (BICs) are optical resonances that remain perfectly confined despite existing within the radiation continuum, enabling incredibly high Q factors in photonic crystal systems. This project investigates the emergence of BIC modes in photonic crystal slabs fabricated from CrSBr, a van der Waals (vdW) antiferromagnetic semiconductor. While the extreme optical anisotropy of monolayer CrSBr typically inhibits the formation of these modes by breaking necessary rotational symmetries, we demonstrate that a 90° "cross-stacked" bilayer configuration restores the conditions required for BIC emergence. Using Rigorous Coupled-Wave Analysis (RCWA), we simulate the angle- and wavelength-dependent reflectance to identify the specific geometric and spectral conditions under which BICs arise. Through field-profile mapping and symmetry analysis of the electric field components, we identify the presence of symmetry-protected BICs characterized by vanishing linewidths and suppressed radiation coupling at the Γ-point. Our findings show that the 90° twist effectively symmetrizes the dielectric tensor, allowing the structure to support robust BICs that are otherwise unattainable in the monolayer limit. This work provides a foundation for future magneto-photonic devices where these high-Q resonances can be tuned in situ by switching the magnetic ground state of the CrSBr layers.

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**When Seconds Count: A Scoping Review of Decision Support System Design for High-Stakes, Time-Pressured Environments**

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When seconds count, decision support systems (DSS) can mean the difference between life and death. Emergency dispatchers, air traffic controllers, trauma teams, and crisis managers rely on digital tools to make rapid, high-stakes decisions under extreme pressure. Yet poorly designed interfaces can overwhelm users with information, obscure critical details, or fail to support the split-second judgments these professionals must make. Despite the critical importance of these systems, no comprehensive synthesis exists of how DSS interfaces are designed for high-stakes, time-pressured environments. This scoping review asks: how are decision support systems designed for high-stakes, time-pressured environments? Following a precise scoping review methodology, we examine peer-reviewed literature published between 2015 and 2025 across domains including emergency response, tactical and military operations, aviation, maritime operations, industrial safety, and emergency medicine. Sources were identified through a structured, multi-database search, screened by various independent reviewers against pre-specified inclusion and exclusion criteria, and then subjected to systematic data extraction. This review will synthesize design principles, visualization strategies, and interaction patterns that support effective decision-making under pressure. Our findings will benefit researchers, designers, and practitioners working to create systems that perform when the stakes are highest, while identifying critical gaps for future research in this vital area.

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**Predictive Modeling of Permeate Flux and Fouling Behavior in Alkaline Crossflow Ultrafiltration Systems using Machine Learning**

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Crossflow ultrafiltration is a critical pretreatment operation for high solids radioactive waste streams. However, membrane fouling and associated permeate flux decline remain major challenges to reliable and energy efficient operation. Predicting permeate flow and transmembrane pressure (TMP) is particularly difficult for highly alkaline, particle laden slurries, where fouling arises from coupled chemical, hydrodynamic, and time dependent processes. In this study, we develop a data driven framework for predicting permeate flow and TMP in stainless steel crossflow ultrafiltration using bench scale datasets from three Hanford relevant nuclear waste simulants. Simulants were formulated from Fe2O3, Al(OH)3, and AlO(OH) in concentrated NaOH and filtered through a sintered stainless steel tubular membrane at NaOH concentrations of 5, 2.5, and 1 mol $L^{-1}$. Raw experimental time series exhibited irregular sampling, missing values, and sensor artifacts, requiring systematic preprocessing prior to model development. Preprocessing included segmentation of active filtration periods, construction of a clean permeate flow signal from redundant measurements, resampling to uniform time steps, and normalization. Six machine learning regression models including Random Forest, Extra Trees, Support Vector Regression (SVR), Gradient Boosting, XGBoost, and an Artificial Neural Network (ANN) were trained to predict permeate flow and TMP. All models achieved strong predictive performance with test $R^2$ values exceeding 0.97. SVR demonstrated the highest accuracy for TMP prediction, while Extra Trees performed best for permeate flow prediction. These results demonstrate that curated bench scale datasets can support meaningful machine learning prediction of fouling behavior in highly alkaline CUF systems. Keywords: membrane fouling, crossflow ultrafiltration

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**Machine Learning–Assisted Raman Spectroscopy for Classification of Lunar Analog Minerals**

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Raman spectroscopy is a powerful, non-destructive analytical technique for identifying mineralogical compositions in planetary materials. However, spectral overlap, fluorescence interference, and signal variability can complicate accurate mineral classification, particularly in lunar analog samples relevant to planetary exploration. In this study, we develop a computational framework that integrates Raman spectral acquisition with machine learning modeling to improve mineral identification accuracy and robustness. Raman spectra of lunar analog minerals were collected under controlled laboratory conditions and preprocessed to reduce noise and baseline distortions. Feature extraction techniques were applied to isolate characteristic vibrational modes, and supervised learning algorithms were trained to classify mineral phases based on spectral signatures. Model performance was evaluated using cross-validation methods to assess generalization and predictive accuracy. Preliminary results demonstrate that machine learning–assisted analysis significantly enhances classification reliability compared to traditional peak-matching approaches. This framework has potential applications in autonomous mineral identification for planetary missions, in situ resource utilization, and remote planetary sensing technologies. The integration of spectroscopy and data-driven modeling provides a scalable pathway toward intelligent material characterization systems.

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**CULTURALLY AWARE MULTILINGUAL MODEL ROUTING THROUGH A MIXTURE-OF-SPECIALISTS FRAMEWORK**

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Large language models (LLMs) continue to underperform for culturally diverse and linguistically underrepresented communities, limiting their effectiveness in multilingual and code-switched settings. We introduce a culturally aware Mixture of Specialists (MoS) framework

coordinated by a Model Control Protocol (MCP) server that dynamically routes user inputs to language- or region-specific models based on linguistic proximity, cultural relatedness, and data availability. When a dedicated specialist is available, it is selected directly; otherwise, a hierarchical fallback strategy routes to a linguistically related model, then to a culturally proximate variant (e.g., West African English–tuned specialist), and finally to a multilingual backbone enhanced with lightweight regional adapters. This paper presents Phase 1 of a multi-stage research program, focusing on routing architecture, cultural metadata extraction, and region-aware prompting while specialist training remains ongoing. To enable future specialization, we establish parameter-efficient fine-tuning pipelines (LoRA and QLoRA) using openly licensed corpora rich in local context, including OSCAR, mC4, BigScience ROOTS, Tatoeba, African StoryBooks, and Global Voices, with rigorous deduplication, filtering, and native-speaker validation. Evaluation on the BLEnD benchmark (SemEval 2026 Task 7) across 26 languages and 30 regions shows that culturally grounded routing signals, regional metadata integration, and language-specific constraints significantly improve contextual accuracy, robustness in low-resource environments, and cross-regional generalization. These findings provide early empirical evidence that leveraging linguistic relatedness and cultural proximity enhances multilingual model performance prior to full specialist integration, establishing a scalable foundation for globally adaptive and culturally grounded NLP systems.

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**ASR Benchmarking for AAVE**

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Automatic speech recognition (ASR) systems are widely used in voice assistants, transcription services, and accessibility tools, yet prior research suggests they perform unevenly across dialects. This project investigates performance disparities in commercial ASR systems for African American Vernacular English (AAVE). We curated and transcribed over 200 hours of question–response style AAVE speech data and split it into training, validation, and test sets. Using an automated benchmarking pipeline, we evaluate systems including OpenAI Whisper, Amazon Transcribe, and Deepgram. Performance is measured using Word Error Rate (WER), with statistical analyses such as Welch's t-test and Shapiro–Wilk tests applied to assess significance and distributional assumptions. Preliminary findings indicate that several commercial systems exhibit elevated WER on AAVE speech relative to reported general benchmarks. To address this gap, we are fine-tuning models on the curated dataset and observing reductions in WER, though this phase remains ongoing. By combining systematic benchmarking, statistical rigor, and dataset development, this work contributes toward more equitable and representative speech recognition technologies.

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**Energy storage in nanocomposite films of polystyrene (PS) grafted TiO2 nanoparticles in PS matrix**

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Polymer nanocomposites can be tuned to achieve exceptional dielectric properties compared to pristine dielectric polymers. To significantly enhance these properties, research has focused on modifying the structure of polymer- grafted nanoparticles. However, while much attention has been given to the shell architecture of these nano particles, the effects of core size (near de Broglie length) and loading amount on the breakdown strength and energy density of nanocomposites remain less explored. In this study, we synthesized polystyrene grafted TiO2 nanoparticles (PSgTiO2 NPs) using surface-initiated atom transfer polymerization (SI-ATRP) with variable core sizes (15 and 40 nm). By adjusting the monomer-to-nanoparticle feed ratio, we controlled the graft density and molecular weight of the grafted chains. When dispersed in a PS matrix at various loading levels, PSgTiO2 NPs showed minimal improvement in energy density up to 5 wt%. However, significant enhancements were observed at 10 wt% and 20 wt% PSgTiO2 and efficiency of 40 nm PSgTiO2 NPs in the PS matrix. Interestingly, for similar loading levels, the energy density 2 NPs in the PS matrix were higher compared to the 15 nm PSgTiO2 NPs. These findings on core size and nanoparticle loading amount have important implications for the design of commercial dielectric capacitors

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**First-Principles Study of ZnO and ZnS Quantum Dots: Phonon Confinement, Raman Signatures, and Field/Stress-Tunable Electronic Properties for Quantum Sensing and Computation Applications**

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Wisdom Benson

Zinc Oxide (ZnO) and Zinc Sulfide (ZnS) are II–VI wide-bandgap semiconductors that exhibit excellent optoelectronic and piezoelectric properties, particularly at the nanoscale. The present study investigates phonon confinement and the electronic and piezoelectric characteristics of ZnO and ZnS quantum dots for potential applications in quantum sensing and quantum computation. Both materials adopt the zincblende (sphalerite) structure within the cubic $\bar{F}43m$ space group, forming tetrahedrally coordinated Zn–O and Zn–S networks. First-principles calculations were performed using density functional theory (DFT) and density functional perturbation theory (DFPT) within the Quantum ESPRESSO framework. Self-consistent and non-self-consistent calculations were employed to determine band structures, density of states, phonon behavior, and piezoelectric response under varying external electric and magnetic fields, as well as applied stress. The

computed bandgap of ZnO is lower than the experimental value, consistent with the known underestimation inherent to conventional exchange–correlation functionals such as LDA and GGA. Despite this limitation, the results provide reliable qualitative trends in electronic structure and phonon confinement effects.The findings demonstrate enhanced tunability of electronic and piezoelectric properties at the quantum dot scale, highlighting the strong potential of ZnO and ZnS nanostructures for next-generation nanogenerators, wearable electronics, biomedical sensors, and self-powered quantum devices.

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**Tuning Topological Phase Transition in Antiferromagnetic Dirac Semimetal of UOTe: Strain and Chemical Substitution**

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Van der Waals Antiferromagnets (AFMs) have drawn significant attention due to their potential in spintronics device applications. A recently synthesized layered AFM, UOTe, has been identified as a strongly correlated material, hosting a Dirac semimetal phase in its bulk form and transitions into an AFM Chern insulator at bilayer. This study aims to examine the effect of strain and chemical doping to induce topological phase transitions in UOTe using density functional theory (DFT) calculations. We found that the mechanical strain in the range of (±4%) changing the electronic band structure, leading to a transition from the Dirac semimetal phase to a topological insulator. Additionally, we examine the impact of chemical substitution, specifically doping Se into the UOTe lattice on the electronic structure and topological properties. Further investigations are ongoing to understand the mechanism of this topological phase transition, which will enable us to gain a deeper understanding of how the band structure and topological properties change under applying external factors.

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**Modeling HIV-Infected T-Cell Dynamics with Non-Exponential Probability Distributions**

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Since the introduction of SIR-type models, substantial advances have been made in the mathematical modeling of infectious diseases, including HIV. T-cell-based models play a critical role in improving understanding of the prevention of HIV infection with pre-exposure prophylaxis (PrEP). In this work, we investigate the dynamics of HIV infection at the cellular level by explicitly examining each stage of the infection cycle: an early non-virus-producing infection stage, a latent stage, and a virus-producing stage, with an emphasis on the timing and biological processes characterizing each phase. While most existing models assume exponential waiting-time distributions, we introduce a non-exponential probability framework to more accurately represent stage-specific and sub-stage dynamics of HIV infection to accurately capture the effect of PrEP. This approach allows for greater flexibility in capturing realistic residence times and times for infection prevention with PrEP within each infection stage. The resulting model is formulated as a system of integral equations derived from the underlying probability structure based on survival functions. The integral system can be reduced to a set of ODEs when the survival probabilities are modeled with gamma (Erlang) distributions. Numerical methods are employed to analyze the model dynamics, and stability analysis is used to characterize equilibrium behavior.

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**Evaluating Perceptions of Naturalness in AI-Generated Speech**

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Advances in neural text-to-speech technologies have allowed for realistic voice cloning, however, determining how "natural" synthetic voices are remains a challenge. As voice cloning becomes more integrated into applications such as accessibility systems, entertainment platforms, virtual assistants, and more, the quality of synthetic speech becomes increasingly significant. Subtle differences can shape listeners' attitudes towards usability, reduce trust, and affect overall user experience. Therefore, identifying factors that contribute to human-like speech and establishing reliable methods to evaluate perceived naturalness is essential in advancing speech synthesis systems. This study investigates the relationship between training data quantity and perceived human-likeness in cloned voices using a neural voice cloning pipeline based on Coqui XTTS. An end-to-end voice cloning system was implemented, with voice models trained on speech samples of varying lengths. Synthetic speech outputs were generated from each model and evaluated through a qualitative listening study. The generated voice samples were assessed by three human evaluators: self, familiar, and unfamiliar listeners. Evaluators rated each sample on a five-point Likert scale for perceived naturalness. Ratings were compiled into a structured dataset for comparative analysis. Additionally, different approaches for evaluating speech naturalness were explored to inform the study design. Thus far, the end-to-end system has been implemented, models have been trained under varying data conditions, and listening evaluations have been conducted to support ongoing analysis. Together, these components establish a systematic framework for examining how training data quantity relates to perceived naturalness in synthetic speech, offering a foundation for further refinement in voice cloning applications.

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**AI4PC-Howard University at SemEval-2026 Task 9: Multilingual Polarization Detection via Large Language Model Inference**

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This paper describes the PolarNLP system submitted to SemEval-2026 Task 9, Subtask 1, which focuses on detecting political polarization in multilingual text. The task spans 22 typologically diverse languages and poses challenges related to domain shift, class imbalance, and cross-lingual generalization. We explored two modeling strategies: (i) a weakly supervised teacher–student approach that uses a large language model (LLM) to generate pseudolabels for training a multilingual classifier, and(ii) direct LLM-based inference augmented with language-agnostic stylistic features. While the teacher–student approach achieved reasonable in-distribution performance, it failed togeneralize to the held-out test set, collapsing toward the majority class. Consequently, our final submission relies on direct LLM inference. We present a detailed analysis of both approaches, highlighting the limitations of weak supervision for polarization detection and the relativerobustness of direct LLM reasoning in multilingual settings.

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**Ensemble Voting and Meta-Learning for Homonym Disambiguation: A Hybrid Approach to SemEval 2026 Task 5**

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We present a hybrid ensemble approach for SemEval 2026 Task 5 (AmbiStory), which requires predicting the plausibility of homonym senses in literary narratives on a 1–5 ordinal scale. The task challenges systems to handle nuanced contextual ambiguity in creative writing, where traditional Word Sense Disambiguation methods often fail. Our methodology combines the complementary strengths of large language models and fine-tuned transformers through a multi-stage pipeline. First, we employ diverse LLM prompting strategies including few-shot learning, contrastive reasoning, and chain-of-thought prompts across multiple model providers and temperature settings, with optional retrieval-augmented generation to surface relevant training examples. Second, we fine-tune RoBERTa-large for ordinal regression using contextualized example sentences, deploying a multi-seed ensemble to reduce prediction variance. Third, we apply ensemble voting with median score aggregation across LLM outputs to improve prediction robustness. Finally, we integrate LLM ensemble and RoBERTa predictions through hybrid combination methods: weighted averaging, confidence-based weighting, and a calibrated meta-learner that learns optimal blending strategies from development data. Our approach achieves 80% exact-label accuracy and 0.74 Spearman correlation on the development set, substantially outperforming baseline methods. The results demonstrate that structured reasoning from LLMs, when combined with learned transformer representations, ensemble aggregation, and proper calibration, effectively captures the ordinal nature of sense plausibility in complex literary contexts. Ablation studies reveal that ensemble voting reduces individual model variance while the meta-learner successfully exploits complementary error patterns between LLM and RoBERTa components. Future work will explore refined retrieval mechanisms and ensemble optimization strategies.

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**Evidence Guided Abductive Scoring with Option Conditioned Retrieval and Constrained LLM Evaluation**

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Abductive event reasoning in the wild requires selecting plausible explanations for an event from noisy, partially relevant multi document context. We present an evidence guided abductive scoring pipeline for SemEval 2026 Task 12 that separates evidence selection from explanation scoring. For each topic, we chunk documents and retrieve option conditioned evidence using dense embeddings, then apply a cross encoder reranker to form compact evidence packs per option. A constrained large language model scorer evaluates each option using only its evidence pack and outputs structured signals capturing evidence support, explanatory directness, and contradiction. We then apply deterministic decision rules to produce single or multi label predictions, including robust handling of none of the above style options through semantic detection rather than reliance on option position. This modular design reduces distraction from irrelevant documents, improves comparability across options, and enables controlled calibration for multi answer outputs. Our approach demonstrates that retrieval focused evidence compression combined with disciplined, signal based scoring can effectively support abductive reasoning without explicit knowledge graphs or end to end prompting over full document context.

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**Psycholinguistic Augmentation for Conspiracy Detection using ModernBERT**

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The PsyCoMark 2026 shared task emphasizes modeling the psycholinguistic structure underlying conspiracy belief expression rather than relying solely on topical cues. In this work, we address Subtask 2, which requires classifying Reddit comments as conspiracy-related or non-conspiracy-related across diverse domains.We implement a syntactically augmented transformer-based classifier using ModernBERT-base. To introduce lightweight structural information aligned with PsyCoMark's theoretical framing, we extract Part-of-Speech (POS) tags using spaCy and concatenate the resulting syntactic sequence with the original comment text via a separator token. This approach allows the model to jointly encode lexical semantics and shallow grammatical structure without architectural modification. The model is fine-tuned for binary classification using cross-entropy loss, with early stopping applied to reduce overfitting.Preliminary experiments on the official development split yield a macro-averaged F1 score of 0.46. While performance remains modest, these results establish a functional baseline for structurally augmented classification and provide initial insight into the contribution of shallow syntactic signals for conspiracy detection in topic-diverse online discussions.This work contributes an empirically grounded starting point for exploring psycholinguistically informed transformer models within the PsyCoMark framework.

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**Learning Symmetries in Turbulence: Kolmogorov, Equivariance, and Data Augmentation in ML**

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The immense computational cost of simulating turbulence has motivated the use of machine learning approaches for super-resolving turbulent flows. A central challenge is ensuring that learned models respect physical symmetries, such as rotational equivariance. We show that standard convolutional neural networks (CNNs) can partially acquire this symmetry without explicit augmentation or specialized architectures, as turbulence itself provides implicit rotational augmentation in both time and space. Using 3D channel-flow subdomains with differing anisotropy, we find that models trained on more isotropic mid-plane data achieve lower equivariance error than those trained on boundary layer data, and that greater temporal or spatial sampling further reduces this error. We show a distinct scale-dependence of equivariance error that occurs regardless of dataset anisotropy that is consistent with Kolmogorov's local isotropy hypothesis. These results clarify when rotational symmetry must be explicitly incorporated into learning algorithms and when it can be obtained directly from turbulence, enabling more efficient and symmetry-aware super-resolution.

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**Morphology-Driven Computation in the Slime Mold: TSP Solution Dynamics and Computational Limits**

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All living systems operate as physical entities that process information according to the laws of physics. Traditional estimates of biological computational capacity assume the Hodgkin–Huxley neuron as the basic information-processing unit. In contrast, the unicellular, multinucleated amoeba Physarum polycephalum exhibits sophisticated problem-solving abilities without neurons, modeling aneural computation. Previous experiments demonstrated that Physarum in a stellate chip can solve N-city traveling salesman problems (TSP) using optically controlled feedback mediated by a modified Hopfield network. We investigate the dynamics of these solutions and show that in the non-equilibrium steady state (NESS), the network bifurcates into solution and non-solution branches. Solution lanes exhibit lower-frequency, higher-amplitude, and more synchronized oscillations than non-solution lanes. Fourier and power spectral density analyses reveal frequency downconversion and collective power amplification consistent with signatures of Fröhlich condensation. These information-processing signatures motivate a quantitative assessment of the limits of aneural computation. We present the first framework for bounding the computational capacity of an aneural organism based on its morphology. In a separate set of experiments independent of the TSP study, we link morphological changes to information processing by analyzing growth dynamics in two Physarum strains under varied conditions. Since the Margolus–Levitin theorem limits computation speed based on available energy, we analyze high-throughput time-series data to establish upper bounds on logical operations. In 24 hours, Physarum can perform up to 10^36 operations, with the number of operations scaling linearly in the NESS. This framework enables comparison of the computational capacities of life, exploiting either classical or quantum degrees of freedom.

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**Fano Line Shape and Chiral Phonons in Thin Films of Weyl Semimetal TaAs**

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Tantalum arsenide (TaAs) has emerged as an important Weyl semimetal because of its broken inversion symmetry, the realization of Weyl fermions,

and the presence of topologically protected Fermi arc surface states. In this work, we have performed angle-resolved Raman spectroscopy on thin films of TaAs grown on GaAs and characterized the A1, B1(1), B1(2) phonon modes in the ab- plane. We compare these results to that of bulk TaAs and GaAs crystals. In the thin film, the B1(1) mode exhibits an asymmetric line shape that is well described by the Breit–Wigner–Fano (BWF) function. The Fano resonance arises from strong coupling between the infrared-active phonon and electronic transitions near the Weyl points [points [1]. From the fitted BWF function, the asymmetric parameter q is determined. A nonzero |1/q| confirms the asymmetric nature of the Raman phonon line shape. Temperature-dependent Raman spectroscopy shows that the asymmetry becomes more pronounced with decreasing temperatures. Circularly polarized Raman spectroscopy further reveals non-zero Circular Intensity Differential (CID) [2], confirming the handedness of the mode, and either the phonon is an axial phonon having a well-defined angular momentum or it's a chiral phonon with broken improper rotational symmetry [3]. Temperature-dependent CID measurements are underway and may reveal important information about TaAs regarding its topological phases and variations in its electronic and structural properties.as a function of temperature.

[1] Xu, B. et al., Nat Commun 8, 14933 (2017).
[2] Phys. Rev. B 92, 241116(R) (2015).
[3] Chiral phonons, Nature Physics, 21, 1532 (2025).

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**Global Optimization Approaches for Parameter Estimation in Nonlinear Within-Host HIV Models**

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Mathematical models of within-host viral dynamics are widely used to study disease progression and treatment response, but parameter estimation for nonlinear ordinary differential equation (ODE) models remains challenging because sparse and noisy clinical data combined with nonlinear dynamics produce highly nonconvex cost functions with multiple local minima, making standard local or gradient-based optimization methods unreliable. In this study, we investigate and compare global optimization and stochastic search algorithms for constrained parameter estimation in a standard within-host HIV model. Preliminary results indicate that optimizer choice strongly influences convergence behavior and the structure of the feasible parameter region, even when comparable goodness-of-fit to observed viral load data is achieved. Overall, this work highlights the importance of optimization strategy selection in nonlinear ODE-based biological modeling and provides a general framework for robust parameter estimation in mechanistic systems.

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**Networking With Light: The Theta-Multimode Interference Cavity**

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Photonic integrated circuits are the next frontier when it comes to making better devices. Using light, their efficiency and speed surpass electronics, but photonic devices struggle when it comes to making smaller, cost-efficient devices. The multiplexer is a devices that allows for the computational logic for real world devices, and the Theta-MMI photonic cavity provides a pathway forward that is very implementable. By placing the multiplexing device inside of a ring resonator, the outputs of the multiplexer are able to be matched to each other and addressed with active modulators to paths to make a viable photonic multiplexer.

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**Modeling HIV Infection Dynamics with Multiple Time Delays: Assessing the Impact of CAB-LA on Latency Formation**

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Human immunodeficiency virus (HIV) remains difficult to eradicate due to the formation of latently infected CD4+ T cells that harbor integrated viral DNA without producing new virus. These latent reservoirs evade immune detection and antiretroviral therapy, allowing infection to persist. Long-acting cabotegravir (CAB-LA), a pre-exposure prophylaxis (PrEP) intervention, has demonstrated strong protection against HIV acquisition, but its potential impact on preventing latency establishment is not fully understood. In this study, we develop and analyze a delay differential equation model of within-host HIV dynamics that incorporates biologically realistic time delays representing key stages of the viral life cycle, including cell-to-cell transmission, latency formation, and viral production, while also accounting for the pharmacological effect of CAB-LA on infection processes. The model includes populations of healthy CD4+ T cells, latently infected cells, productively infected cells, and free virus, and admits both infection-free and endemic equilibrium states. Analytical methods are used to derive the basic reproduction number R0 and determine local stability conditions using linearization and the Routh–Hurwitz criterion. Numerical simulations are conducted to examine how variations in delay parameters and CAB-LA efficacy influence viral persistence and latent reservoir formation. This work extends existing HIV delay models by incorporating multiple biologically distinct delays and PrEP effects, providing insight into how early intervention timing may prevent latency and improve HIV prevention strategies.

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**An exploration into Stiffness Perception using a Custom-Built Elbow Exoskeleton**

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This project aims to explore stiffness perception by quantifying the just noticeable difference (JND) perceptual threshold. Studying this perception provides important visualizations of stiffness's role in coordination and motor function. The resulting data may improve impedance communication in collaborative robotics or aid in standardizing rehabilitation methods for the "abnormal" stiffnesses of post stroke patients. To achieve this, this study designed, built, and tested an upper-limb elbow exoskeleton that can simulate a torsional spring of varying stiffnesses. Specifically, a stiffness controller for the exoskeleton was designed by utilizing a DC motor and an optical encoder. The encoder identified a neutral position and measured the distance that a participant moved the exoskeleton away from the neutral. Using this data, the motor then applies a torque towards the neutral that is directly proportional to the exoskeleton displacement. The position-dependent torque simulates elbow stiffness as the arm moves. Additionally, to measure grip force we attached a load cell sensor to the handle of the exoskeleton. In upcoming pilot studies, participants will be asked to apply different levels of grip force while interacting with the rendered stiffness. They will then complete a (JND) task, in which they compare a reference stiffness to five comparison stiffness levels, allowing us to quantify the threshold at which users can detect changes in joint stiffness. In addition to characterizing JND thresholds, this experiment will also examine the relationship between applied grip force and perceived stiffness—specifically, whether modulating grip force affects participants' ability to discriminate between different stiffness levels.

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**A U-Net Prototype for HRRR 1-h APCP Using Rain-Aware Sampling**

Presenter's Name: Oscar Chimborazo
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School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Sen Chiao

Rainfall intermittency in complex terrain creates class imbalance and limits precipitation guidance. We test a U-Net that predicts 1-h APCP from High-Resolution Rapid Refresh (HRRR) fields using HRRR predictors. This HRRR-only experiment can transfer to other products and configurations. We use 2 months of hourly HRRR data on the 3-km grid (01 Jan-29 Feb 2024; f01). Inputs are composite reflectivity (REFC) and precipitable water (PWAT); the target is HRRR APCP (kg m^-2, equivalent to mm). Training is patch based (256x256) with log1p and L1 loss in log space. Time-ordered: 48 training days (01 Jan-17 Feb; 1152 files) and 12 validation days (18-29 Feb; 288 files). Uniform patch sampling drives a near-zero solution because pixels are mostly dry, so a naive model can appear skillful by predicting near-zero everywhere. In validation, only 4.59% of pixels exceed 0.1 mm, and a zero forecast gives MAE_all = 0.0495 mm but poor rainy-pixel performance (MAE_rain = 0.6989 mm for APCP >= 0.1 mm). We therefore use rain-aware sampling: with 70% probability, patches are drawn when maximum APCP exceeds 0.1 mm; the rest are sampled uniformly, while validation stays unbiased. Preliminary Results: With rain-aware sampling, the U-Net beats the zero baseline. At the best epoch, validation MAE_all decreases to 0.0321 mm (35.2% reduction) and MAE_rain to 0.4441 mm (36.5% reduction). These results show that addressing precipitation sparsity is essential in early prototypes and that sampling can yield skill with modest computational resources. Ongoing work will add predictors and test generalization across storm regimes and regions.

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**Investigating the Impact of Biomass Composition on Dietary Fiber Classification through Tribo-Electrostatic Separation**

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School/College: Engineering & Architecture
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Tribo-electrostatic separation (TES) is a dry and solvent-free fractionation technique with growing potential for sustainable biomass processing. This study aims to enhance our understanding of how the original composition of biomass affects tribo-charging behaviour, yield, and the separation efficiency of protein and dietary fibres in cereal-derived biomass. Finely milled wheat bran and oat hull flours were selected as model biomass residues. A TES process using controlled laminar airflow rate, polyvinyl chloride (PVC) tribo-charger tubes, and an electric field strength of 9kV is used as the operating conditions. The obtained fractions were analysed for protein and dietary fibre contents to determine yield, enrichment factors, and separation efficiencies. The wheat bran yields for the negatively charged plate, positively charged plate, and chamber bottom were 43.2, 1.2, and 45.7%, respectively, compared to 18.1, 11.8, and 57.7% when using oat hull, indicating that a greater portion of the oat hull remained uncharged. The wheat bran fractions collected from the negatively charged plate showed protein and cellulose enrichment factors of 1.06 and 1.12, respectively, with separation efficiencies of 45.7% and 50.2%. Oat hull fractions collected from the chamber bottom were seen to have the highest cellulose, hemicellulose, and lignin separation efficiencies of 58.0%, 57.4%, and 53.3%, showing higher recovery of fiber in the uncharged fraction. The results of this study establish key relationships between biomass composition and TES operating parameters, broadening the basis for advanced bioprocessing applications. Acknowledgements: This material is based upon work supported by the NSF under Grant No. 2503093.

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### A Dual-Mode LLM-Based Chatbot for Resilient Disaster Information Access

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We present the development of a resilient, dual-mode conversational chatbot designed to support access to critical information during natural disasters and infrastructure disruptions. Many existing emergency communication systems rely on continuous internet connectivity or one-way broadcast alerts, limiting their effectiveness during outages. Our system addresses this gap by integrating large language model-driven dialogue with structured, disaster-relevant services to deliver concise and actionable guidance.The chatbot employs a GPT-based conversational model for natural language interaction and routes user queries to seven verified services accessed through external application programming interfaces. These services provide information on weather conditions, air quality, emergency alerts, road conditions, shelter availability, geolocation, and local resource data persistence. The system supports both an internet-based interface and an SMS based interface, enabling continued operation when broadband connectivity is unavailable. Location awareness and emergency detection workflows are incorporated to support context-appropriate responses and escalation. Current results demonstrate a functional prototype capable of grounding conversational responses in verified service outputs while maintaining a human-readable interaction style. Ongoing work focuses on expanding service robustness and transitioning from a web-hosted prototype to a deployable mobile application. This work demonstrates the feasibility of LLM-assisted conversational agents as components of resilient disaster information systems.

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### Classification of High-Risk Conditions for Pedestrian Crashes

Presenter's Name: Fiona Clarke
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Pedestrian crashes remain a significant roadway safety concern, often resulting in severe or fatal injuries. Although crash reports document the circumstances of pedestrian incidents, the specific conditions contributing to high-risk injury outcomes remain insufficiently quantified. This study develops a logistic regression model to identify crash characteristics associated with elevated injury severity, supporting more targeted pedestrian safety interventions. Using the Montgomery County non-motorist crash database from 2015 to 2026, pedestrian-related crashes were extracted from the original records. Preliminary data processing reduced the dataset from 7,064 entries to 5,004 pedestrian-only cases. Injury severity is defined as a binary outcome, where high-risk crashes include fatal or serious injuries and low-risk crashes include minor or no injury outcomes. The logistic regression model is being implemented in R using categorical variables including crash date and time, weather, roadway surface condition, lighting condition, traffic control, pedestrian movement, pedestrian location, and pedestrian fault status. The model is expected to generate estimated probabilities of high-risk injury outcomes and produce odds ratios quantifying the relative increase or decrease in severe injury risk associated with specific crash characteristics. The anticipated findings will offer data-driven insights to prioritize safety countermeasures, inform pedestrian-focused roadway design, and guide targeted public awareness strategies aimed at reducing serious and fatal pedestrian injuries.

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### Simulating Fluid Flow Around Obstacles Using Physics-Informed Neural Networks

Presenter's Name: Sean Clemons
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Co-authors: Sonya Smith, Chavonne Bowen

This study presents a Physics-Informed Neural Network (PINN) solution for a 2D incompressible flow past a circular cylinder at a Reynolds number of 40. The PINN model is advantageous because traditional Computational Fluid Dynamics solutions require mesh generation and numerical discretization, whereas PINNs utilize the governing incompressible Navier-Stokes equations as terms in a training loss function, requiring little to no labeled training data. The PINN model was developed in PyTorch, featuring a fully connected architecture with 8 hidden layers, each containing 64 neurons, which transform the spatial dimensions ($\boldsymbol{x}$,$\boldsymbol{y}$) into flow variables ($\boldsymbol{u}$, $\boldsymbol{v}$,$\boldsymbol{p}$). The training loss function incorporated the residuals of the incompressible continuity, momentum, and energy equations over 10,000 collocation points. It also included terms to enforce inlet conditions (prescribed velocity, temperature, and density), outlet pressure, and no-slip conditions on the cylinder surface and walls. Additionally, the equation of state ($\boldsymbol{p}=\boldsymbol{\rho RT}$) was enforced for the physics constraints. Training was conducted over 2000 epochs using the Adam optimizer, achieving convergence at a final loss of $\mathbf{8.9\times10-2}$. The PINN was validated against ANSYS Fluent simulations and theoretical data, confirming the effectiveness of the methods employed. The PINN achieved $\mathbf{17.5\%}$ velocity error and accurate stagnation pressure ($\boldsymbol{Cp}=\mathbf{0.98}$) compared to analytical inviscid theory. The discrepancy reflects fundamental physics differences: the PINN solves viscous Navier-Stokes ($\boldsymbol{Re}=\mathbf{40}$) while analytical theory assumes inviscid flow ($\boldsymbol{Re}\rightarrow\infty$). As a mesh-free solution, the PINN successfully captured all relevant flow physics, including streamline deflection, flow separation, wake formation, and characteristic pressure distributions.

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**XMM-Newton Observations of Flares and a Possible Pulse Dropout in the Supergiant X-ray binary 4U 1909+07**

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I report on a pair of X-ray Multi-Mirror Mission (XMM-Newton) observations of the Supergiant X-ray binary 4U 1909+07, which were performed on 2021 October 3 and 2021 October 8, respectively. I measure the neutron star rotation period in each observation to be ∼602.62 s. This continues a long spin-up trend that has persisted since 2001 where the neutron star spin period was found to be ∼604.66 s. In the timing analysis, I observe strong variations in the amplitude of the 1–10 keV pulse profile as a function of time, and for the first time find a low flux interval extending for a single pulse period in which pulsations are no longer detected. I interpret this low flux interval as a pulse dropout similar to those observed in Vela X-1 and GX 301-2, which were each explained by a low-density cavity in the wind driving the propeller effect. In my time-resolved spectral analysis, we observed the spectral continuum, which can be described as an absorbed power law modified by a high-energy cutoff, to significantly soften during the pulse-dropout phase. No evidence of an increasing absorption column density was found. The observed softening in 4U 1909+07 also supports an interpretation that the observed pulse dropout may be driven by the propeller effect, but the quasi-spherical settling accretion regime cannot be ruled out.

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**Improving Drone-Based Air Quality Measurements Through Motion and Environmental Bias Correction**

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*Presentation Type: Oral Presentation*
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Uncrewed aerial systems provide a promising tool for resolving spatial variability in fine particulate matter (PM2.5); however, measurements collected in flight are strongly influenced by vehicle motion, disturbed airflow, and ambient environmental conditions. These influences introduce systematic bias in onboard optical particle sensors, reducing the reliability of airborne air-quality observations. This study presents an integrated correction approach that combines environmental effects, aerodynamic motion, and vibration-related dynamics into a unified regression-based model for improving drone-mounted PM2.5 measurements. Concurrent PM2.5 data were obtained from drone-mounted and stationary sensors during multiple flight experiments. The discrepancy between airborne and ground-based observations was treated as a learnable residual error. Predictor variables included thermodynamic measurements such as temperature and humidity, along with telemetry-derived indicators of motion and disturbance, including acceleration magnitude, angular rotation, vertical oscillation, and flight velocity. Supervised machine learning models were trained using group cross-validation across individual flights to evaluate generalization and isolate the contribution of each physical factor. Analysis revealed that both environmental conditions and platform-induced motion significantly affect PM2.5 measurement error, with vibration intensity and airspeed consistently exerting the strongest influence. Integrating these variables produced a stable correction relationship that transferred across flight conditions. The resulting model enables transformation of raw airborne particulate measurements into stationary-equivalent concentrations, demonstrating that reliable sUAS-based air-quality sensing requires the combined treatment of thermodynamics, airflow, and mechanical motion. This framework supports improved accuracy for localized pollution characterization using mobile aerial platforms.

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**Black Press + AI**

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Historical newspaper archives are critical for preserving Black press history, yet many digitized newspapers exist as fragmented image strips that are difficult to access and study. This fragmentation hinders researchers' ability to efficiently navigate and analyze these invaluable historical documents. Working with the Black Press Archive at Howard University, this project addresses this challenge by developing an automated pipeline to reconstruct complete newspaper pages from image strips. Using OpenCV computer vision library, the approach vertically concatenates sequential newspaper strips into complete documents. The system then employs brightness analysis to detect dark horizontal gaps between pages, automatically identifying page boundaries and splitting the stitched image into individual pages. This eliminates manual segmentation work that would otherwise be time-intensive and error-prone. The implemented pipeline successfully processes multiple newspaper strips, generates intermediate stitched outputs for quality verification, and produces organized individual page files. This automation significantly improves the accessibility and usability of the Black Press Archive's digitized newspaper collection for historical research and preservation.

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**Comparative Study of Point Cloud and Voxel Methods for 3D Convolutional Neural Networks**

Presenter's Name: Joseph Davis
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Recently, machine learning has shown solid potential through its rapid growth in real-world applications. In particular, computer vision holds promise in applications like autonomous driving and medical image segmentation. 3D semantic object detection can be expected to change the ways we solve problems in countless fields of study, and there are many ways to represent data to feed into deep learning architectures. Our study compares the computation-heavy point cloud representation with the more conventional voxel representation to make an informed conclusion about which is better for certain applications. To test, we compared the classification results of two models, PointNet and VoxNet, where PointNet uses solely a point cloud input and VoxNet converts the point cloud to voxels on a grid. We trained and tested the two on the ModelNet10 dataset including 10 classes(objects): [‘bathtub’, ‘bed’, ‘chair’, ‘desk’, ‘dresser’, ‘monitor’, ‘nightstand’, ‘sofa’, ‘table’, ‘toilet’], while also considering their differing architectures. To contrast the models, we propose five metrics: Precision, Recall, F1 score, Accuracy, and ROC-AUC. We found that, overall, the PointNet performed better than the VoxNet on this dataset. The VoxNet attained an overall accuracy of 77% while the PointNet achieved one of 89%. Furthermore, the PointNet beat the VoxNet in its ROC-AUC with a score of 98.97%. The VoxNet came close, however, with a score of 97.07%. It is possible that though the VoxNet performs classification less accurately, its speed makes it desirable for quick tasks. The PointNet is more suitable for tasks where speed is less important than accuracy.

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**AR Alert System for Real World Task Completion: A Usability Study**

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In high-stakes environments, rapid decision-making is critical, yet traditional information displays can overwhelm users, increasing cognitive load and stress. Augmented reality (AR) holds the potential to deliver information effectively while supporting situational awareness. Previous research suggests that alert effectiveness is maximized when varying intrusion methods are used to convey urgency. Building on this principle, a five-tier alerting system was designed for an AR decision support system. The five tiers organize alerts by importance and required response time. Tier 1 and 2 alerts demand immediate action, appearing in the top center of the display within the user’s direct field of vision, using high-intensity cues such as blinking, red coloring, and louder audio. Tier 3, 4, and 5 alerts do not require an immediate response; they appear smaller along the periphery and use lower-intensity cues like gray or yellow coloring and minimal or no sound. To evaluate this alert system, a real-world cooking simulation was developed in which participants completed physical tasks while receiving instructions and alerts through an AR headset. Data were collected via screen recordings, think-aloud protocols, pre- and post-study surveys, and the System Usability Scale (SUS). Findings will inform the final design of the alert system for deployment in emergency task support contexts, revealing whether the design is appropriate for users performing demanding tasks under stress and whether the intrusion hierarchy intuitively communicates alert urgency.

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**Thermal Analysis for Balloon-Borne Payload – Cryostat Gondola**

Presenter’s Name: Kayin Davis
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*Presentation Type: Oral Presentation*
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Gamma-ray telescopes are instruments designed to shine light on the unknown mysteries of this world. Due to these instruments often containing semiconducting or superconducting components, they require cryogenic operating conditions to maintain their sensitivity and reduce thermal noise during a high-altitude flight. This project presents a thermal analysis for a balloon-borne gondola housing a cryostat that can provide the necessary cooling for the telescope. Despite the fact that the payload operates in a near-space environment that is both extremely cold and essentially in vacuum, careful thermal modeling is required due to radiation which can still cause heating and affect performance. In Thermal Desktop, a simplified geometry of the gondola was modeled, including structural components, radiative surfaces, and conductive interfaces. Environmental conditions representative of a stratospheric flight were developed, primarily considering solar radiation, albedo, and earth infrared radiation. These variables were applied to simulate hot and cold cases and were compared with the maximum and minimum allowable temperatures for each component to determine whether the amount of heating is acceptable. Multiple steady state simulations were done, simulating with the sun aimed at different points on the payload. Although simulations are still in progress, expected results are that additional thermal control apparatuses are required on the payload. These results will reveal whether the gondola will maintain acceptable temperatures throughout the duration of the flight, and will determine whether adjustments need to be made before the planned flight time of May.

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**Mechanical Alloying Nanoparticles using High-Energy Ball Milling**

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Mechanical alloying is a solid-state powder processing technique used to produce advanced materials with unique microstructures and improved properties. One common method of mechanical alloying is ball milling, which grinds, refines, and mixes materials through repeated impact and friction between hard grinding media (typically steel or ceramic balls) and the powder inside a rotating or vibrating mill. These forces progressively reduce particle size, often down to the micro- or nanometer scale, and can enable alloy formation without melting the materials. In this study, we

investigated the effect of mill rotational speed (RPM) on the mechanical alloying of tungsten disulfide (WS□, 1500 nm) and aluminum oxide (Al□O□, 30 nm) nanoparticles. We hypothesized that higher rotational speeds would increase impact energy, leading to improved bonding between particles. To test this, we held the particle mass ratio constant while systematically increasing the RPM during experimentation. After milling, the samples were analyzed using Scanning Electron Microscopy (SEM) to observe changes in particle topography and Energy Dispersive X-ray Spectroscopy (EDS) to examine elemental composition. SEM images were further analyzed in ImageJ to quantify particle diameters. The decrease in WS□ particle size and changes in its surface structure suggested that the smaller Al□O□ particles became integrated into the WS□ particles during milling, indicating successful alloy formation.

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**Outlier Detection Statistical Methods for Predicting Aberrant Ship Behavior**

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The Francis Scott Key Bridge Collapse was an extremely tragic event. A ship colliding with the bridge resulted in structural damage, injuries, and most importantly deaths. Aberrancy in ship behavior is difficult to predict; however, investigating the variance in ship parameters can lead to prevention of ship collisions. This project serves as the preliminary step of outlier detection for these parameters. With Automated Identification System sample data for ship encounters with the Fred Hartman Bridge (the busiest bridge in the dataset), statistical analyses were performed for a ship's latitude and longitude (positioning), speed over ground, change in course over ground (the direction a ship is moving), and change in heading (the direction a ship is facing). First, univariate detection was performed, using the Interquartile Range Method to create a range of inliers, therefore pinpointing outliers. The percentage of outliers detected varied by parameter, stream direction, and vessel type, demonstrating the need to expand beyond univariate analysis. The Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) algorithm served as a multivariate method for observing the influence of all the parameters at once. This algorithm creates clusters and outer points are labeled as outliers. HDBSCAN showed that the distance between coordinates contributed highly to aberrant behavior. This implies increasing distance can lead to unpredictability in speed and positioning, as expected. The future work involves applying HDBSCAN to additional bridges to ensure the outlier detection is fully scalable, and incorporating past incident data to identify the correlation between aberrancy and ship collisions.

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**Affordable High Performance Optical Fiber Hydrophone**

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The sensor design mirrors the function of a Fabry-Perot interferometer. Except the optical signal is fully reflected upon reaching a flexible diaphragm. So, the signal is transmitted and received by the same optical fiber. The cavity length is encoded in the signal and mapped to the sensor's pressure and temperature response. A diaphragm made of a graphene film and platinum reflective coating are responsible for the high dynamic range and signal strength. In combination with the resolution from interferometer, we have measured a static pressure sensitivity of 0.0130 Pa/m and mechanical sensitivity of 111.8 nm/Pa of the diaphragm. We are currently working on getting dynamic pressure and temperature sensitivity data. The sensor is operated using a broad-spectrum IR super luminescent diode (SLD) with low coherence. So, in comparison to a traditional laser (high coherent) source, the SLD is much cheaper but cannot be used for interferometry over long distances. All of the components of the optical measuring system are commercially available and relatively cheap. I will present on the working principle of the sensor, the manufacturing process, and the results.

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**Utilizing Internal Water Resources to Rebuild Water Infrastructure in Syria**

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After more than a decade of conflict, approximately 70% of Syria's water infrastructure has been damaged or destroyed, leaving millions without reliable access to safe drinking water. Contaminated supplies, dysfunctional treatment facilities, and groundwater over-extraction have intensified public health risks and economic instability, particularly in rural and agricultural regions such as Aleppo. This research proposes a two-tiered, sustainable strategy to rebuild Syria's water infrastructure by utilizing internal water resources and rehabilitating existing facilities, with a focus on the Al-Khafsa Water Treatment Plant. Drawing lessons from Jordan's Disi-Amman Water Conveyance Project, this study evaluates the limitations of large-scale, fossil-water dependency and emphasizes the need for locally sustainable alternatives. The short-term solution introduces low-cost bio-sand filters at the household level to provide immediate access to safe drinking water. Costing under $100 per unit and capable of removing up to 98% of bacteria, these filters offer rapid, community-centered relief while reducing waterborne illness.
The long-term solution centers on rehabilitating damaged sedimentation tanks at Al-Khafsa and modernizing operations through solar-powered micro-pumps and real-time water quality sensors. This approach strengthens operational reliability, reduces dependence on unstable

energy grids, and enhances environmental sustainability. By combining decentralized household filtration with centralized infrastructure rehabilitation, this project advances environmental justice, public health, and post-conflict recovery. Ultimately, it presents a scalable, cost-effective model for restoring water security and promoting long-term resilience in Syria.

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**Effect of Extractive Content on the Mechanical Performance of Corn Stover–PBAT Composites**

Presenter's Name: Oluchi Emenike
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Poly(butylene adipate-co-terephthalate) (PBAT) is a widely used biodegradable polymer with broad commercial applications. However, it is petroleum-based, motivating efforts to reduce reliance on such materials through the incorporation of renewable biomass fillers. Corn stover was selected as a representative agricultural residue due to its abundance, low cost, and sustainability. Because corn stover contains natural extractives that may influence mechanical performance, this study investigated how extractive content affects the tensile properties of corn stover-based PBAT composites. Specifically, PBAT blends containing raw corn stover, partially extractives removed corn stover, and fully extractives removed corn stover were compared. Extractive removal was carried out to varying extents through Soxhlet extraction and chemical treatments. The effectiveness of extraction was confirmed by mass balance analysis, which showed significant reductions in extractive content after treatment. Tensile testing was used to evaluate the mechanical performance of the resulting composites. Results demonstrated that the extraction procedures were successful in removing biomass extractives and that different extractive levels led to measurable changes in mechanical performance (tensile strength, modulus) of the composites. These findings contribute to the development of stronger, more commercially viable corn stover-based PBAT composites for biodegradable material applications.

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**Speech-Based Detection and Severity Assessment of Alzheimer's Disease**

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Early detection in Alzheimer's remains challenging, as current diagnostic methods rely on clinical expertise, and cognitive testing, which can be costly and inaccessible. Because cognitive decline is reflected in speech through changes in vocabulary, readability, pauses, articulation, and prosody, spoken language offers a scalable, low-cost, and non-invasive signal for screening and monitoring. Prior work demonstrated good performance in predicting Mini-Mental State Examination (MMSE) scores using large acoustic-linguistic feature sets, with optimized LightGBM and ensemble models significantly reducing RMSE and achieving strong Alzheimer's detection accuracy. In this work, we extend beyond text-focused modeling toward a multilingual, audio-driven model for dementia detection and severity assessment. We train Audio Spectrogram Transformer (AST) models across ADReSS-style datasets to establish robust audio-only baselines, apply multilingual automatic speech recognition to obtain transcripts, and develop multimodal fusion models that integrate acoustic embeddings with linguistic features. This work lays the foundation for scalable and multilingual speech-based tools that can support early dementia detection. By using both audio and linguistic signals, it moves towards a more accessible approach to identifying cognitive decline.

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**Knowledge-Grounded Adverse Drug Event Detection from Clinical Narratives**

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Adverse Drug Events (ADEs) remain a leading cause of preventable morbidity and healthcare expenditure, yet their identification from electronic health records (EHRs) remains challenging due to the unstructured and context-dependent nature of clinical narratives. While annotated corpora such as the n2c2 dataset support benchmark evaluation, their limited scale and annotation cost constrain generalizability. We present a knowledge-grounded ADE detection framework that integrates clinical note extraction with structured pharmacovigilance knowledge from SIDER. Our approach first applies large language model (LLM)-based entity and relation extraction to identify drug–event mentions within clinical text. We then incorporate a context-engineering layer that cross-references extracted drug entities against curated side-effect profiles in SIDER, enabling structured validation of candidate ADE associations. This integration reduces spurious drug–event pairings while preserving sensitivity to plausible associations, thereby improving precision without sacrificing recall. By combining biomedical knowledge bases with LLM-driven extraction, this work demonstrates a scalable and biologically informed strategy for pharmacovigilance from real-world clinical data. The proposed framework contributes to translational health informatics by bridging curated molecular–drug knowledge and patient-level clinical evidence.

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**Unveiling the Chemistry of Monoprotic, Amino and Benzoic Acids Derivatives Modulators on Zr-Based MOFs for Heavy Metal Ions Absorption in Aqueous Solutions**

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The removal of heavy metal ions is crucial for ensuring safe water consumption, and developing an effective protocol for their removal from wastewater has been a topic of significant interest in wastewater treatment. Among the various reported methods, including activated carbon, activated alumina, carbon composites, and zeolites, metal-organic frameworks (MOFs), such as Zr-based MOFs, have garnered substantial research interest due to their exceptional performance and high affinity for heavy metal absorption. This study utilizes modulated Zr-based MOFs (UiO-66 and UiO-67) with monoprotic and amino acid-based modulators that enhance the MOFs' crystallinity toward heavy metal ion absorption, including Cd(II), Pb(II), Cr(VI), Hg(II), and As(V). Conversely, aromatic system modulators bearing amino ($-NH_2$), hydroxyl (-OH), and thiol (-SH) groups in MOF frameworks are a well-established strategy that enhances metal ion affinity and absorption sites through strong coordination with Lewis acid metal ions, as these groups act as Lewis bases. The crystallinity of the synthesized MOFs based on different modulators was characterized PXRD, and the diffraction patterns exhibit key peaks at 2θ values of 7.3°, 8.3°, and 25.8°, corresponding to the crystallographic planes of (111), (002), and (006), indicative of increased MOF crystallinity. These diffraction angles were absent in the pristine MOFs (UiO-66). FTIR analysis confirmed distinct absorption peaks peculiar to the MOFs, while TEM analysis was employed for morphological study. Keyword: MOFs, Modulators, Heavy Metal, Wastewater

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**NICER Observations of the Accretion Disk Corona Candidate 4U 1210-64**

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We present seven Neutron Star Interior Composition Explorer (NICER) observations of the Intermediate-mass X-ray binary 4U 1210-64, which sampled different phases of its 6.71 day binary orbital period. In most of our observations, which were performed outside of the X-ray eclipse, the spectral shape can be described as a power law with a spectral index of 1.3 modified by both a fully and partially covered neutral hydrogen column density component. While we consistently find an emission line at 6.4 keV, which was previously interpreted as Fe Kalpha, we do not observe the highly ionized 6.67 keV and 6.97 keV features found in archival Suzaku data. For the first time, we observed an emission feature at 7.47 keV, which we interpret as Ni Kalpha. Additionally, we found for the first time a noticeable disk blackbody component at orbital phase 0.33, which is consistent in orbital phase with the optical eclipse observed with Las Cumbres Observatory (Monageng et al. 2024). We interpret the disk blackbody component as evidence of residual emission from the accretion disk that is observed along the line of sight.

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**A Comparative Study of Nano- vs. Micron-Sized Fillers: Laponite and $CaCO_3$ in Acrylate Terpolymer Systems**

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This study systematically examines how filler size and morphology influence the thermomechanical and physical properties of an acrylate terpolymer matrix. Nanocomposites reinforced with unmodified synthetic nano-silicate (Laponite RDS) were directly compared with micro-composites containing untreated calcium carbonate ($CaCO_3$), all prepared under identical processing conditions to isolate dimensional effects. Performance was evaluated using Dynamic Mechanical Analysis (DMA), Thermogravimetric Analysis (TGA), and water absorption measurements. DMA results demonstrate that the high aspect ratio and nanoscale dispersion of Laponite platelets provide substantially greater reinforcement than conventional $CaCO_3$ particles. At 3 wt% loading in a high–acrylic acid latex system, the Laponite nanocomposite exhibited an 11-fold increase in storage modulus and a 10-fold increase in loss modulus relative to the $CaCO_3$ microcomposite. TGA analysis further showed enhanced thermal stability, with the Laponite-filled system displaying a 27 °C higher onset degradation temperature. Water absorption behavior revealed that strong electrostatic interactions between carboxylate groups and positively charged Laponite edges significantly restricted water diffusion, limiting uptake to the first 24 hours. In contrast, $CaCO_3$-filled composites exhibited continuous absorption due to weaker interfacial bonding. The findings demonstrate that transitioning from micro- to nano-scale fillers fundamentally alters structure-property relationships, providing key principles for designing high-performance polymer nanocomposites.

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**Rheology-Driven 3D Printability of Additive-Free Protein-Starch Pastes**

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3D food printing offers a promising approach for producing customized foods with enhanced nutritional value. However, many native food

materials lack suitable flowability and structural properties, which often necessitate the use of additives to improve printability. This study examines the printability of additive-free legume-based pastes by systematically varying protein and starch composition. Yellow pea–based pastes were prepared with protein-to-starch weight ratios ranging from starch-rich to protein-rich formulations. For each ratio, three solid concentrations were tested, yielding three types of printing behavior: weak gels with poor shape stability after deposition, strong gels that clogged the 3D printer nozzle, and optimally printable pastes. Printability results were then linked to the rheological properties of the pastes. Rheological characterization included steady shear and oscillatory tests in the linear viscoelastic region. All formulations showed shear-thinning behavior and were well described by the power-law model. Storage and loss moduli (Pa) of weak gels collapsed under the applied frequency (0.1-30 Hz), while strong gels showed negligible frequency dependence, with an almost constant loss factor (tanδ). According to principal component analysis, increasing protein content and protein-to-starch ratio improved yield stress (Pa) and shear recovery of viscosity (%), which ultimately enhanced the ability of pastes to form stable multilayer 3D printed structures. Overall, this study establishes clear relationships between composition, rheology, and printability for additive-free protein-starch pastes and provides practical guidelines for 3D food printing applications. Acknowledgment: The project was funded through USDA-NIFA-AFRI Grant #2020-67021-31141.

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**Magnetic and Magnetocaloric Properties of CuAg(SO4)2**

Presenter's Name: Pousali Ghosh
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*Presentation Type: Oral Presentation*
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Antiferromagnetic materials are a class of magnetic systems in which neighboring atomic moments align in opposite directions, resulting in zero net magnetization. Despite this cancellation, they exhibit rich thermodynamic behavior, particularly when competing magnetic interactions are present. These interactions can produce unusual entropy changes under applied magnetic field, making antiferromagnets promising for both fundamental studies and applications such as magnetic cooling technologies. In this work, we investigate the magnetic and magnetocaloric properties of the heterocationic sulfate compound CuAg(SO4)2. Temperature dependent magnetization measurements reveal a clear magnetic ordering transition near 40 K, indicating the onset of antiferromagnetic order. Analysis of the magnetic susceptibility above the transition yields a large negative Curie–Weiss temperature ($\theta_{CW} \sim -141$ K), confirming strong antiferromagnetic interactions and persistent magnetic correlations well above the ordering temperature. Field-dependent measurements show hysteresis below the transition, which disappears at higher temperatures as the material enters a paramagnetic state. The magnetic entropy change, determined from isothermal magnetization measurements, peaks near the ordering temperature and evolves systematically with applied field. Notably, the entropy change reverses sign across the transition, reflecting competition between antiferromagnetic order at low temperatures and field-aligned paramagnetic moments at higher temperatures. These results establish CuAg(SO4)2 as a system for exploring unique and interesting magnetocaloric effects in antiferromagnets.

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**A.N.T.S. (Autonomous, Navigation, Technician, Swarm)**

Presenter's Name: Luther Gourdine
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This project focuses on aircraft exterior inspection within aviation maintenance operations, particularly between-flight walk-through inspections used to identify cracks, dents, corrosion, and paint erosion on aircraft surfaces. These inspections currently require significant manpower, can vary by inspector, and may expose technicians to safety risks when accessing elevated or hard-to-reach areas of the airframe. A.N.T.S. (Autonomous, Navigation, Technician, Swarm) proposes an autonomous drone-based aircraft inspection system that performs stable, close-range inspection flights around a stationary aircraft while capturing high-resolution imagery and optional depth information. The system integrates a maintainable quadcopter inspection platform with an embedded computer-vision pipeline (YOLOv8n) running on resource-constrained edge hardware to detect defect candidates and generate maintenance-ready inspection reports. The proposed solution is designed to integrate into maintenance operations as an operator-supervised decision-support tool, preserving technician authority while improving inspection repeatability and documentation quality. Software-controlled inference throttling ensures perception workloads remain compatible with flight safety, power, and thermal constraints in real-world environments. Anticipated challenges include reliable close-proximity navigation near reflective aircraft surfaces, validating defect detection performance across varied lighting and material conditions, and integrating drone-based inspection into existing maintenance workflows. Opportunities include reducing inspection cycle time, improving inspection consistency and traceability, and enabling scalable inspection processes as aircraft fleets and maintenance demands continue to grow.

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**Evaluating Dialect Bias in Commercial Automatic Speech Recognition Systems: A Comparative Analysis of AAVE, Clean, and Noisy Speech**

Presenter's Name: Kennedy Gregg
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*A Statistical Fairness Evaluation Using Error and Semantic Similarity Metrics* — This study evaluates eight commercial automatic speech

recognition (ASR) systems Google Cloud Speech, Microsoft Azure AI Speech, IBM Watson Speech, Deepgram, Amazon Transcribe, OpenAI Speech, AssemblyAI, and Speechmatics across three speech conditions: clean Common Voice (CV), African American Vernacular English (AAVE), and noisy CV. Outputs were compared to human transcripts using word error rate (WER), character error rate (CER), Levenshtein distance, and semantic similarity metrics (BERT cosine similarity, Euclidean distance, Jaccard similarity). Two-sample t-tests (Student's or Welch's, selected via Levene's test) with Benjamini Hochberg correction assessed performance differences. All vendors showed statistically significant disparities across all metrics (adjusted $p \approx 0$ to $< 10^{-58}$). AAVE speech produced higher error rates and lower semantic similarity than noisy CV, indicating reduced transcription accuracy linked to dialectal variation rather than noise. These findings highlight the need for dialect-aware benchmarking to ensure equitable ASR performance. CCS Concepts: • Computing methodologies • Speech recognition; Natural language processing; Social and professional topics • Bias and fairness. Additional Keywords and Phrases: Automatic Speech Recognition, African American Vernacular English, AAVE, Dialect Bias, Fairness Evaluation, Word Error Rate, Semantic Similarity, Speech Recognition Benchmarking. References: [1] Manu Edavakandam, "From Audio to Words: A Python Guide to Measuring Transcription Accuracy,"Medium,2023. https://medium.com/@manuedavakandam/from-audio-to-words-a-python-guide-to-measuring-transcription-accurracy-f9dd9e70651f

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**Seedbot: Retrieval-Augmented Q&A System for Farmers**
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Food sovereignty is the right of people to have control over their food systems. It honors local traditions and protects small farmers. Seed governance laws, particularly those shaped by UPOV, often prioritize agribusiness and make it difficult for small farmers to understand and comply, leaving them vulnerable to penalties and systemic disempowerment. To address this, we created SeedBot, an open-source Q&A chatbot with A Growing Culture. SeedBot uses natural language processing and retrieval-augmented generation to simplify plant breeder rights laws. Our dataset contains 153 English legal documents from 78 countries over 40 years. We process these using hierarchical chunking and vector embeddings for efficient search. User queries are matched with relevant text, and a language model provides simplified, context-specific answers. We evaluated several embedding models and LLMs, using ROUGE as our benchmark. While Gemma scored highest, we chose Phi-4-mini for its speed, reliability, and lightweight architecture. SeedBot currently supports 48 countries, with plans to expand to all 78 and add multilingual support. Future goals include refining chunking, addressing token limits, conducting farmer-centered studies, and developing a free, open-source interface. By bridging the gap between complex legal frameworks and farmer understanding, SeedBot advances food sovereignty through equitable access to agricultural law.

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**Denoising and Object Tracking in Adverse Conditions**
Presenter's Name: Saniya Harrigan
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The goal of the VISTAC challenge is to improve visual object tracking under adverse weather conditions. While advanced tracking technologies perform well in controlled and well-lit environments, their performance decreases significantly in challenging conditions such as haze and rain. This limitation is critical because real-world applications, like traffic monitoring systems and autonomous vehicles, must operate reliably in unpredictable environmental settings. The challenge aims to develop robust tracking algorithms capable of maintaining accuracy and consistency in harsh environments. This research investigates the effectiveness of different image denoising and filtering techniques for improving object tracking performances in degraded visual conditions. Using annotated video data containing hazy and rainy scenes, multiple preprocessing methods are applied to enhance frame clarity before tracking. The impact of each denoising technique is evaluated based on visual quality, feature preservation, and tracking performance metrics such as Qualitative Precision (QP) and effective frames per second.

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**A Tunable Copolymer Hydrogel Platform for Material-Directed Beta-Like Cell Differentiation**
Presenter's Name: Brianna Harris
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*Presentation Type: Poster Presentation*
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Engineering biomaterials that can direct stem cell fate offer a promising approach for generating functional cell types in a controlled and reproducible manner. Differentiation of induced pluripotent stem cells (iPSCs) into beta-like cells typically requires complex biochemical protocols, and outcomes often vary due to inconsistent microenvironmental cues along with high cost of handling. Emerging synthetic hydrogels provide a tunable platform to better mimic extracellular matrix properties while delivering defined mechanical and chemical signals. Utilizing linear tunable copolymers enables precise control over polymer architecture, degradation behavior, and localized presentation of small bioactive molecules. In this project, we engineered a hydrogel system formed from a linear copolymer backbone functionalized with small molecules such as curcumin to establish a supportive microenvironment for iPSC differentiation. By leveraging material-driven guidance rather than reliance on extensive soluble factor cocktails, this platform aims to streamline differentiation, reduce cost, and deliver a biomaterials-based strategy for producing beta-like cells suitable for research and translational applications.

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**Has the 'New Normal' Arrived? A Multilevel Investigation into the Temporal Stability of the Determinants of Bike-Share Demand**

Presenter's Name: Sanjana Hossain
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Bicycle-sharing systems (BSS) have transitioned from niche mobility tools to resilient components of urban transportation, particularly as they offered a safe, socially-distanced travel alternative during the COVID-19 pandemic. Yet it remains unclear whether the pandemic merely caused a temporary surge in ridership or fundamentally altered the determinants of bike-share demand. This study investigates whether the influence of socio-economic attributes, land use patterns, built environment attributes, and weather conditions on station-level demand has shifted between 2019 (pre-pandemic) and 2025 (post-pandemic). Using ridership data from "Capital Bikeshare" in Washington, D.C., we estimate multilevel random-intercept models with monthly trips nested within stations. This framework isolates temporal changes in the determinants of demand, while accounting for unobserved station-level heterogeneity. Preliminary results indicate a significant overall increase in system ridership compared to 2019 levels. While the direction of influence (signs) for most determinants (e.g., proximity to transit hubs and high-density residential areas) remains stable, the magnitude of several effects has shifted. Recreational land uses and weekend activity patterns have gained relative importance, whereas traditional weekday morning peak effects near employment centers have weakened. These findings suggest not a complete structural break, but a recalibration of the determinants of demand consistent with sustained telework and evolving travel behavior. The study provides empirical evidence on the temporal stability of micromobility demand determinants, offering actionable insights for station placement, capacity planning, and post-pandemic system expansion strategies.

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**Improving Multilingual Medieval Handwriting Recognition through Multimodal Language Modeling**

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The automatic recognition of multilingual medieval manuscripts remains a challenging task due to the wide variety of languages and writing styles, making it difficult to achieve consistent analysis. Historical documents exhibit grammatical irregularities such as inconsistent spelling and nonstandard grammar, degraded manuscript conditions that have compromised legibility over time, multiple languages written in diverse alphabets, and paleographic complexities, thus rendering conventional OCR(Optical Character Recognition) systems ineffective. Using the CMMHWR26 dataset as a source of multilingual medieval manuscript data, we acquire and preprocess manuscript images and their corresponding transcriptions to ensure proper normalization and formatting. Our method focuses on training open-weight multimodal language models that integrate visual and textual data to improve handwritten text recognition performance. By leveraging both image-based features and language modeling capabilities, the system aims to achieve robustness and generalization across diverse medieval scripts and languages, including related and linguistically different language families. This work contributes to the development of multilingual historical handwritten text recognition by exploring the use of open-weight multimodal language models in medieval manuscript settings, supporting the creation of more robust systems capable of handling real-world retrodigitization challenges and improving large-scale digitization efforts in the digital humanities.

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**Collective Quantum Effects and Heat Engine Performance in Microtubules**

Presenter's Name: Mohsen Izadyari
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School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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Building on analytical results for helical distributions of quantum emitters [1], numerical simulations of protein-fiber networks [1-3], and experimental observations of superradiant quantum-yield enhancement in microtubules [2], recent work suggests that tryptophan lattices in diverse protein fibers can exhibit robust, length-dependent signatures of quantum-coherent interactions in the single-photon regime. In this study, we investigate microtubules as a quantum heat-engine platform, quantifying the power output and efficiency while analyzing how collective quantum effects—particularly superradiance—contribute to their performance. This framework provides new insight into how biological structures may exploit quantum correlations, offering a deeper understanding of their functional behavior through the lens of quantum thermodynamics. [1] H. Patwa & PK. Single-photon superradiance and subradiance in helical collectives of quantum emitters. arXiv:2510.22468 [quant-ph] (2025). [2] N.S. Babcock, G.M.-Cabrera, K.E. Oberhofer, M. Chergui, G.L. Celardo, & PK. Ultraviolet superradiance from mega-networks of tryptophan in biological architectures. Journal of Physical Chemistry B 128, 4035–4046 (2024). [3] H. Patwa, N.S. Babcock, & PK. Quantum-enhanced photoprotection in neuroprotein architectures emerges from collective light-matter interactions. Frontiers in Physics 12, 1387271 (2024).

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**Survivability Windows Taxonomy in Embedded Systems: A Multi-Dimensional Perspective**
Presenter's Name: James Jenkins
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*Presentation Type: Oral Presentation*
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Mission-critical embedded systems are increasingly required to operate reliably in complex, dynamic, and potentially hostile environments. Aerospace, defense, automotive, and industrial applications demand that these systems not only perform their intended functions correctly but also maintain core capabilities in the face of disruptions. Survivability—defined as the ability to continue essential operations and recover from adverse conditions—has emerged as a key design objective. Traditional approaches to resilience, such as fault-tolerance, security hardening, and redundancy, while necessary, are no longer sufficient given the growing complexity, connectivity, and autonomy of modern embedded systems. This paper introduces a novel \textit{survivability windows framework} — a taxonomy that categorizes system vulnerabilities by the origin of disruption rather than fault type or affected subsystem. The taxonomy encompasses diverse disruption classes, including security breaches, environmental disturbances, mission evolution, human error, resource depletion, design ambiguity, and integration failures. This structure enables a multi-dimensional and cross-domain perspective on embedded system resilience, and provides a foundation for developing intelligent, robust, and certifiable survivable embedded systems.

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**Graph Theory applications on novel optical networks**
Presenter's Name: Kevaughn Johnson
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*Presentation Type: Oral Presentation*
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Our group has developed a new class of optical resonators that exhibit novel physical effects, including topologically nontrivial bound states in the continuum (BICs), and that can be networked into increasingly complex systems. BICs are characterized by exceptionally high quality (Q) factors, enabling lowloss waveguiding and enhanced light–matter interactions. When arranged into networks, these resonators support additional emergent phenomena, some of which have no direct analog in existing physical systems and effectively extend the dimensionality of the platform. Analyzing large optical networks composed of such resonators using conventional numerical techniques can be computationally intensive. To address this challenge, we developed an analytical modeling framework to enable more efficient analysis. By leveraging graph theory, we generalized this model to accurately describe complex resonator networks, reducing large systems of coupled equations to smaller matrices defined by the vertices and edges of a given configuration. This approach significantly simplifies system analysis and substantially reduces computational cost compared to finiteelement methods, saving both time and computational resources.This framework enables systematic exploration of novel photonic physics in arbitrarily complex resonator networks and facilitates characterization using established tools from graph theory. As illustrative examples, we present the analysis of simple Qport and thetaport resonator configurations.

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**Thermal Analysis for Balloon-Borne Payload – Cryostat Gondola**
Presenter's Name: Jayson Johnson
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*Presentation Type: Poster Presentation*
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Gamma-ray telescopes are instruments designed to shine light on the unknown mysteries of this world. Due to these instruments often containing semiconducting or superconducting components, they require cryogenic operating conditions to maintain their sensitivity and reduce thermal noise during a high-altitude flight. This project presents a thermal analysis for a balloon-borne gondola housing a cryostat that can provide the necessary cooling for the telescope. Despite the fact that the payload operates in a near-space environment that is both extremely cold and essentially in vacuum, careful thermal modeling is required due to radiation which can still cause heating and affect performance. In Thermal Desktop, a simplified geometry of the gondola was modeled, including structural components, radiative surfaces, and conductive interfaces. Environmental conditions representative of a stratospheric flight were developed, primarily considering solar radiation, albedo, and earth infrared radiation. These variables were applied to simulate hot and cold cases and were compared with the maximum and minimum allowable temperatures for each component to determine whether the amount of heating is acceptable. Multiple steady state simulations were done, simulating with the sun aimed at different points on the payload. lthough simulations are still in progress, expected results are that additional thermal control apparatuses are required on the payload. These results will reveal whether the gondola will maintain acceptable temperatures throughout the duration of the flight, and will determine whether adjustments need to be made before the planned flight time of May.

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**FPGA Acceleration on PYNQ-Zynq for Efficient Edge AI Workloads**
Presenter's Name: Donovan Jones
Classification: Undergraduate Student
School/College: Other
*Presentation Type: Poster Presentation*
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This project investigates the use of FPGA-based acceleration for artificial intelligence workloads using a PYNQ-enabled Zynq system-on-chip platform. The work focuses on designing and deploying a custom hardware accelerator for low-precision matrix multiplication, a core computational kernel underlying many modern AI algorithms including convolutional neural networks and transformer models. Using a hardware–software co-design approach, the accelerator is implemented in programmable logic and integrated with the processing system via AXI interfaces and direct

memory access (DMA). High-level synthesis is employed to explore architectural optimizations such as loop unrolling, pipelining, and on-chip buffering, enabling efficient data reuse and increased throughput. Performance is evaluated by comparing FPGA-accelerated execution against CPU-based baselines, with particular emphasis on the impact of data movement, memory bandwidth, and quantization on overall system efficiency. The project demonstrates how FPGA architectures can be leveraged to tailor computation and dataflow to AI workloads, providing insight into the tradeoffs between performance, resource utilization, and precision in edge-oriented AI acceleration.

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**Utilizing Molecular Dynamics for Energy Storage Enhancement of Phase Change Materials to Increase Thermal Efficiency of Batteries**

Presenter's Name: Ayanna Jones
Classification: Graduate Student
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*Presentation Type: Oral Presentation*
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Effective heat dissipation and thermal management are crucial for enhancing energy efficiency and preventing thermal failure in high-power applications, such as lithium-ion batteries. Phase change materials (PCMs) offer an effective passive cooling solution through latent heat storage and isothermal transitions. However, their performance is often limited by low intrinsic thermal conductivity. This research investigates thermally enhanced PCM composites that utilize high-conductivity additives to accelerate heat transfer without compromising phase change performance. The study compares the thermal responses of organic (paraffin wax) and inorganic (sodium thiosulfate pentahydrate) PCMs with similar melting points. To improve conductivity, aluminum oxide, magnesium oxide, and Carbon 65 were incorporated at various weight percentages, chosen for their cost-effectiveness and availability. The composites were characterized using differential scanning calorimetry (DSC) and the transient plane source (TPS) method to evaluate melting behavior, enthalpy of fusion, thermal stability, and conductivity. The results indicate that inorganic-based PCM composites consistently outperform their organic counterparts in thermal conductivity across all tested additives and concentrations. These findings lay a foundation for designing next-generation PCM systems aimed at enhancing the thermal safety, efficiency, and operational durability of advanced energy storage technologies.

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**Addressing Fairness and Trustworthiness in The Workplace Using Scalable Blockchain Survey Solutions**

Presenter's Name: Hamid Kabia
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Fairness and trustworthiness are principles that were implemented into the workplace to allow for the growth of a more competitive career marketplace in which all individuals have equal opportunity at a role regardless of external matters such as race, religion, gender, or sexuality [1]. However, despite the positive impacts these initiatives have had in the work place, in recent years there's been a push back against them. With multiple organizations even going as far as rolling back their programs supporting fairness in the workplace. To combat this we have developed a tool that allows for anonymous insider reporting of a company's policies through the blockchain. Through the use of this tool we hope to allow consumers and potential jobseekers to make informed decisions about the companies they patronize.

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**Ibom Folktales: Applying NLP to Folktales from Minority Nigerian Languages**

Presenter's Name: Oluwadara Kalejaiye
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Background: With a population of approximately 200 million people who speak more than 500 languages, Nigeria is the most populous African country and one of the most linguistically diverse countries in the World. Most Nigerian languages have folktales that are unique to the communities in which these languages are spoken. These folktales are tools for passing along traditions and cultural values and norms from one generation to the next. Often times, these folktales are orally passed down, however, in some cases, they are not properly documented. Therefore, over time, some folktales are forgotten or distorted. This highlights the importance of documenting folktales in these languages. Natural language processing (NLP) research has mostly focused on the three majority spoken Nigerian languages i.e. Hausa, Yoruba, and Igbo and little work has been done on the other minority Nigerian languages. Methods: Our work aims to collect folktales in four minority Nigerian languages i.e. Ibibio, Efik, Anaang, and Oro and use this data for a question answering task. Specifically, in collaboration with linguists, we engage with community/cultural leaders -- who are custodians for preserving folktales and traditions in communities that speak these languages, to (a) collect folktales in these languages and (b) create questions based on these folktales. Results: We apply several large language models (LLMs) to generate answers to these questions and we evaluate these generated answers. Conclusion: The approach used in this work can inform other researchers on how to collect folktales and language related data in low-resource settings.

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**THE LANGUAGE FAMILY EFFECT: IMPROVING AFRICAN SENTIMENT MODELS THROUGH LINGUISTIC RELATEDNESS**

Presenter's Name: Selorm Kalitsi
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African languages represent one of the world's most linguistically diverse regions, yet they remain critically under-resourced in Natural Language Processing, limiting the development of equitable and effective language technologies. Sentiment analysis for these languages is particularly constrained by scarce labeled data, limited representation in pretrained models, and heavy reliance on translation-based pipelines that introduce cultural and semantic distortion, especially in code-switched contexts. This work extends the AfriSenti benchmark with sentiment data from 38 additional African languages and examines how linguistic relatedness, captured through language family structure, can be leveraged to improve multilingual sentiment modeling. We evaluate two complementary approaches: extended task-adaptive pretraining on a large and heterogeneous multilingual dataset, and direct language and family conditioning through explicit input-level metadata. Experiments conducted at the overall, language family, and individual language levels show that task-adaptive pretraining provides strong gains in large and noisy multilingual settings, while direct language and family conditioning is most effective on smaller and cleaner benchmarks such as AfriSenti. Together, these results provide empirical evidence for the language family effect, demonstrating that both implicit and explicit modeling of genealogical relationships improves robustness and generalization for African languages that are underrepresented or absent in standard pretrained models. Our findings highlight the value of linguistically grounded and data-efficient approaches for building more inclusive and sustainable NLP systems for African languages.

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**Simultaneous Acquisition of IV, dI/dV, and $d^2I/dV^2$ Curves: A Framework for IETS Measurement Protocols**

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Inelastic Electron Tunneling Spectroscopy (IETS) is a characterization technique which captures the second derivative of the current-voltage (IV) curve of a device, either directly or via mathematical computation. Our system requires AC and DC power sources, a signal adder, two digital multimeters, and two lock-in amplifiers to be calibrated with appropriately adjusting settings for the given device. Traditionally, IETS is performed by measuring the IV and dI/dV curves and calculating the d2I/dV2 mathematically. In this set up we will attempt to measure all three curves simultaneously, however there are no standardized settings for the instruments used in this method. The goal of this project is to collect various datasets across different devices to develop a guide for determining proper settings and potential issues that could arise from instrument settings. The results include tests using various resistors in series with a diode. These tests typically measure the IV curve from -1V to 1V, and attempt to resolve a discontinuity that appears between 0 and 0.2 V. Additional measurements were also taken outside of the low temperature measurement system in order to isolate any changes introduced to the measured signal, allowing us to adjust the settings accordingly. The collection and consolidation of this data will allow for a more efficient use of the IETS programs and serve as a resource for troubleshooting in the future. This set up will serve as the primary instrumentation tool for IETS characterization of nanoscale material systems such as porphyrin based devices and graphullerene materials.

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**Assessing Video LLM Performance in Detecting Child Safety Risks**

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Traditional baby monitoring devices serve as a cautionary tool for parents, guardians, and caregivers concerned about the safety and security of their child; however, they require constant and scrutinous supervision. With ever-so-persistent distractions and responsibilities, as well as the inevitable need for rest, humans do not have the luxury of around-the-clock surveillance. This preliminary study introduces the use of large language models (LLMs) to develop an artificial intelligence (AI)-enabled baby monitoring system that identifies when a child is engaging in unsafe behavior requiring adult attention. Forty-five use-case videos of children engaging in either dangerous or age-appropriate activity were fed into two video understanding LLMs: Qwen2-VL and Video-LLaVa. A sliding window approach was employed to simulate live video streaming. Both models were prompted to process the video input and return the first instance of danger detected. The outcomes were compared against human perception to identify maximal detection accuracy. Qwen's accuracy matched human perception on 31/45 videos by the second and 29/45 videos by the frame, yielding a 67% average accuracy rate. LLaVa's accuracy matched human perception on 23/45 videos by the second and frame, yielding a 51% accuracy rate. Results demonstrate that the use of AI in child danger detection is highly feasible, and Qwen2-VL presented itself as the superior model for this task. Future work aims to supply the model with context from previous windows, perform fine-tuning, and collect data from additional observers to further refine accuracy and precision in preparation for deployment to a fully operational device.

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**Effect of Solvent-Free Tribo-Electrostatic Separation on the Functional Properties of Yellow Pea Flour**

Presenter's Name: Lotus Khanal
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*Presentation Type: Poster Presentation*
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Tribo-electrostatic separation (TES) is a solvent-free dry fractionation technique that separates legume flour components based on differences in tribo-charging behavior, offering a suitable alternative to plant protein enrichment without chemical modification or pH shifts. In this study, yellow pea flours produced using two milling types (pin and Ferkar) and two milling intensities (fine and coarse) were fractionated by TES into protein-rich and starch-rich fractions. The effects of milling type and intensity on the functionalities of these fractions were evaluated and compared with those of the original unfractionated flour and a commercially available yellow pea protein isolate produced via traditional wet fractionation. The electrostatically separated protein-enriched fractions exhibited enhanced oil absorption capacity (OAC), while starch-enriched fractions showed increased water absorption capacity (WAC) relative to the original yellow pea flours. Compared to protein-rich fractions, the commercial yellow pea protein isolate showed higher WAC and OAC values; however, the TES-derived protein fractions exhibited superior solubility across a wide pH range compared to the commercial isolate. All protein-rich fractions had higher emulsion stability (ES) and emulsion activity index (EAI) values compared to the original flours. All protein- and starch-rich fractions demonstrated higher foam expansion (FE) values than the commercial protein isolate. All protein- and starch-rich fractions showed FE values comparable to their original flours, except the protein-rich fractions produced through TES of the pin-milled yellow pea flours, which showed slightly higher FE values. Acknowledgment: The project was funded through USDA-NIFA-AFRI Grant #2020-67021-31141.

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**Predicting Microplastics Downstream of Wastewater Treatment Plant Discharge Sites**

Presenter's Name: Alicia Knight
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*Presentation Type: Poster Presentation*
Faculty Advisor: Sara Kamanmalek
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Microplastics are an emerging contaminant of concern in freshwater systems, with wastewater treatment plants (WWTPs) identified as major point sources. Although treatment processes partially remove a fraction of microplastic particles, substantial quantities are still discharged into receiving streams, where they are transported downstream and may accumulate in sediments or biota. However, predicting downstream concentrations remains challenging due to variability in flow conditions, particle characteristics, and environmental interactions. This research will focus on how geographic information systems (GIS), conduct geospatial analysis to be able to model downstream concentration gradients and identify spatial patterns of microplastic accumulation relative to wastewater discharge points. Spatial interpolation will be done based on the different flow of streams such as monthly flow, mean flow as well as low flow and high flow. Additionally, it will address the differences in the concentration of microplastics during the wet and dry seasons. By integrating spatial modeling, this framework enhances prediction and supports decision-makers in making more targeted monitoring and management strategies aimed at mitigating microplastic pollution in freshwater ecosystems.

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**Exploring Prompt Strategies for Joke Generation Under Input Constraints**

Presenter's Name: Abdulmujeeb Lawal
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A number of studies have explored what makes jokes funny. Conversely, only a few have actually tackled generating them, mostly leaving humor-generation relatively unexplored. The SemEval MWAHAHA Challenge tasks participants with generating jokes under different constraints with the aim of pushing models beyond memorization towards genuine joke creation. In Subtask A, inputs were either keyword pairs or news headlines, and jokes had to incorporate both keywords or draw from the given headline. For headlines, we prompted the model to write reaction-style tweets, which produced more natural humor, while for the keyword pairs, we had the model adopt Dave Chappelle's comedic persona to create observational jokes about some everyday situations and disappointments. We experimented primarily with open-source models (Llama and Qwen) and ended up using Llama for our final submission.
In our preliminary results, we found that persona-based prompting consistently outperformed generic prompting approaches. The Chappelle-style observational jokes for keyword pairs also seemed to elicit more reactions than the standard outputs, and the tweet-format jokes for headlines felt more natural and appropriate for the given context. We also observed that models struggled a lot more with keyword pairs than with headlines, most likely because combining two unrelated words into coherent humor may require a bit more creative reasoning.
Our findings show that tailoring prompting methods based on input type, rather than applying a singular approach, decently improves humor generation. Our work also shows the value of using personas when guiding models toward more diverse and naturally funny jokes.

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**Quantum Corners: Improving Emergency Response with Smart Traffic Management and Quantum Sensors**

Presenter's Name: Cameron Lewis
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Especially in the Washington, DC area, emergency vehicles are subject to traffic, as it is very common to see emergency vehicles halted behind various cars on highways or even side streets due to congestion issues. Smart traffic management works well to solve this issue as it implements Internet of Things (IOT) sensors to provide information for traffic analysis. While IOT sensors provide a great foundation for smart traffic management, system designers can migrate to quantum sensing technology to enhance precision in data collection. To address the problem of delayed emergency response, the goal is to design a sensing system that sends information to a smart traffic management system. This information will be relayed to a smart traffic management system to plan the best route for an emergency vehicle to travel. Once the ideal path is planned for the emergency vehicle, the system will then send notifications to surrounding vehicles to update their current GPS routes to redirect them away from the emergency vehicle's path. To accomplish the original goal, this work uses an autonomous car as a testbed using a mixture of cutting-edge and state-of-the-art technologies. In this testbed, the objective is to perform a hardware acceleration of ORB-SLAM2 with a Graph Neural Network designed in Vivado HLS and implemented on an Intel Cyclone 10 at the edge. After completion, the final goal is to report how the previously mentioned cutting-edge technologies can be used to design the quantum sensing system for improved emergency response.

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**Mechanical and Material Characterization of NASA's GRX-810**

Presenter's Name: Kenneth Looby
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GRX-810 is an additively manufactured high entropy alloy developed by NASA Glenn Research Center in 2022, it possesses outstanding mechanical properties at ambient and elevated temperatures. However, little work has been done exploring the connection between the microstructural features such as grain size, texture and defects (pores and microcracks) to the fatigue and high strain rate properties of this alloy. Fatigue and high strain rate properties are critical for jet engine turbine blades as they will be exposed to cyclic loading and impacts from debris during the life of an aircraft. This study explores the microstructure of GRX-810 both in the as-built and hot isostatic pressed (HIP) conditions and their respective effects on tensile, fatigue and split hopkinson pressure bar tests results. Optical microscopy, scanning electron microscopy and x-ray diffraction methods are used to identify microstructural features and their contributions to strengthening and deformation mechanisms between the two material conditions.

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**Optical and Electrical Characterization Carbon Nanostructures**

Presenter's Name: Joi Malone
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*Presentation Type: Oral Presentation*
Faculty Advisor: Kim Lewis
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Our goal for this project is to characterize the electron transport properties of a new carbon allotrope, graphullerite, a 3D van der Waals crystal structure [1]. Due to the versatility that carbon and its allotropes exhibit, post-synthetic modifications of carbon-based materials, such as graphullerite, can extend its capabilities to electrical, biomedical, and composite-based applications. Graphullerene, a flake (tens of microns) obtained by mechanically exfoliating graphullerite will be characterized by inelastic electron tunneling spectroscopy (IETS) and Raman spectroscopy. The IET spectra will be used to determine the vibrational modes of the allotrope, including its interaction with applied voltages to explore future use in electronic devices such as diodes, switches, or wires [2]. In contrast, the Raman spectrum is commonly used to provide a structural fingerprint to identify properties of a sample. With these experimental techniques there are potential challenges such as, identifying the peaks for Raman-IET spectra, creating the junction for the IETS measurements, and IETS measurements because of its low-signal profile. For our investigations, since the Raman spectra are from graphullerene and the IETS peaks include the bonds from the electrical contacts to the graphullerene, comparing the Raman-IET spectra of graphullerene will be useful. This comparison will become important for extracting properties of graphullerene whose applications can range from an electrical device wired into a circuit to opto-electric devices. Our preliminary results will show Raman spectra from graphullerene.

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**Analyzing the Distribution of Capital Bikeshare Stations in Washington, DC: A Geographic Information System Approach Comparing Manual and Electric Bike Usage**

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Washington, DC was the first metropolitan city to launch a bikeshare program in the United States in 2008. Currently, there are more than 8,000 bikes that can be ridden from 800 stations across seven jurisdictions [1]. Capital Bikeshare also introduced an electric bike model in 2023 that promotes faster and further commute. The combination of manual and electric bicycles not only contributes to efficient and sustainable public transportation, but can also be used for recreation, while helping to reduce traffic congestion, parking issues, and pollution. The distribution of bikeshare stations appears to be uneven, disproportionately impacting certain communities [2]. This research uses Geographic Information System (GIS) methods and ridership patterns to explore the disparities of station placement with respect to the socioeconomic and racial patterns across DC's eight wards. In addition to spatial distribution, ridership patterns will also be analyzed to create heat maps of bikeshare usage to visually analyze usage disparities. Preliminary findings indicate that Wards 7 and 8, had the highest unemployment rates, and predominantly Black population, had lowest station densities. The lack of access to bikeshare services can restrict mobility, worsening existing inequities in accessing education, employment opportunities, healthcare, and other essential services. Additional analysis will compare the use of electric

bike usage, compared to traditional manual bikes, to further study the different adoption patterns across demographic groups. The results of the analysis will provide evidence-based recommendations for equitable bikeshare expansion strategies, and strategic e-bike deployment to maximize accessibility and transportation justice outcomes.

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### Synthesis and Characterization of Novel Dark Cesium Copper Bromide Crystals

Presenter's Name: Charlie Mcadoo iii
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Dark crystalline materials that exhibit strong, broadband optical absorption are of significant interest for a variety of optoelectronic applications, including solar energy harvesting, photodetection, and thermal sensing. Additionally, such materials hold promise for use in camouflaging paints or coatings. In this work, we report a simple, solution-phase synthesis route for producing dark cesium copper bromide crystals. The resulting crystals are characterized using optical microscopy and scanning electron microscopy (SEM) to investigate their morphology, while energy dispersive x-ray spectroscopy (EDS) provides insight into elemental composition. X-ray diffraction (XRD) is used to determine the crystalline structure and phase identity of the synthesized material. Preliminary findings suggest the emergence of a potentially novel phase or crystal structure within the cesium copper bromide family, distinct from previously reported compositions. Ongoing and future studies will focus on detailed structural analysis, optical measurements, and evaluation of the material's performance in optoelectronic contexts.

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### Synthesis and structural analysis of Ag(I), Cs(I), and tetrabutylammonium nido-carborane complexes via single-crystal x-ray diffraction and spectroscopy

Presenter's Name: Alemu Melka
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The deboronation of closo-1,2-$C_2B_{10}H_{12}$ under basic alcoholic conditions afforded the nido-$C_2B_9H_{12}^-$ anion, which was subsequently isolated with silver(I), cesium, and tetrabutylammonium ($TBA^+$) cations. Single-crystal X-ray diffraction (XRD) revealed structural diversity dependent on the metal cation and solvent selection. Cs[nido-$C_2B_9H_{12}$] crystallizes in the monoclinic space group $P2_1/c$ (V = 976.33 Å$^3$, $\rho$ = 1.805 Mg m$^{-3}$, $R_1$ = 0.0353), forming polymeric networks via Cs–B interactions (3.64–3.87 Å). A solvated acetone phase crystallized in P-1, exhibiting additional Cs–O coordination (3.21–3.25 Å) and generating a three-dimensional coordination framework.Th e silver complex, Ag[nido-carborane], crystallizes in the tetragonal space group I-4 (V = 2124.88 Å$^3$, $\rho$ = 1.806 Mg m$^{-3}$) at 100(2) K. Structural refinement revealed a multinuclear Ag cluster stabilized by interactions with the nido-carborane cage. TBA[nido-$C_2B_9H_{12}$] crystallizes in the triclinic space group P-1 (V = 1245.86 Å$^3$, Z = 2, $\rho$ = 0.999 Mg m$^{-3}$), exhibiting charge-separated ion pairing without direct cage coordination. Spectroscopic characterization ($^{11}$B NMR and FT-IR) confirms retention of the open nido framework in all compounds. Solvent polarity and coordinating ability significantly influenced crystal packing, phase formation, and metal–cage interactions. Coordinating solvents promoted additional metal–oxygen contacts and higher-dimensional assemblies, whereas less coordinating media favored discrete ion pairs or polymeric Cs–B networks. These results highlight the structural adaptability of nido-carborane toward monovalent cations, demonstrating the influence of counterions and solvent selection as crystallization conditions on framework assembly. Keywords: nido-Carborane; Silver; Cesium; Tetrabutylammonium; Single-crystal X-ray diffraction; NMR; FT-IR

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### PedAlert: An Open-Source iOS System for Reducing Pedestrian Distraction Near Intersections

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Pedestrian distraction due to mobile phone use is an increasing public safety concern, particularly at intersections where brief lapses in attention can result in severe injuries. This study presents PedAlert, an open-source iOS-based system developed at Howard University to mitigate distracted walking by delivering timely alerts as pedestrians approach intersections. PedAlert leverages smartphone GPS, iOS Core Location services, and geofencing to detect when a user enters a configurable buffer zone surrounding an intersection and trigger a warning accordingly. The system comprises four core modules: user device management, location tracking, distraction detection, and alert delivery. It is designed to operate passively, requiring minimal user interaction and no external infrastructure such as roadside beacons. Initial results demonstrate that PedAlert reliably supports multiple intersection locations and delivers real-time notifications when users enter predefined geofenced areas. Ongoing work focuses on enhancing distraction detection through a machine learning classifier trained on publicly available smartphone sensor datasets, including accelerometer and gyroscope signals. The classifier will distinguish between walking with and without active phone use and will be integrated into the application so that alerts are issued only when both proximity to an intersection and user distraction are detected. This work lays the foundation for controlled experiments and real-world field evaluations of lightweight, user-centered pedestrian safety technologies.

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**Time-Aware Two-Dimensional Packing for Slicing-Aware 3D Printing Throughput Optimization**

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Batching multiple parts onto a single fused-filament fabrication build plate improves throughput, but existing packing algorithms optimize for geometric density rather than print time. We introduce a slicing-aware cost model that estimates print time from part geometry and placement without invoking toolpath generation, achieving strong correlation with slicer-reported times (Pearson $r = 0.90$, Spearman $\rho = 0.96$). Evaluating packing algorithms on synthetic production builds, we find that greedy polygon-based packing matches or exceeds Large Neighborhood Search at three orders of magnitude lower compute cost — a negative result we attribute to high initial packing density leaving minimal room for iterative refinement. Against PrusaSlicer's default auto-arrange, our method achieves 5.7% throughput improvement (95% CI [4.7%, 7.3%], $N = 329$), with median savings of 19.5 minutes per build.

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**Real-Time Lightweight Object Detection Pipelines on PYNQ FPGA for Edge Vision Deployment**

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Object detection is a fundamental capability in modern computer vision systems, supporting applications such as autonomous vehicles, robotics, smart surveillance, and edge AI. However, deploying deep learning–based detection models on resource-constrained platforms remains challenging due to high computational demands and energy consumption. Field-programmable gate arrays (FPGAs) provide a promising solution by enabling low-power, real-time acceleration of vision workloads at the edge.This project explores the feasibility of implementing and optimizing object detection pipelines using the PYNQ FPGA platform, with an emphasis on hands-on semiconductor workforce training and practical edge AI deployment. Inspired by recent demonstrations of real-time edge detection on PYNQ, we extend FPGA-based image processing toward more advanced detection tasks, including lightweight convolutional neural network (CNN) inference and hardware-accelerated preprocessing. The study investigates how FPGA programmable logic can support key components of object detection, such as feature extraction, edge-enhanced filtering, and model acceleration. The project also evaluates trade-offs between software-based Python execution on embedded ARM processors and hardware-based acceleration using FPGA overlays. The long-term goal is to develop an accessible framework for integrating computer vision with FPGA-based acceleration while contributing toward efficient, real-time object detection at the edge.This work supports the broader mission of expanding semiconductor and AI workforce development at HBCUs by promoting practical experience in hardware-software co-design, embedded vision, and FPGA-enabled edge intelligence.

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**The Effect of Altering Vancomycin: Novel Compounds in the Treatment of Bacterial Infections**

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Vancomycin is a tricyclic glycopeptide antibiotic used to treat severe gram-positive bacterial infections, including methicillin-resistant and methicillin-susceptible Staphylococcus aureus (MRSA and MSSA). However, a mutation of the Lipid II peptidoglycan responsible for cell wall polymerization bacteria has resulted in significant resistance to vancomycin. Functionalization at the N-terminus of vancomycin with alkyl and aromatic chains was shown to present a secondary binding pocket to interact with Lipid II. This study seeks to enhance vancomycin's potency through structural modification of alkyl and aryl derivatives at the N-terminus with a bulky hydrophobic carboranyl group. To synthesize the desired carboranylbenzaldehyde derivatives, Sonogashira coupling reactions were performed to form the target ethynylbenzaldehyde with a yield in the range of 70%. A subsequent cage-closing reaction of the ethynylbenzaldehyde with the nido-decaborane forms the desired closo-carboranyl benzaldehyde with yields ranging from 60 - 80%. Finally, the closo-carboranylbenzaldehyde is attached to vancomycin via amination reactions. Reaction progress was monitored using chromatography and characterized by FT-IR, GC–MS, and NMR to support structural analysis.

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**Classifying Risky Driver States Using In-Vehicle Monitoring: A Comparative Analysis of Urban and Rural Driving Environments**

Presenter's Name: Andrea Morris
Classification: Undergraduate Student
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Risky driver behaviors such as distraction and drowsiness are known contributors to traffic crashes, yet limited research has examined whether these dangerous states occur at different rates across roadway environments. This study investigates the prevalence of risky driver states in urban versus rural driving environments and evaluates how in-vehicle driver monitoring systems can support real-time identification of these hazardous conditions. Using data from the SHRP2 Naturalistic Driving

Study, this research analyzes synchronized driver video, physiological signals, vehicle motion, and roadway classification data. Driver states will be classified using facial landmark detection and head pose estimation to identify periods of distraction and drowsiness, and secondary task engagement. These classifications will be compared across urban and rural roadways to determine whether environmental factors influence the frequency of risky driving behaviors. Expected findings suggest that higher rates of distracted and drowsy driving may occur in urban areas characterized by higher traffic density and more complex driving demands. The findings will contribute to the development of in-vehicle monitoring systems that can provide targeted safety interventions based on driving context, ultimately supporting enhanced road safety across diverse transportation environments.

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**Mathematical modelling of methanotrophic bioreactors to support the partial oxidation of methane to methanol from low concentration methane sources**

Presenter's Name: Ajani Moss
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Fugitive methane emissions with low concentrations (≤5% v/v) contribute significantly to climate change and air pollution. These dilute methane streams can fall below the methane flammability limit, making stable combustion infeasible. This work applies green chemistry and green engineering principles, considering a biological pathway to valorize dilute methane into methanol, which is a liquid chemical feedstock. Under aerobic conditions, methanotrophs can oxidize methane to methanol, particularly when supported by a well-designed bioreactor with optimal conditions and nutrient supply. We developed a steady-state model of an aerobic continuous stirred-tank reactor (CSTR) using methanotrophic kinetics coupled with gas-liquid mass transfer to identify operating windows that enable methane conversion while maintaining methanol formation (i.e., limiting over-oxidation to downstream products). Preliminary MATLAB-based simulations predict a stable operating region under dilute-methane conditions. At steady state, the model reaches a biomass concentration of 0.138 g L-1 and a methanol formation rate of 0.468 mmol L-1 h-1, corresponding to a methanol productivity of 0.015 g L-1 h-1 (0.36 g L-1 d-1) and a specific methanol formation rate of 3.39 mmol gbiomass-1 h-1. Oxygen transfer can reach 2.20 mmol $h^{-1}$ at near air saturation, suggesting operation with air may be feasible without pure O2 supplementation. In this sense, we propose the valorization of a harmful gas from waste streams to a liquid chemical feedstock efficiently, supporting a process-intensification aligned with SDG 9 (Industry, Innovation, and Infrastructure).

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**Optimization of Standoff Raman Spectroscopy for Lunar Mineral Characterization: A Proof-of-Concept Demonstration**

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For this project, we have developed a novel manual approach to standoff Raman spectroscopy for the characterization of lunar minerals, addressing the current limitation of a 7-meter range in the state-of-the-art systems due to restricted telescope aperture and signal collection efficiency. Our method relies on precise tweaking and adjustment of the experimental apparatus to optimize backscattered spectral radiance by maximizing the spatial distribution of laser excitation and enhancing the angular collection of Rayleigh and Raman signals from our analog lunar minerals. We utilize 520 nm and 532 nm green lasers, as well as a 650 nm red laser, to achieve optimal excitation and signal detection. In laboratory tests, we successfully demonstrated this proof-of-concept using samples such as chalcopyrite, corundum, and limonite at distances of 1 m, 10 m, 30 m, and 60 m. Additionally, we have extended these trials to a lunar mare simulant (JSC-1A) from the Johnson Space Center. In partnership with NASA Goddard Space Flight Center and Astrobotic Technology, Inc., this experiment is intended to serve as a fundamental proof of concept for upcoming lander missions, with potential implementation on an Astrobotic Raman Cube Rover.

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**Augmenting Naval Ship Images for Viewing Distance**

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Co-authors: Saurav Keshari Aryal, Jaye Nias, Gloria Washington, Christopher Watson, Janelle Yankey

The aim of this project is to assess the ability of a generative AI to produce reasonable and believable images based on the same original images at varying scales to simulate differences in distance from the object. The objects used in this project were varying types of ships. The generated images were assessed in three different ways, all on a scale of high medium and low to measure levels of quality. Firstly, background quality which refers to the realism and consistency of the generated image. Subject dimensions which refers to how well the generated image preserves the scale and zoom of the ship in the original image. And subject integrity, which referred to the features of the ship and how consistent and believable they were. Additionally, we noted whether the original image contained the ship as a whole without any 'cut off' parts, and if so being labelled as "Incomplete source". And lastly was "Artifact present" which stated if the generated image had had hallucinations or

objects added that were not present in the original image. Space was also made for comments to be made on the generated images.

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**Development of ab initio Approaches to Study the Photogalvanic Responses in Antiferromagnetic Topological Materials**

Presenter's Name: Alana Okullo
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Co-authors: Sugata Chowdhury, Panchapakesan Ganesh, Vineet Sharma

Since the discovery of topological insulators (TIs), the interplay between topology and symmetry has been the major research topic in condensed matter physics. The emergence of exotic states in a TI depends on the carrier concentration, presence of magnetic atoms, symmetries, chemistry, substrates, spin-orbit coupling, etc. Among different types of exotics quantum states, the discovery of the Berry phase effects, and nonlinear optical responses, such as shift current, second harmonic generation (SHG), and photovoltaic Hall effect, brings an excellent opportunity for developing next-generation optoelectronic devices. Recent theoretical and experimental works demonstrated that the TIs display a large circular photogalvanic effect (CPGE) and strong SHG effect. Additionally, CPGE is not limited to topological materials but can also occur in some materials through the Rashba effect and Dresselhaus spin splitting. These other phenomena may confound the measurement or control of surface-polarized current when the topological material is on a substrate with these properties. Therefore, extensive research has been dedicated to realizing and understanding the CPGE and strong SHG effect in antiferromagnetic TIs, which are very important for the design of spintronics and topological optoelectronics devices. Among these efforts, material discovery and understanding of the physics behind those exotic states are the unambiguous driving forces to advance the field. To overcome the challenges and real implementation of TIs into spintronics devices, we need a clear understanding of thermodynamically stable structures' optical properties, topology, and chemistry. Therefore, a theoretical study is necessary to make progress in discovering and optimizing ideal TIs for optoelectronics devices.

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**Hybrid Drug Design Method for Curating TAK-242-based Analogs for Alzheimer's Disease**

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Introduction: Alzheimer's disease (AD) is a progressive neurodegenerative disorder and the leading cause of dementia. In addition to amyloid and tau pathologies, neuroinflammation and microglial activation play key roles in disease progression. FDA approved therapies primarily target amyloid plaques; however, they are limited to early stage disease and present safety and accessibility challenges. Targeting innate immune signaling pathways such as Toll-like receptor 4 (TLR4) offers an alternative strategy to modulate neuroinflammation in AD. TAK-242 (resatorvid), a small molecule TLR4 inhibitor, has demonstrated neuroprotective effects in preclinical AD models, supporting its potential as a scaffold for further optimization. Aims: This project evaluates TAK-242, the (R)-N-phenylcyclohex-2-ene-1 sulfonamide scaffold, and related sulfonamide conjugates using a hybrid computational workflow to identify structure–activity trends that guide rational analog prioritization. Methods: A virtual ligand library was curated to generate TAK-242-based analogs, including Fmoc-amino-acid, benzofuran, and substituted aryl derivatives. Molecular docking coupled with Molecular Mechanics Poisson–Boltzmann Surface Area (MM-PBSA) calculations was performed to predict binding poses and estimate binding free energies. Computational results were used to rank candidates for synthesis. Planned experimental characterization includes NMR, X-ray diffraction, and in vitro enzyme-based and cell-based assays to assess biological activity and toxicity. Results: Variations in N-alkylation and substituent electronic properties produced physicochemical differences that influenced predicted binding orientation, complex stability, and binding energy within the TLR4/TIR domain. Conclusion: This work demonstrates the value of a hybrid ligand based and structure based drug design approach for prioritizing TAK-242-derived sulfonamides targeting TLR4-mediated neuroinflammation in AD.

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**Development of Autonomous Strategies for High Resolution Data Acquisition For sUAS-Based Atmospheric Research**

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This study presents the development and implementation of an autonomous atmospheric sensing platform using a Hexsoon EDU-450 quadcopter, a CubePilot Cube Orange running ArduPilot, a Raspberry Pi companion computer, and an Alphasense OPC-N3 particulate sensor. The goal of this work was to create a fully programmable and synchronized flight pipeline capable of executing structured autonomous missions while collecting high-resolution particulate measurements in real time. Hardware integration included custom sensor mounting, accounting for Electromagnetic interference, and a dedicated UART link between the Raspberry Pi and Cube Orange for MAVLink communication. ArduPilot was selected over PX4 due to its stability during low-speed and hover-dominant operations, along with its stronger companion-computer interface. DroneKit was chosen as the primary autonomy library after demonstrating more reliable timing, parameter access, and mission execution than MAVSDK .Four autonomous flight patterns were evaluated, including fixed-position hover maneuvers for sensor stability analysis, a box trajectory for navigation precision assessment, and boustrophedon and zigzag paths to provide diversified spatial coverage. To synchronize autonomous navigation and sensing, the OPC-N3

sampling routine was executed as a Python subprocess embedded within the main DroneKit script. This allowed both processes to run concurrently while using MAVLink timestamps to fuse particle data with GPS, altitude, velocity, and attitude information. Autonomous data collection and path planning were successfully achieved. Results indicate that the EDU-450 effectively served as an autonomous atmospheric research testbed, successfully executing all mission types despite its small frame.

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**Development of Chemically Modified Lignin/PBAT Composites for Sustainable Biodegradable Film Applications**

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Background: The environmental impact of petroleum-based plastics has intensified the demand for renewable and biodegradable alternatives for packaging and agricultural applications. Lignin, an abundant natural aromatic polymer, is a promising yet underutilized biomass resource for sustainable material development. However, poor interfacial adhesion between lignin and polymer matrices often limits its mechanical performance in composite materials. This study investigates the demethylation of lignin as an effective chemical modification strategy to improve its compatibility with poly(butylene adipate-co-terephthalate) (PBAT). By increasing the phenolic hydroxyl group content, demethylation enhances intermolecular interactions within the composite system, leading to improved interfacial bonding and overall material performance. Methods: Hardwood organosolv lignin was chemically modified through demethylation to increase phenolic hydroxyl functionality. Modified lignin and PBAT were melt blended via extrusion to promote uniform dispersion and then processed into films through heat pressing. The resulting films were evaluated for tensile properties, including Young's modulus, tensile strength, and elongation at break, to assess mechanical performance and interfacial compatibility. Conclusion: Lignin modification significantly improved compatibility and stress transfer within the PBAT matrix. Films containing modified lignin demonstrated enhanced mechanical performance compared to neat PBAT and composites with unmodified lignin, including an approximate 30% improvement in tensile strength and an approximate 25% increase in Young's modulus. This work supports the development of high-performance, biomass-derived polymer films and highlights the potential of lignin valorization for sustainable packaging and agricultural applications.

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**Automated Estimation of Glasgow Coma Scale Scores Using Multimodal Video Analysis**

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This project investigates the feasibility of using multimodal artificial intelligence to estimate Glasgow Coma Scale (GCS) scores from video based observations of patient behavior. The GCS is widely used to assess neurological status following injury, but assessments can vary depending on clinician experience and situational factors. We explore whether large multimodal models can assist by providing consistent interpretations of eye opening, verbal response, and motor response from video recordings.To support this investigation, we developed a workflow that manually preprocesses video clips to isolate patient behavior and reduce bias from narration, overlays, or instructional content. We curated a small dataset of publicly available recordings and explored controlled scenario generation to address the limited availability of single patient assessments. The system then evaluates observable behaviors and produces structured GCS estimates. Preliminary results suggest that automated analysis can identify key behavioral cues in controlled settings, highlighting both the promise and challenges of applying AI to clinical assessment tasks. We also examine practical issues including dataset scarcity, variability across recordings, and the importance of careful preprocessing when using AI in medical contexts.
This work contributes an early exploration of how video based AI tools might support clinical training, documentation, and decision support, while emphasizing the need for further validation using larger and more diverse datasets.

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**Form, Meaning, and Misalignment: Investigating Internal Entity Alignment to Strengthen LLM Safety**

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Background and Method: LLMs exhibit impressive fluency and broad capability, yet it remains unclear whether they internally align semantically equivalent entities across changes in surface form. We introduce an invariance-based framework that quantifies internal entity alignment using geometric stability, dimensional consistency, and representational drift in embedding space. Our metrics combine cosine-based clustering (intra-/inter-class similarity and separation) with a Fisher–MAD criterion that estimates an invariant subspace via the invariant-dimension count and a stability threshold, supported by significance testing. Results and Implications Across four model families show strong alignment for direct lexical aliases but rapid degradation under form-disrupting transformations. For city aliases in the clean setting, intra-class similarity

is typically high (often 0.75–0.99) and separation is positive for most entities, yet the stable subspace is small (roughly 10–30 invariant dimensions). Under controlled perturbations, separation contracts toward zero and frequently becomes negative, indicating that perturbed aliases are no longer reliably closer to their own entity cluster than to others. Cross-lingual translation further exposes shallow grounding: translated variants yield low separation (approximately 0 to 0.06, sometimes negative) and very low invariant-dimension counts (often below 10), with large stability thresholds indicating substantial within-entity drift. For safety-relevant expressions, embeddings remain moderately coherent (intra-class similarity around 0.70–0.85), but extreme terms can invert separation; additional perturbations often increase both intra- and inter-class similarity, consistent with a saturation-like compression of the space rather than improved semantic fidelity. Overall, LLM embeddings prioritize surface-form similarity over meaning, yielding brittle semantic anchors exploitable for safety evasion.

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**Predicting High-Risk Colorectal Polyps in African American Patients Using Pre-Colonoscopy Features: Machine Learning Model Development and Validation**

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Purpose: Risk stratification for advanced colorectal polyps typically depends on colonoscopy and pathology findings. There is increasing interest in whether non-invasive, pre-colonoscopy features can identify patients at higher risk. Such approaches may help prioritize surveillance when colonoscopy resources are limited, reduce unnecessary procedures in lower-risk individuals, and promote more equitable access to care. We developed and externally validated machine learning models to predict high-risk colorectal polyps (HRP) using non-invasive, pre-colonoscopy features in a diverse, predominantly African American, urban cohort. Methods: We conducted a retrospective cohort study using demographic, lifestyle, and comorbidity data from patients undergoing colonoscopy at Howard University Hospital. Multiple machine learning models including neural networks, random forest, support vector machines, Naïve Bayes, logistic regression, decision trees, KNN, and XGBoost were developed to predict HRP, defined as villous or tubulovillous adenomas, high-grade dysplasia, polyps ≥10 mm, and/or ≥3 polyps per procedure. Internal validation included 4,681 patients (2015-2022), and external validation included 1,562 patients (2023-2024). Model performance was evaluated using ROC-AUC, accuracy, and related metrics. Model interpretability was assessed using SHapley Additive exPlanations.Results:Predictive performance was moderate. A neural network achieved the highest internal performance (ROC-AUC 0.78) but showed reduced external performance (ROC-AUC 0.67). Simpler models demonstrated lower internal performance but more stable external generalization. Key predictors included age, smoking status, sex, race, colonoscopy indication, and family history of colorectal cancer.Conclusions: Prediction of HRP using routine pre-colonoscopy data is feasible but shows limited generalizability. Additional data may be needed to achieve clinically robust and equitable prediction tools.

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**Disentangling Logic from Content: A Dual-Track Neuro-Symbolic Approach to Robust Reasoning**

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Large Language Models (LLMs) frequently exhibit Content Bias: when premises conflict with real-world knowledge, models reject logically valid conclusions due to semantic implausibility. We argue that this failure stems from semantic entanglement during parsing, where world knowledge priors interfere with formal inference. To address this in SemEval-2026 Task 11, we introduce a hybrid neuro-symbolic solver that explicitly isolates structural reasoning from semantic content. Our core contribution is a Dual-Track Parsing architecture that departs from single-pass semantic pipelines. The Semantic Track maps natural language into predicate–argument triplets. In parallel, an Abstract Track transforms entities and predicates into typed symbolic placeholders, removing semantic associations while preserving logical form. Both representations are unified into a logic graph where deductions are validated using explicit syllogistic constraints. By decoupling entity meaning from structural role, the system biases validity toward graph consistency rather than plausibility priors. While optimized for syllogistic reasoning, this abstraction targets semantically adversarial inference settings more broadly. To handle implicit knowledge gaps without reintroducing bias, a Safe NLI layer activates only when structural analysis detects a formal gap (e.g., a missing transitive link). A restricted entailment model retrieves minimal bridging facts, incorporated under the same symbolic constraints. On the SemEval validation set, the system achieves 98.0% accuracy (baseline: 90.0%) and reduces Task Content Error (TCE) from 13.33 to 3.33, supporting the claim that structural abstraction mitigates content-driven reasoning failures.

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**High-Fidelity Modelling of Atmospheric Stability Effects on Offshore Wind Turbine Wake Dynamics**

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Offshore wind farms play an increasingly significant role in the global renewable energy transition. By accessing sturdier and more persistent ocean winds, they offer performance advantages over land-based installations. However, due to their large scale and increased interaction

with the atmospheric boundary layer (ABL), their power output is strongly influenced by wake effects. These wakes reduce wind speeds and alter turbulence characteristics downstream, decreasing energy yield and directly impacting wind farm efficiency and profitability. Accurately quantifying offshore wind resources therefore requires detailed analysis of wake dynamics under varying atmospheric stratification conditions. This study employs a coupled modeling framework that integrates mesoscale simulations with high-resolution large-eddy simulations (LES) to characterize wake evolution and assess downstream performance impacts. A simplified three-turbine array configuration in AMR-Wind is used to perform the analysis. Results reveal distinct differences in wake structure and recovery across atmospheric stability regimes. Stable stratification produces more coherent and persistent wake structures, while unstable conditions promote enhanced turbulence and accelerated wake breakdown. These findings highlight the strong sensitivity of offshore wind turbine wakes to atmospheric boundary layer stability. This sensitivity underscores the importance of accurately representing stability effects to improve the efficiency of offshore wind energy systems.

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**Analyzing #BlackLivesMatter related Social Media Posts published from Racially diverse Geographic Regions in the United States**

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The Black Lives Matter (BLM) movement is focused on protesting police brutality against Black people and communities, mostly in the United States (US). The racial demographic composition of US counties varies. On social media platforms, individuals publish posts about BLM. In this work, we hypothesize that the topics and subtopics expressed in BLM related social media posts published from US counties with a higher percentage of African American residents varies from those expressed in BLM related social media posts published from US counties with fewer African American residents. Using a large language model (LLM), we extract the topics and subtopics expressed in millions of BLM related social media posts published over a period of 8 years from different US counties. With this dataset, we conduct analyses to determine if there are differences in the topics and subtopics expressed in social media posts published from US counties with 20\% or more African American residents compared to those published from US counties with less than 20\% African American residents. Our findings show that there is a negative Pearson's correlation between the subtopics expressed in BLM related social media posts published in these groups of US counties. We find that the subtopics on BLM, police violence, and social issues are more associated with the posts published from US counties with 20% or more African Americans, while the subtopics on law enforcement and politics are more associated with the posts published from US counties with less than 20% African Americans.

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**Onboard Multimodal Learning for Data-Driven Decision-Making in Humanoid Robotics**

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This work presents the development of a modular bipedal humanoid platform focused on tightly integrating onboard artificial intelligence with multimodal sensor perception for data-driven autonomy. Built upon the Berkeley Humanoid Lite architecture, the system emphasizes the unification of mechanical design, embedded compute, and learning-based control within a fully self-contained humanoid framework. We design and implement a multimodal sensor array incorporating LiDAR, RGB and depth cameras, and microphone inputs, enabling rich environmental perception across spatial and acoustic domains. Sensor data are synchronized and fused through a ROS 2-based middleware pipeline to produce real-time state estimation, semantic scene understanding, and context-aware environmental representations. These perception outputs inform higher-level decision-making modules, allowing the robot to adapt its locomotion and manipulation strategies based on sensed environmental conditions rather than pre-scripted behaviors. Locomotion and task policies are trained in GPU-accelerated simulation and deployed to onboard embedded AI hardware for low-latency inference. This architecture enables closed-loop, perception-driven autonomy without reliance on external compute infrastructure. We evaluate system performance in terms of perception latency, decision consistency, and behavioral adaptability in dynamic indoor environments. The resulting platform demonstrates a scalable approach to embedding AI directly within humanoid robotic systems, enabling real-time, sensor-informed decision-making and advancing the integration of learning-based intelligence in embodied agents.

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**Application of the Kohlrausch function to ultrafast transient absorption spectral kinetics**

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The Kohlrausch (stretched exponential) function, $I(t)=e^{-(t/\tau)^\beta}$, describes relaxation in ultrafast transient absorption spectroscopy. We investigate whether stretched exponential behaviour can arise directly from the intrinsic decay-rate spectrum of a protein architecture. Using 1JFF PDB-derived tryptophan dipoles, we construct the non-Hermitian effective Hamiltonian $H_{\mathrm{eff}}$ of a 100-spiral microtubule (MT) and diagonalize it to obtain complex eigenvalues whose imaginary parts define the decay-rate spectrum ${\Gamma_j}$. This spectrum yields a statistical decay-rate distribution $H(\Gamma)$, whose Laplace transform gives a time-dependent population decay as a finite sum $I(t)=\

sum_j w_j e^{-\Gamma_j t}$. We evaluate the finite sum first with equal weighting of all eigenstates and then with Boltzmann weighting $w_j \propto e^{-E_j/k_BT}$ at room temperature ($T=290,\mathrm{K}$) to examine how thermal population modifies the decay curve.The decay-rate spectrum ${\Gamma_j}$ from $H_{\mathrm{eff}}$ contains both superradiant ($\Gamma_j \gg \gamma$) and subradiant ($\Gamma_j \ll \gamma$) modes, organizing into a broad distribution $H(\Gamma)$. Its Laplace transform produces a time-dependent decay $I(t)$ with an initial faster-than-exponential drop dominated by superradiant modes and a long-time slower-than-exponential tail governed by subradiant modes. In the Levy stable limit, when $H(\Gamma)$ approaches the Levy stable distribution, this yields exactly the stretched exponential. These results demonstrate that the Kohlrausch function arises naturally from collective radiative behaviours in structured biological networks, providing an underlying microscopic mechanism for stretched exponential ultrafast kinetics. Our conclusions advance a quantum-biological perspective where intrinsic collective excitonic structure shapes observed relaxation dynamics.

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**Algorithmic Phase Detection and Regression Modelling of Biofilm Surface Coverage**

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A computational framework was developed to analyze and predict Staphylococcus aureus biofilm surface coverage under different flow and nutrient conditions. Time-resolved surface coverage data from microfluidic experiments were first preprocessed and averaged across replicates to generate smooth time-series profiles for each condition. An automated phase-detection algorithm was then applied to segment each trajectory into growth, exodus (detachment), and regrowth phases. Exodus was identified as the first local maximum followed by a sustained decrease of at least 20% over five consecutive timepoints, while regrowth was defined as a local minimum followed by a ≥20% increase within four subsequent timepoints. These threshold-based constraints ensured that only meaningful biological changes, rather than noise, were classified as phase transitions. Each phase was modeled independently using functions suited to its dynamics. The growth phase was modeled using a logistic function to capture saturation behavior, while the exodus and regrowth phases were modeled using exponential decay and exponential rise functions, respectively. Model parameters were estimated using regression-based curve fitting, where parameters were adjusted to minimize the difference between the model and experimental data. To enable prediction across conditions, all extracted parameters were organized into a structured dataset and interpolated across the shear–nutrient space. These interpolated parameters were then used to reconstruct full biofilm lifecycle trajectories under both measured and unmeasured conditions. By combining automated phase detection with regression-based modeling, this framework provides a consistent, interpretable, and scalable approach for analyzing complex biofilm dynamics.

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**Testing AI Safety Guardrails Across Personality-Based Personas**

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This paper investigates whether personality type influences a user's ability to bypass AI safety guardrails. We construct psychologically grounded personas using Gaussian Mixture Models (GMM) applied to the Big Five personality dimensions (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism), drawing from the Statistical "Which Character" Personality Quiz (SWCPQ) dataset of 2,125 fictional characters rated on 500 personality traits, and the NKI Rockland Sample (NKI-RS) which combines Big Five scores with psychosis-proneness measures. Characters are clustered per Big Five dimension independently to avoid high-dimensionality issues, with optimal K determined via elbow method, silhouette scoring, AIC, and BIC, and validated through bootstrap resampling. Each cluster's most representative character becomes the blueprint for a persona, and crossing P personality archetypes with S psychosis profiles yields P×S unique AI personas encoded as LLM system prompts. These personas systematically probe AI models with restricted prompts, measuring compliance rates and manipulation strategies across personality types. Preliminary clustering with K=7 produced balanced groupings with exemplars from works including 10 Things I Hate About You and The Great Gatsby, though AIC and BIC disagreement motivated the shift to Big Five-aligned clustering. Next steps include completing the Big Five trait mapping, obtaining NKI-RS access, constructing the full persona matrix, and running probing experiments to determine which personality profiles most effectively bypass AI safety guardrails. CCS Concepts: Computing methodologies → Artificial intelligence → Natural language processing→ Security and privacy → Human and societal aspects of security and privacy. Keywords: AI safety, jailbreaking, personality types, Big Five, Gaussian Mixture Models, persona construction, large language models

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**Raman Spectroscopy of Graphene Quantum Dots**

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Graphene Quantum Dots (GQDs) are novel nanostructured semiconductors capable of expressing unique physicochemical properties such as photoluminescence and adsorption of organic and metallic materials. These properties allow for the application of GQDs

to various technologies and other chemical systems. Notably, GQDs are found in heavy metal sensors, detectors for biological compounds, energy storage and production devices, and optical detectors. GQDs differentiate themselves from other quantum dots by their organic framework, nontoxicity, and affordable synthesis processes. GQDs can possess molecular functional groups along their edges, permitting interactions between GQDs and other biological compounds like proteins and enzymes.The Laser Spectroscopy Laboratory wants to characterize GQDs, specifically using Raman Spectroscopy and complementary modeling and simulation techniques to determine their electronic properties. We are using specifically the Bruker Senterra II Raman Microscope to record and analyze the Raman spectra of GQD samples. We are also running simulations in Quantum ESPRESSO to calculate properties of GQDs, such as band structure, phonon spectra, and quantum confinement. The results of our measurements, modeling, and analysis will then aid in differentiating the vibrational properties of GQDs from bulk graphene, which already finds uses in quantum computing and superconductivity.Funding from the National Science Foundation (Award #s DMR-2349300, & DMR-2101121), Department of Defense Army Award# W911NF2410346, and ACCESS supercomputing allocation support via PHY210066, DMR190126 & PHY250252 are gratefully acknowledged.

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**Learning Euler's Factor using Machine Learning & Deterministic Algorithms**

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Predicting traces of Frobenius $a_p$ for elliptic curves is a challenging task where Transformers and deep learning models often recover the magnitude but fail to predict the correct sign. This research investigates two novel approaches to accurately determine both the value and sign of $a_p$. First, we isolate local arithmetic features, specifically valuations and residues, to train TabNet and LightGBM models. While using raw traces $a_q$ yields near-random sign prediction accuracy near 50%. Incorporating valuation-based features and the signs of $a_q$ raises the accuracy to approximately 75% for $p=97$. Second, to address whether earlier models were implicitly learning the twists of the underlying elliptic curves, we developed a deterministic matching algorithm. This algorithm groups curves by their $j$-invariant and computes a comprehensive sign vector for each curve. By matching the sign vector of a test curve against a precomputed training set of curves within the same $j$-invariant class, we deterministically calculate $a_p$. Preliminary results on 10,000 test curves for $p=29$ show that the $j$-invariant deterministic method matched 7,947 curves to the training set, resulting in 7,822 correct sign predictions and 7,821 correct exact value predictions. An alternative grouping using absolute coefficient tuples yielded similarly high accuracy. These findings demonstrate that combining machine learning on local valuation data with deterministic $j$-invariant sign matching could have a potential to overcome limitations in predicting exact Frobenius traces.

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**Query Reformulation and Dense-Lexical Retrieval Fusion for Multi-Turn Retrieval-Augmented Generation**

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While large language models increasingly serve as chat-based assistants, grounding their responses in retrieved evidence across multi-turn conversations remains a significant challenge, particularly when questions reference earlier turns, when the system must recognize unanswerable queries rather than hallucinate, and when relevant passages shift as the conversation evolves. We address these challenges on the MTRAG benchmark across four domain-specific corpora: ClapNQ (Wikipedia), Cloud (technical documentation), FiQA (financial), and Govt (government web pages). Our system employs a hybrid retrieve-then-rerank architecture. Queries are first augmented through LLM-driven query rewriting, breaking down entities and query itself, and generating hypothetical embeddings (HyDE) for semantic matching. Results from dense vector search and lexical matching are then fused via Reciprocal Rank Fusion and reranked though cross-encoder. Llama-3.3-70B-Instruct then generates responses based strictly on the most relevant text passages. The system achieves an nDCG@5 of 0.4098 on passage retrieval, a harmonic mean of 0.7462 on reference-grounded generation, and 0.5796 on end-to-end RAG.

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**Swarmin for Security: Exploring Chaotic Dynamics as a Cryptographic Framework**

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This project investigates a novel connection between swarm dynamics and cryptographic system design, motivated by structural parallels between collective biological behavior and secure distributed communication. Swarm systems generate coherent global behavior through simple local interactions without centralized control, exhibiting robustness under noise, delay, and agent failure. Properties such as decentralization, resilience, and adaptability—are similarly essential in modern cryptographic systems operating in adversarial environments. This work proposes a swarm-inspired framework for chaotic cryptology in which encryption emerges from collective nonlinear dynamics rather than purely algebraic transformation. The project formulates a delay-coupled swarm model capable of exhibiting transitions between coherent and chaotic states. Within this framework, encrypted information is conceptualized as distributed state perturbations embedded across interacting agents. Sensitivity to initial conditions, bifurcation-driven transitions, and decentralized communication structure are analyzed as candidate mechanisms for secure message dispersion and reconstruction.

Preliminary work has established a formal analogy between delay-coupled swarm models and distributed cryptographic interaction frameworks. Candidate dynamical systems exhibiting bifurcation-driven transitions and chaotic milling have been identified as potential cryptographic primitives. Initial analytical exploration suggests parameter regimes in which sensitivity to initial conditions may support secure message dispersion. This research aims to bridge nonlinear dynamical systems theory and distributed cryptographic design, developing secure, adaptive, and fault-tolerant schemes in which security emerges from decentralized dynamic complexity.

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**Construction of a Single Point Coherent Thomson Scattering System at the Helicon Plasma Physics Laboratory's (HUPL) Helicon Plasma Experiment (HPX)**

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The Helicon Plasma Experiment (HPX) is relocating to the Howard University Plasma Physics Lab (HUPL) as our main tool for Fusion energy and adjacent ecosystem research. We will continue the work begun at the Coast Guard Academy and employ a high-energy incident YAG laser system with frequency doubled at 1064/532 nm up to 2.5 J of pulsed power. The system self-verifies collected data with a scattered wavelength shift of ~8 nm at 1064 nm and ~2 nm at 532 nm in our Thomson Scattering system. The collection optics architecture upgrade is currently underway which will be used to eliminate stray light with the existing volume phase holographic grating and an intensified changed-coupled device system at 532 nm and the General Atomics polychrometer at 1064 nm. HPX, with its small form factor, is an easily reconfigurable device. Larger machines - even those considered relatively small, like Columbia University's High Beta Tokamak-Electron Pulse (HBT-EP) have long recovery timescales after returning to "air" to make physical changes. Plasma temperatures in HPX are relatively cold by fusion standards. Single-point coherent scattered light will be difficult to distinguish from the incident laser. Until additional plasma heating scenarios are implemented, the system will rely on the collection optics precision to resolve the internal density measurements. Progress on HUPL, HPX, and the Thomson Scattering system will be reported.

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**Ciprofloxacin-Dipeptide Conjugates for Oral Drug Delivery Applications**

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Peptide–drug conjugates (PDCs) represent a promising class of therapeutic agents that integrate drug molecules with short peptide chains to enhance oral delivery. This targeted prodrug strategy leverages carrier-mediated transport to overcome limitations of intestinal absorption. The gastrointestinal tract expresses Peptide Transporter 1 (PepT1), a specialized transporter responsible for absorbing small peptides such as dipeptides and tripeptides. By conjugating a drug with a dipeptide-like structure, theresulting prodrug can utilize PepT1 to traverse the intestinal membrane and enter systemic circulation.This approach effectively circumvents barriers to oral absorption, including enzymatic degradation andpoor permeability, thereby improving bioavailability. In this project, we developed a novel ciprofloxacin–L-tryptophan–L-phenylalanine conjugate to enhance oral drug delivery. This conjugate was synthesized and evaluated for cellular uptake, transport mechanisms, cytocompatibility, and its potential as an efficient oral delivery system. Keywords: Ciprofloxacin, Peptides, Targeted drug delivery, Oral Drug Delivery applications

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**Unsupervised Speech in the Wild Challenge (UPS): BiMamba2 Masked Spectrogram Modeling**

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Self-supervised speech learning extracts transferable representations from unlabeled audio, which is essential for multilingual settings where transcripts and reliable language annotations are limited. We present a masked spectrogram modeling (MSM) system for the Unsupervised Speech in the Wild Challenge (UPS dataset), Open Filtering sub-track, with an emphasis on data selection strategies that reduce language imbalance during training. The UPS audio pool is large and highly multilingual, but the distribution is skewed toward high-resource languages. To prevent training from being dominated by a small number of languages, we enforce manifest-level balancing for the non-English portion by grouping examples by language and applying a per-language quota (cap) before filling a fixed multilingual budget. In our current setup, no single non-English language contributes more than 4,000 examples to the multilingual manifest, ensuring consistent representation of lower-resource languages throughout training. We train a BiMamba2-based MSM model on log-mel spectrogram segments (10-second chunks), reconstructing masked time-frequency regions to learn phonetic and speaker structure without supervision. The current training phase uses 200 hours of filtered audio (100 hours English, 100 hours non-English) aligned with the challenge's Few-Shot ASR, Zero-Shot Language ID, and Speaker Clustering objectives. Preliminary results show stable optimization, with validation loss decreasing from approximately 12.0 at early checkpoints (1k–2k steps) to 4.68 at 145k steps, indicating substantially improved reconstruction under multilingual balancing. We are scalling to larger filtered subsets and evaluate downstream transfer on the challenge metrics.

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**Visualizing Flow Effects on Quadcopter**
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Small uncrewed aerial systems (sUAS) are increasingly used for atmospheric and air-quality monitoring; however, the accuracy of onboard particulate matter measurements is strongly influenced by rotor-induced flow disturbances. Flow features such as downwash, turbulent wakes, and recirculation generated by rotary-wing platforms can bias optical particle counter (OPC) measurements and complicate sensor placement. This work uses wind tunnel smoke visualization to characterize the quadcopter aerodynamic environment and identify wake structures, recirculation regions, and zones of reduced disturbance that inform physics-based OPC sensor placement for in situ atmospheric boundary layer sampling. A DJI Matrice 100 quadcopter was modeled in Fusion 360 and scaled to 55% of its original size to enable wind tunnel testing. Because propeller aerodynamics dominate the local flow field, the propeller geometries were modified to preserve aerodynamic similarity at the reduced scale. Surface sanding and epoxy finishing were applied to minimize micro-scale roughness and maintain representative flow behavior. These experimentally observed flow features are used to validate computational fluid dynamics (CFD) simulations of the quadcopter flow field and to guide the selection of optimal OPC sensor locations. Field flight experiments are then used to evaluate the influence of sensor placement on observed particulate matter concentrations. The combined experimental, computational, and field results provide insight into sensor locations that minimize aerodynamic bias, supporting the development of reliable sUAS-based particulate matter sensing for atmospheric and environmental monitoring applications.

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**Measuring the Residual Resistivity Ratios of Superconductive Materials at Unexplored Temperature Ranges**
Presenter's Name: Quentin Taylor
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Oral Presentation*
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This research outlines the measurement of the residual resistivity ratio(RRR) of copper(Cu), niobium(Nb), and Tantalum(Ta). RRR is an important property related to sample purity and superconductivity, yet experimental RRR data are not available for Nb at superconducting temperatures. Using the four-point probe method and cryogenic cycling techniques, it is possible to obtain the resistivities of the target materials across a broader range than what is currently available. Expanded RRR information of Nb will aid in implementing the use of Nb in the design of engineered systems such as space electronic devices. The collinear four-point probe method is used to acquire resistivities of the testing samples across a range of 4-300 kelvin. A preliminary comparative study with Cu and Ta property data from the National Institute of Standards and Technology (NIST) is used to verify accurate results.

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**Modulation-Controlled Crystallinity in Zirconium-Based Metal–Organic Frameworks**
Presenter's Name: Alexander Tewobola
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Timothy Fidelis

Metal-organic frameworks (MOFs) are highly versatile materials with diverse applications due to their unique structures and properties. They are utilized in sensing biomolecules, gas capture, and the synthesis of organic materials. Zirconium-based MOFs (Zr-MOFs) exhibit high chemical and thermal stability, enabling them to retain structural integrity regardless of defects, making them ideal candidates for photocatalytic reactions such as water splitting and $CO_2$ reduction. MOF stability is strongly influenced by synthesis conditions and modulators, including organic and inorganic acids such as hydrochloric acid and formic acid. Herein, we describe the influence of two monotopic modulators, hydrochloric (HCl) and acetic acids ($CH_3COOH$), to control crystal growth and incorporate defects within the MOF matrix. The concentration of HCl was systematically evaluated from 0.00 to 60.5 mM. MOF crystallinity was determined by powder X-ray diffraction (PXRD), with major 2θ peaks at 7.3°, 8.3°, and 25.8°. A decrease in full-width-half-maximum was observed, correlating with increased crystallinity upon modulation. Use of acetic acid required higher concentrations, up to 1750 mM, to obtain similar crystallinity characteristics to the UiO-66 analogue.The characteristic peaks at 2θ 7.3°, 8.3°, and 25.8° correspond to reflection planes (111), (200), and (002) of UiO-66-HCl/$CH_3COOH$ crystals, while peaks at 2θ 5.7°, 6.5°, and 11.4° correspond to planes (111), (002), and (113) for UiO-67-$CH_3COOH$. These peaks are not well-defined in unmodulated UiO-66 and its analogue. These findings demonstrate that acid modulation is an effective strategy for tuning the crystallinity of Zr-MOFs and provide insight into structure–property relationships relevant to future applications

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**Angle-Dependent Ellipsometry for Probing Surface Conductivity in TaAs(112): A Transfer Matrix Approach**
Presenter's Name: Vishal Thakur
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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Topological Weyl semimetals, such as TaAs, have emerged as a frontier in condensed-matter optics due to their unique electronic structure, which hosts bulk Weyl nodes and exotic surface states known as Fermi arcs. Experimentally, optical spectroscopy of TaAs has revealed characteristic signatures, including a narrow Drude peak and linear frequency-dependent interband conductivity. However, most existing studies have focused on bulk-averaged responses, leaving the polarization- and angle-dependent optical properties—particularly on specific surface orientations like (112)—largely unexplored. In this work, we employ

angle-dependent ellipsometry combined with a Transfer Matrix Method (TMM) to disentangle the surface and bulk optical responses of TaAs. By utilizing variable polarization states, including ±45°, linear and circular polarizations, we investigate the anisotropic conductivity tensor and isolate the contributions of topological surface states. Furthermore, we analyze signatures of linear and circular dichroism to probe chirality-dependent optical selection rules. These results not only clarify the interplay between bulk and surface electrodynamics in Weyl semimetals but also highlight the potential of TaAs for polarization-sensitive optoelectronic applications.

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**Preliminary Process Design and Economic Evaluation of a Biological Methane Conversion Process**

Presenter's Name: Isaiah Thompson
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Cristiano Reis
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Methanotrophic bacteria oxidize methane using oxygen and can, under controlled conditions, accumulate methanol as an intermediate rather than fully oxidizing carbon to carbon dioxide. Translating that biological selectivity into a scalable process remains challenging because modest changes in conversion and selectivity can greatly increase gas handling requirements and downstream separation duties. In this work, we developed a steady-state DWSIM process model to support techno-economic analysis of a methane-to-methanol bioprocess. The flowsheet is built as a scenario engine in which reactor performance is defined from literature parameters on biological metrics for CH4 conversion, methanol selectivity, productivity, and outlet compositions, then propagated through unit operations representing gas conditioning and product recovery. Our simulation in DWSIM generates consistent stream tables, energy balances, and equipment duties that can be translated into capital and operating cost estimates. Parameter sweeps across literature-bounded performance ranges are used to identify the dominant economic levers and the biological targets required for viability. This framework links microbial performance to process-level costs and establishes a baseline for future upgrades that incorporate coupled kinetics and gas–liquid mass transfer.

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**Cross-Silo Federated Learning for Radiomics**

Presenter's Name: Anthony Tucker
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
Faculty Advisor: Saurav Keshari Aryal
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Co-authors: Saurav Keshari Aryal

Radiomics allows for the extraction of features from medical images for predictive modeling, but due to data privacy regulations, training models on multi-institutional datasets is not feasible. We propose a cross-silo federated learning framework that allows hospitals to jointly train radiomics models without sharing patient data. Our solution utilizes the Flower framework and the radMLBench benchmark (50+ radiomics datasets) to create a multi-hospital federated learning setting. Each hospital is given unique datasets, as seen in real-world settings. We handle feature heterogeneity by using intersection-based feature alignment, making the model compatible across hospitals. The framework utilizes a four-layer neural network architecture that is trained locally at each hospital. The central server combines the model parameters using Federated Averaging (FedAvg), weighted by the number of samples. We compare the federated learning method with a centralized approach that trains on aggregated data using accuracy as a metric. Although the centralized approach has the advantage of direct access to all the data, the federated approach is able to attain similar results while preserving the privacy of the data, thus proving that collaborative learning can come close to the centralized approach without breaching the privacy constraints. The framework is applied to brain-related disorders (gliomas and glioblastomas) using MRI images, thus illustrating how different institutions can work together to collaboratively enhance the performance of the model while being HIPAA compliant.

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**Self-reported survey question rewording can negatively impact accuracy of prioritization tools**

Presenter's Name: Taylor Vander
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Co-authors: Qingshi Sun, Nathan Justin, Eric Rice, Phebe Vayanos

Authors: Taylor Vander, Qingshi Sun, Nathan Justin, Eric Rice, Phebe Vayanos

Background: In Los Angeles and in many other communities across the United States, a triage and prioritization tool is used to prioritize individuals experiencing homelessness for very scarce housing resources and services. In LA, computer scientists and social scientists, using a community-engaged approach, have built a new artificial intelligence (AI)-driven prioritization tool that was anticipated to be more accurate and less biased. Simultaneously, they have reworded the tool's very sensitive self-reported survey questions to make them more socially sensitive, racially aware, clearer, and less re-traumatizing, in the hope that all individuals, independently of their race, will feel comfortable sharing their real experiences to get the support they need. These changes are now being deployed under the name LA HAT - Los Angeles Housing Assessment Tool. Methods: While well-intentioned, the tool rewording is anticipated to introduce distribution shifts: changes in the distribution of the responses. In this paper, we show these shifts can significantly affect the performance of prioritization tools in deployment. Results/Conclusions: In particular, we demonstrate that an AI-driven prioritization tool that ignores these shifts in the learning phase can perform significantly worse than anticipated in terms of accuracy, raising awareness on the need to explicitly account for shifts when training and evaluating any model trained on the data before rewording.

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**Effect of textile-derived nanoparticles on the pathogen-trapping potential of Porcine Gastric Mucin (PGM).**

Presenter's Name: Keayla Vanderstoop
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Mucins are glycoproteins present in mucus, a primary biological barrier that traps pathogens within a sticky matrix. This entrapment of pathogens relies on binding interactions between viral envelope proteins and the viral sugars and the dense sugar chains (glycans) decorating the mucin backbone. However, micro and nanoparticles (NPs) that shed from common textiles (cotton, rayon, and polypropylene) may interfere with this 'trapping' mechanism. This study aims to investigate how textile-derived NPs alter the physical structure of Porcine Gastric Mucin (PGM). Dynamic Light Scattering (DLS) is used to observe shifts in PGM particle size and aggregation after exposure to fluffed textile fibers. Mucin glycan accessibility will be probed as a measure of pathogen entrapment, since pathogens primarily bind to the glycans on mucin. Lectins are proteins that bind glycans, and lectin-binding assay via DLS will be performed to assess whether NPs mask or alter pathogen-binding sites. Given the prevalence of these materials in hygiene products, garments, and personal protection equipment, understanding these interactions is vital for public health and the manufacturing of 'safe' products.

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**Characterization and Mechanical Exfoliation of Graphullerene for Use in Carbon-Based Electronic Devices**

Presenter's Name: Victoria Vinson
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Co-authors: Joi Malone, Malik Williams, Kim Lewis

Within the last two decades, two-dimensional (2D) materials have attracted immense attention due to their unique structural, electrical, and optical properties. Carbon has garnered much of that attention following the discovery of the first 2D material: graphene. Acquired through mechanical exfoliation of the three-dimensional (3D) van der Waals (vdW) crystal graphite, graphene is one of many natural and synthetic allotropes that attest to carbon's unique chemical and physical characteristics. The continued discovery of new allotropes is motivated by their remarkable attributes (i.e., the ability to exhibit various hybridizations and geometries). Recently, a materials research group at Columbia University synthesized a new allotrope: a 2D crystalline polymer called graphullerene and its 3D vdW equivalent dubbed graphullerite. Carbon allotropes are often functionalized or doped to enhance select properties. Previous studies have characterized the electron-transport properties of the new allotrope doped with magnesium ($Mg_4(C_{60})_\infty$). We plan to utilize the 2D, undoped product as a candidate for device applications. Thus far, our attempts at exfoliation of graphullerite have yielded relatively large, thin flakes (tens of microns). For these studies, we will use scanning electron microscopy and atomic force microscopy to identify flakes of optimal size and thickness. Then, we will employ a cryogenic technique to fabricate graphullerene test beds. Through our research, we aim to further extend the capabilities of carbon allotropes as components within electronic devices to leverage their transport properties.

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**Synthesis of Imidazole Derivatives via Groebke-Blackburn-Bienaymé (GBB) Reaction for the Inhibition of Valosin-containing Protein (VCP/p97)**

Presenter's Name: Kamryn Walker
Classification: Graduate Student
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Valosin-containing protein, also known as AAA+ ATPase p97, is a potential therapeutic target due to its upregulation in cancer cells, such as breast carcinomas, and its contribution to maintaining cellular homeostasis. VCP is an evolutionarily conserved component of the UPS that recognizes and translocates ubiquitinated proteins from the endoplasmic reticulum to the cytosol for degradation. Research has shown that the inhibition of this protein leads to proteotoxic crisis and induces apoptosis in cancer cells while reserving normal cells. Research has also shown that proteasome inhibitors have failed to sustain favorable outcomes in solid tumors, while p97 inhibitors can be effective in both solid and hematological tumors. Our lab has developed imidazole-based compounds as potential allosteric binders to VCP based on rational design and computational methods. Previous research expanded the Groebke-Blackburn-Bienayme' Reaction (GBBR), a well-established multi-component method for forming imidazoles using cyclic amidines, to include acyclic amidines. We utilized the GBBR with acyclic amidines to create and test a diverse library of imidazole analogs. Additionally, we optimized this reaction by assessing individual components to enhance the efficiency and yield of GBB reactions using acyclic amidines in a diversity-oriented synthesis approach. Finally, we began designing a probe to asses the chemical environment of VCP, aiming to identify the mode of inhibition and improve the design of future imidazole compounds. These derivatives showed promise to inhibit VCP, and the findings suggest that these analogs have the potential to treat cancerous cells.

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**First/Last-Mile Transit Access and Pedestrian-Vehicle Conflict: Trajectory-Based Safety Analysis in Washington, D.C.**

Presenter's Name: Michael Walker
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*Presentation Type: Poster Presentation*
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First/last-mile transit access—the walking segment of a trip between a transit station and one's origin/destination—encompasses distance, route directness, infrastructure conditions, and crossing frequency, yet it remains one of the most overlooked aspects of transit-aligned pedestrian risk. Indirect street layouts and frequent vehicle interactions create pedestrian-vehicle conflicts—near-miss events that conventional crash data fails to capture. These conflicts, quantified through safety indicators such as Time-to-Collision (TTC) and Post-Encroachment Time (PET), can reveal infrastructure deficiencies before collisions occur.. This study develops a predictive safety model to examine how indirect or lengthy walks between transit stations and destinations contribute to risky pedestrian crossings and vehicle near-misses in Washington, D.C. Using publicly available pedestrian and vehicle trajectory data, we calculate TTC and PET values at interaction points within 500-meter catchments surrounding transit stations, focusing on factors such as street connectivity and walking distance to gauge conflict risk. The analysis aggregates risk at intersections, with preliminary data processing yielding 9,717 interaction records across 206 intersections. Results are expected to reveal concentrated clusters of low TTC and PET values at intersections with higher walk-penalty scores and limited crossing infrastructure. Stations with better crossing availability and lower walk penalties are anticipated to show fewer near-miss events per catchment. These findings will demonstrate that trajectory-based near-miss metrics can identify infrastructure deficiencies before collisions occur. The model will be validated using crash data, and the results will inform a prioritization framework for crossing improvements, network reconfigurations, and intersection redesigns to enhance pedestrian safety around transit access points.

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**User-focused Design & Development of Responsible Voice-based AI for Tactical Decision-Making**

Presenter's Name: Nia Walton
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Co-authors: Armisha Roberts, Gloria Washington

Recent advances in generative modeling have significantly improved the realism of synthetic speech. Early speech synthesis systems relied on rule-based or concatenative techniques, but modern neural text-to-speech and voice conversion models now generate audio that can closely resemble natural human speech. As these systems have improved, research has increasingly focused on how to reliably detect AI-generated voices, particularly in security and authentication contexts where voice functions as a behavioral biometric. Detection approaches in literature generally fall into two methodological groups. Classical machine learning methods rely on engineered acoustic features such as entropy measures or Mel Frequency Cepstral Coefficients (MFCCs) combined with kernel-based classifiers, including support vector machines. More recent work uses deep neural network architectures such as convolutional, recurrent, residual, and graph-based models trained on spectrogram or waveform representations derived from short-time Fourier transforms. Many of these systems treat time–frequency representations as image-based inputs, while others operate directly on the raw waveform. Despite architectural differences, most approaches rely on short-time segmentation to model temporal and spectral structure. Across these methods, recurring challenges include limited generalization to unseen spoofing techniques, sensitivity to noise and transmission distortions, and vulnerability to adversarial manipulation. As generated voices become increasingly human-like, a natural next step is to examine how variation in human dialect may influence the accuracy and reliability of these detection systems.

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**Beyond Accuracy: Forensic Evaluation of Trust and Grounding in LLM Outputs**

Presenter's Name: Christopher Watson
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Large language models (LLMs) are increasingly used in high-stakes decision support to summarize situations, propose actions, and communicate rationale. While these systems often produce fluent and plausible responses, such outputs can obscure uncertainty, weaken grounding, and invite over-reliance by human decision-makers. We present Project Comprehension, a forensic evaluation framework that examines LLM outputs as decision-relevant artifacts rather than isolated answers. The framework combines operationally grounded scenarios with human-centered annotation to assess plausibility, uncertainty signaling, grounding transparency, comprehension support, and actionability. Across empirical testing, we find that surface-level response quality is only weakly predictive of grounding transparency: a non-trivial subset of responses appear clear and actionable while providing limited justification or source signaling. These patterns highlight an interpretive risk that is not captured by accuracy-focused evaluation alone. We discuss how forensic evaluation can support trust calibration, assurance practices, and the design of language-enabled decision support systems that better align with human judgment in high-stakes contexts.

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**Metacognitive AI and Predictive Classification**

Presenter's Name: Khayri White
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Metacognitive AI (Artificial Intelligence) is a growing field that develops AI architectures inspired by human cognition. The dual-process cognitive theory of human decision states that humans have two modalities of decision making, "thinking fast and slow." Our research implements the human cognitive modality of "thinking fast" in AI architectures because

of its potential to improve AI classification speed while minimizing tradeoffs in accuracy for "thinking slow" modalities, which tend to have high accuracy. We developed an AI predictive classification architecture for real time hand-gesture recognition. This AI architecture is modeled and evaluated using a controlled rock-paper-scissors game experiment, which we chose because the game is constrained by time and computing resources. The concept of our AI architecture is equivalent to an "unbeatable" rock-paper-scissors game because the AI model can instantly classify the hand gesture upon recognition in a frame, giving the illusion that the model is predicting what gesture the player is going to throw far before the hand reaches its final state. We further explored predictive classification by integrating our AI architecture onto a robotic hand with a camera for gesture recognition. This allows us to evaluate the AI architecture with realistic time and computing resource constraints given by the physical mechanics of the robotic hand. Our study proves that the rapid predictive classification speed of the AI architecture can make up for the additional time taken by the robotic hand to move to its final state.

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**Development of High-throughput Testing for Organic Electrochemical Transistors (OECT's)**

Presenter's Name: Osei-sekou Whylie
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Organic electrochemical transistors (OECTs) are polymer-based, mixed ionic-electronic devices that enable low-voltage operation, showcase high transconductance values, and can directly interface with biological environments. OECTs are a promising new technology for wearable biosensors, neural interfaces, flexible diagnostic platforms, and artificial synapses in neuromorphic systems. However, much of the testing is still in its early stages, and with high-dimensional parameters, it requires scalable characterization tools. Thus, leading to the development of a high-throughput testing for OECTs using printed circuit boards (PCBs) and an integrated system for 60-channel batch testing OECT. The system was designed to select through all 60-channels of the OECT with 60 drain and 60 source selectable inputs through a multiplexer network. Eight 16:1 multiplexers were daisy-chained into two 4:1 multiplexers, allowing for the analysis of 120 individual inputs through 6 Arduino control pins. After testing concluded for the first design, a redesign was made to improve modularity and component replacement by separating the 60-channel chip into a separate, independent PCB board. This platform was validated using a PEDOT:PSS-based OECT device and an N- and P-type MOSFET, benchmarking against direct terminal measurements. The key parameters are ON current, transconductance, and threshold voltage. There were small percent differences in ON current (7.73%) and threshold voltage (11.67%), with a larger but acceptable deviation in transconductance (24.89%), demonstrating scalable and reasonably accurate multiplexed characterization. This system streamlines testing, reduces human error, and enables automated, rapid OECT screening. It lays the foundation for standardized benchmarking and future integration of AI-driven optimization.

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**Regioselective Synthesis of Iodo-o-Carboranes for Application in Rare Earth Extraction**

Presenter's Name: Danielle Wood
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*Presentation Type: Poster Presentation*
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Co-authors: Alyssa Richardson, Mia Payson

Each year, the United States generates approximately 158 million tons of coal fly ash (CFA), a byproduct of coal combustion containing significant concentrations of valuable rare earth elements (REEs) (156–590 ppm). This underutilized domestic resource represents a potential 74,000–106,000 tons of rare earth oxides (REY), which are critical for renewable energy systems, electronics, and defence technologies. Despite this potential, the United States remains heavily dependent on imported REEs, and no large-scale industrial recovery process currently exists. This project describes the investigation of carboranyl ionic liquids (CILs) to serve as a sustainable and tuneable platform for extracting REEs from coal fly ash, with the goal of reducing the environmental impacts of traditional mining while strengthening domestic supply chains. A key component of this work involves the regioselective functionalization of carboranes. Iodination of decaborane yields 1-iodo- and 2-iodo-decaborane which can be separated via recrystallization from heptane. Cage-closing of 1-iodo- or 2-iodo-decaborane in the presence of an alkyne and Lewis base should yield the two regioisomers, 9-iodo- and 8-iodo-o-carborane, respectively. However, it was found that when using 2-iodo-decaborane in the presence of N-butyl-N-methyl imidazolium chloride as Lewis base the thermodynamically preferred 9-iodo-o-carborane isomer was formed rather than the desired 8-iodo product. Described herein are the considerations for this mechanistic re-arrangement and conditions to selectively isolate 8-iodo-o-caborane.

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**Evaluating Pedestrian Safety and Accessibility Around WMATA D.C. Metrorail Stations**

Presenter's Name: Bailey Zalewski
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*Presentation Type: Oral Presentation*
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Safe and accessible pedestrian environments are essential for effective transit use, yet the relationship between pedestrian safety and station access remains understudied. This study evaluates how pedestrian crash patterns and walkability conditions surrounding WMATA Metrorail stations in the District of Columbia relate to station-level ridership across pre- and post-COVID-19 periods. Walkable catchment areas are defined using a ½-mile network-based walking distance, reflecting the standard 10-minute walk in transit accessibility research. Pedestrian crashes occurring within these catchments are quantified and categorized by severity, then combined with accessibility measures—including catchment size and employment density—into a normalized, equally weighted Safety-Accessibility Index. Ridership will be analyzed

separately for pre-COVID (2017–2019) and post-COVID (2022–2024) periods to minimize pandemic-related distortions. GIS-based heat maps and correlation analysis will be used to identify spatial patterns, station-area risk concentrations, and relationships between the index and ridership. Results are expected to reveal substantial variation in safety conditions across stations, with higher crash frequencies likely concentrated around downtown stations and major transfer hubs. Stations combing strong accessibility with poor safety may also emerge, reflecting riders' prioritization of convenience. Post-COVID ridership is anticipated to remain lower overall, likely due to remote work trends rather than safety conditions alone. The study will demonstrate a replicable method for station-area safety assessment and clarify whether pedestrian safety meaningfully influences ridership or whether convenience remains the dominant factor despite elevated crash risk.

**Not Waiting for Crashes: Reliable Prediction of Pedestrian Close Calls from Statewide Video**

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Pedestrian fatalities in the United States have increased by 80% since 2009, underscoring the need for proactive safety strategies that do not rely solely on historical crash data. This study develops predictive models for pedestrian-vehicle close calls—near-miss events where collision was narrowly avoided through evasive action—using video-derived data from 18 unsignalized intersections across Minnesota. The dataset comprises 3,314 pedestrian-vehicle interactions with 16 identified close calls (0.48% rate), presenting an extreme class imbalance challenge.

We compare class-weighted logistic regression and LightGBM gradient boosting under two validation schemes: pooled stratified cross-validation for within-site deployment and leave-one-site-out validation for cross-site transferability. Results show that uncalibrated LightGBM achieves strong within-site discrimination (PR-AUC = 0.386, ROC-AUC = 0.978), while post-hoc calibration methods unexpectedly degrade performance. Cross-site transferability is more limited, with PR-AUC declining by 38%; however, relative risk rankings remain informative (ROC-AUC = 0.932), enabling identification of high-risk locations without site-specific training data. Feature importance analysis reveals that temporal variables dominate as proxies for operational context, while pedestrian stopping midway and non-yielding vehicle counts emerge as the strongest directly observable behavioral predictors. The concentration of close calls at a small number of sites constrains generalizable risk pattern extraction but supports targeted intervention strategies. This work demonstrates the feasibility of video-based predictive screening for pedestrian safety while highlighting the methodological challenges posed by extreme class imbalance and spatial heterogeneity. The findings provide guidance for agencies seeking to prioritize safety interventions before crashes occur.

# SOCIAL SCIENCES

**Losing Market Access, Losing Jobs: The Impact of AGOA Suspension on Industrial Employment**
Presenter's Name: Beza Afework
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*Presentation Type: Oral Presentation*
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This paper examines how the suspension of African Growth and Opportunity Act (AGOA) trade preferences affects industrial employment in Sub-Saharan Africa. Using panel data on 42 countries from 2001 to 2024, I combine two-way fixed effects estimation with entropy balancing and the Callaway-Sant'Anna difference-in-differences estimator to address the non-random nature and staggered timing of suspensions. The effects of suspension depend critically on duration. Short suspensions reduce total industrial employment by about 3.7 percentage points, with female employment declining by roughly 4.1 percentage points, suggesting women bear a disproportionate share of the losses. Medium-duration suspensions show no significant negative effects, consistent with firms and workers adjusting to the shock over time. Long suspensions again reduce employment significantly, suggesting that prolonged loss of preferential access erodes the industrial base in ways that adaptation cannot offset. Event study estimates confirm that effects build gradually, reaching four to five percentage points within a decade of suspension.

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**An integrated Analysis of Economic and Enviromental interactions in Predicting Health Outcomes in Ghana**
Presenter's Name: Zoya Afreen
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*Presentation Type: Poster Presentation*
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Health outcomes in Ghana remain unevenly distributed despite national progress in healthcare access and child survival. Research suggests that economic disadvantage and environmental conditions both shape patterns of illness, yet these factors are often examined separately. This study explores how economic and environmental conditions interact to predict health outcomes in Ghana. Using publicly available data from nationally representative surveys, this project examines indicators such as household wealth, maternal education, water and sanitation access, cooking fuel type, and urban–rural residence in relation to child health outcomes, including under-five mortality and recent infectious disease prevalence. Rather than treating these variables as independent predictors, the study evaluates whether environmental risks are more strongly associated with poor health outcomes among economically disadvantaged households. By analyzing the combined effects of socioeconomic and environmental conditions, this research aims to provide a more integrated understanding of health inequality in Ghana. Findings will contribute to policy discussions focused on reducing preventable morbidity and mortality through coordinated economic and environmental interventions.

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**Hashtag Activism and New York Public Housing: Exploring the Role of Social Media in Addressing NYCHA Challenges**
Presenter's Name: Lillian Agosto maldonado
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School/College: Communications
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Social media serves as a reflection of urban communities and public perceptions, offering insights into human behavior and social issues (Wu et al., 2016). Hashtags are a form of activism, highlighting marginalized voices and political counterpublics (Jackson et al., 2020). The New York City Housing Authority (NYCHA) oversees public housing, often marked by poverty, health disparities, and systemic barriers (McAuliff & Rehm, 2020). Studies reveal higher rates of asthma and obesity among boroughs like The Bronx public housing residents, underscoring the need to address these challenges. This research examines how hashtags are used on social media to highlight systemic neglect, inadequate living conditions, and the urgent need for policy reform in New York City's public housing. Using critical textual analysis, the study will explore how these hashtags raise awareness, share personal experiences, and mobilize community action. Additionally, interviews with social media activists will provide insights into the relevance of digital platforms for advocacy. Motivated by the need to amplify marginalized voices and address public housing challenges, this research aims to demonstrate the role of social media in advocating for social justice and driving policy change.

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**The Social Influence of Hip Hop in Black Communities**
Presenter's Name: Araba Aidoo-apau
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Msia Clark
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Hip hop has functioned as more than just a musical genre; it is a cultural movement that impacts the way individuals within the Black community respond to their lived realities. It has served as a powerful tool for storytelling, resistance, identity formation, and social critique. Furthermore, hip hop has acted as a site for controversial and contemporary issues that interrogate narratives around misogyny and violence, highlighting how these dynamics complicate its social impact. This presentation examines the influence hip hop has had on social contexts within Black communities. Drawing from historical analysis,

cultural theory and contemporary discourse, this presentation will also explore how hip hop has informed political consciousness and national dialogue. Particular attention will be given to the ways in which hip hop has been able to articulate experiences related to gender, race, class, structural violence, and survival, while also offering opportunities for empowerment, resistance, and innovation. Ultimately, this presentation argues that understanding the social influence hip hop has had on cultural communities is essential to understanding how these communities continue to navigate their worlds. In addition, this presentation aims to stimulate discourse that examines the future of hip hop as a viable method for expressing contemporary social issues.

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**Critical Computational Geographies: Leveraging Mathematical Models to Explore Binary Classifications of Race in Neighborhood Dissimilarity**

Presenter's Name: Nathan Alexander
Classification: Junior Faculty/ Lecturer/ Instructor
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Nathan Alexander
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Co-authors: Nicholas Angelo, Emmanuel Christian, Kade Davis, Amari Gray, Ethan Gwinn, Hye Ryeon Jang, Angel Mochoge, Myles Ndiritu, Bayowa Onabajo, Andrew Ratcliff, Felisha Shepard-White, Theron White

This collaborative research inquiry applies an abstract mathematical framework to assess race in neighborhood dissimilarity through the binary classification structure embedded in the Index of Dissimilarity. Using data from the U.S. Census, we examine how racial categories are operationalized within a two-group comparative model and how these classifications shape spatial interpretations of segregation in the United States. By mapping dissimilarity scores and an isolation algorithm across counties in more than ten U.S. cities, we identify a series of "Dividing Walls" and analyze how binary constructions of race at the city and neighborhood levels produce measurable patterns of segregation that map onto local historical inequities. Our approach emphasizes the mathematical properties of spatial analysis to understand how relationships between neighborhoods influence racial isolation. This study contributes to critical geographies scholarship by clarifying how mathematical form, classification decisions, and spatial topology interact to define and measure neighborhood inequality.

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**Listen to Black Women: A Critical Thematic Analysis of Black Women Political Social Media Influencers**

Presenter's Name: Avery Allen
Classification: Graduate Student
School/College: Communications
*Presentation Type: Poster Presentation*
Faculty Advisor: Loren Saxton-Coleman
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This dissertation examines how Black women political social media influencers functioned as digital political communication professionals through contracts with progressive political PACs and social action organizations during the 2020 and 2022 U.S. election cycles. Using digital Black feminism as a framework, the study explores how these influencers practiced agency, navigated complicated allegiances of paid contracts, and advanced dialectics of self and community interests in their Instagram content. The research employs a multi-phase critical thematic analysis approach: semi-structured interviews with Black women political influencers, followed by critical thematic analysis of their Instagram posts. A final phase triangulates the analyses. This methodology aims to center Black women's experiences and contributions in an era where social media influencers are becoming professionalized in political communication. Situated within the current age of digital political communication, this study recognizes the historical marginalization of Black women while highlighting their vital role in shaping political discourse. It argues for centering Black women political influencers as digital strategists as the field evolves. This research addresses gaps in literature regarding political influencer contracts and the intersection of race, gender, and digital political engagement. The findings have implications for understanding the evolving nature of political communication and the crucial contributions of marginalized voices in digital media.

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**Black Love on Screen: Exploring the Impact on Black Women and Intimate Partner Violence**

Presenter's Name: Tatiana Allen
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
Faculty Advisor's email: fatou.sow@howard.edu

Black women have been statistically shown to have the highest rates of experiencing intimate partner violence (IPV) among racial demographics (Rice, J. et al. 2020). Yet, the crisis is rarely highlighted in the media, leading to a lack of advocacy and stigmatization. This study seeks to determine if there is a connection between the messaging in Black love films and the IPV Black women face in their communities. The researcher will use a mixed-method approach of surveys and focus groups to analyze participants' perspectives on themes in films while gaining insight into their perceptions of IPV. Black women and men from ages 18-26 attending Howard University will be selected through convenience and purposive sampling. The researcher hypothesizes that Black romance films have further diminished awareness of IPV within the Black community. The research aims to understand the impact that Black romance films can have in shaping societalattitudes toward IPV advocacy and the recognition of victimization.

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**No Taxation Without Representation: Voter Apathy and Information Overload**

Presenter's Name: Kessonga Allen
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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Despite being founded on the principles of proper representation, voter apathy in the United States is very high, with only half of eligible voters casting ballots in the 2022 election cycle (US Census Bureau, 2023). A potential issue of voter apathy in America is the phenomenon of "information overload," when too much information confuses and disengages voters. This research investigates the relationship between voter apathy and information overload, honing in on Black working-class Millennial and Gen Z populations in the District of Columbia. While the dissemination of political information has caused confusion amongst voters, the widespread accessibility of digital media has had a strong impact—especially in marginalized communities such as Black America. This paper shall utilize surveys and intervews to measure the relationship between voter apathy and information overload. The researcher hopes to identify strategies to enhance political engagement and improve voter turnout among Black Americans.

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**The Drastic Effects of Fatherlessness on Children**

Presenter's Name: Lauryn Anderson
Classification: Undergraduate Student
School/College: Business
*Presentation Type: Poster Presentation*
Faculty Advisor: Gbadebo Odularu
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My research highlights that fathers help aid their children in their psychological adjustments and when they are not present to do that, their child is left to struggle:, "Given that presence of fathers in the family and involvement in their children's lives are factors associated with better psychological adjustment in adolescence, it could be argued that absence of the biological father in a child's life may constitute a risk for psychological maladjustment" (Culpin et al. 2616). When a father is present in their child's life, their children tend to adjust better psychologically. This suggests that when a father is not present, children have a harder time adjusting, which could contribute to poor mental health. Fathers fulfill certain important roles in their child's life, and when those roles are left unfilled, children end up seeking other ways to compensate for that, researchers say, "there are unique parenting roles which make the fathers important such as disciplinarian, protector and role model. If therefore these unique roles have no one to fill them the child may end up seeking comfort in the streets with gangs. These aspects may then lead to feeling of loss which would then affect the self-esteem of a child. Literature revealed that due to father absence self esteem is reduced and depressive moments are most likely to occur." (Bothwell et al. 103).

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**U.S. Foreign Assistance and Militancy in West Africa**

Presenter's Name: Garrison Andrews
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Ariel White
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Does U.S. Foreign Assistance reduce state and non-state involved militant violence? As of 2025 United States Foreign Assistance at large is saw major readjustment under the Trump Administration, such as the downscaling of the United States Agency for International Development (USAID). It is therefore pertinent to understand its record of layered impacts within various forms including humanitarian and development assistance. Development assistance focuses on proactive longer-term challenges ranging from improving infrastructure and health to raising education standards and promoting democracy. Humanitarian assistance in theory focuses on many of the same issues through a more reactionary approach. Within this particularly polarizing political landscape, I pose the question of whether the expansion of U.S. Development and Humanitarian Assistance has the layered impact of reducing state-involved and organized non-state-involved violence in West Africa? My approach seeks to answer this question through the analysis of existing data on reported violence-related deaths from the (UCDP, n.d.) and United States Foreign Assistance data from (ForeignAssistance.gov). Through the use of regression-based modeling and temporal trend analysis employing data collected from six different West African nations with differing levels of state and non-state involved violence ranging from 2001 to 2023, it is my finding that neither United States Development nor Humanitarian Assistance significantly reduces state-involved or organized non-state involved violence. These findings indicate that there may need to be a furthering of U.S. Development Assistance in proactively getting ahead of challenges like militancy.

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**The African Union in Multilateral Diplomacy: Institutional Strategies, Constraints, and Policy Influence in Global Governance**

Presenter's Name: Ambachew addisu Anjulo
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Prof. Paul Tiyambe Zeleza
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This dissertation examines the role of the African Union (AU) in multilateral diplomacy and global policymaking, focusing on how the AU operates as an institutional and strategic actor within major international governance arenas. While the AU has become increasingly visible in global forums addressing peace and security, trade, development, health, education, and environmental governance, its actual influence on global decision-making remains uneven and insufficiently understood. Existing scholarship often treats the AU either as a normative symbol of pan-African unity or as a constrained regional organization, without systematically analyzing its diplomatic strategies, institutional capacities, and structural limitations. Drawing primarily on Rational Choice Institutionalism, and complemented by Constructivist and Postcolonial perspectives, this study investigates how the AU coordinates member-state interests, engages multilateral institutions, and navigates global power asymmetries. Methodologically, the research employs a qualitative multi-method design combining archival and document analysis with a limited number of elite interviews conducted primarily at the African Union Headquarters in Addis Ababa and the United Nations Headquarters in New York. Comparative analysis across selected policy domains allows the study to identify cross-sectoral patterns as well as issue-specific variations in AU diplomacy. The dissertation contributes to African Studies and International Relations by offering a theory-informed and empirically grounded assessment of African collective

diplomacy. It also provides policy-relevant insights into how the AU can enhance its institutional effectiveness and diplomatic influence in an era of multipolarity and global uncertainty.

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**Undershadowed: Black Women Sex Trafficking and the Me Too International Movement**

Presenter's Name: Cirace Annan
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Michelle Dovil
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Sex trafficking is a severe form of exploitation that disproportionately affects Black women, revealing immense racial disparities rooted in systemic racism. While the resurgence of Me Too International brought global attention to sexual and gender-based violence, Black sex trafficking victims remain marginalized within the movement's framework. Through a content analysis of the official Me Too website and annual reports, this study reveals that sex trafficking receives significantly less mention and fewer dedicated resources than other forms of exploitation. Grounded in Critical Race Theory, the research demonstrates how institutional practices and policy gaps reinforce inequities in access to healing and representation, leaving victims to fall through the cracks of potential legislative and restorative initiatives. Ultimately, this paper identifies critical failures in current advocacy and calls for specific inclusivity to ensure equitable protection and support for Black women sex trafficking victims.

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**Interconnectedness as a Pathway to Black joy**

Presenter's Name: Tatiana Anthony
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Zoeann Finzi-Adams
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Co-authors: Zoeann Finzi-Adams

While the negative mental health outcomes of chronic anti-Black racism experienced by African Americans are well documented (Williams &Williams-Morris, 2000; Clark, 2001; Jackson et al., 2018), fewer studies have examined the positive lived experiences of African Americans, including experiences of Black joy (Tichavakunda, 2022). For context, Black joy has been defined as ". . . a state of psychic contentment, an enduring feeling of "enoughness," and an experience of racial pride despite deficit narratives about Black identities" (Williams, 2022, p. 370). While the term Black joy is relatively recent, the phenomenon itself has been long rooted in Black history. Black psychologists have long emphasized interconnectedness as a cultural strength within the Black community which is rooted in the African worldview that everything and everyone in the universe are inherently interconnected (Parham, 2009). Interconnectedness continues to be a protective factor and means to sustain Black joy among African Americans (White & Parham, 1990). This poster examines the evolution of interconnectedness as a component of Black joy.

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**The Effects of Self-efficacy and Coping Strategies on the Relationship between Stress and Psychological Well-bieng among Mother's Caring for Minors**

Presenter's Name: Meshai Anthony
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Debra Roberts
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In 2024, there were 3,622,673 births in the United States (CDC, 2025). Motherhood involves both positive (eustress) and negative (distress) stressors that influence mental health outcomes. Existing research consistently demonstrates direct relationships between stress and psychological well-being (PWB) among Black mothers; however, less is known about how one's perceived ability and one's coping strategies shape these relationships. Guided by Lazarus and Folkman's transactional model for stress and coping, Bandura's social learning theory, and Bronfenbrenner's ecological theory, this research will investigate the impact of self-efficacy (perceived thought control ability; PTCA) and coping strategies (problem-focused, emotion-focused, and dysfunctional) on PWB in the context of stress among Black mothers caring for minors. Regression analysis using Hayes' PROCESS model 4 will be used to test the following hypotheses: H1: There will be a negative correlation between stress and PWB among Black mothers caring for minors. H2: Stress will be negatively associated with PTCA. H3: PTCA will moderate the relationship between stress and PWB where high PTCA will protect the PWB when stress levels are higher, while low PTCA will threaten the PWB when stress levels are higher. H4: Coping styles will moderate the relationship between stress and PWB where using more problem and/or emotion-focused coping will buffer the relationship when stress levels are higher, while more dysfunctional coping will threaten the relationship when stress levels are higher. Implications of the findings will be discussed within the context of public health as it pertains to Black mothers caring for minors.

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**Understanding Medication Adherence in Immigrant Life: Building a Conceptual Framework**

Presenter's Name: Susie Asamoah
Classification: Professional Student
School/College: Social Work
*Presentation Type: Poster Presentation*
Faculty Advisor: Altaf Husain
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Medication adherence is a critical determinant of health outcomes, yet immigrant populations, particularly West African immigrants, face unique cultural influences and barriers that affect their ability to follow prescribed regimens. These factors are not abstract—they manifest in concrete behaviors and daily routines, spanning individual, social, organizational, and policy levels, with direct implications for work,

family responsibilities, and social engagement. To better understand these influences and guide culturally sensitive interventions, a conceptual framework that integrates evidence-based theories is needed. This conceptual framework draws on empowerment theory highlighting the role of self- efficacy and knowledge in enabling immigrants to manage their medication. Social ecological models emphasize the multilevel determinants of adherence and a social constructive perspective influences social and cultural and cultural norms of health beliefs.

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**The Threat of Political Corruption to Environmental Sustainability in West Africa**

Presenter's Name: Ama Baffour
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Ronald Smith
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Corruption is a threat to the political and economic development of West Africa. Previous research asserts that political corruption hinders economic growth and sustainability in West African countries and promotes environmental degradation. How does political corruption affect environmental sustainability within these countries? I hypothesize that countries in West Africa with high levels of political corruption will have lower levels of environmental sustainability. I use the Political Corruption Index and the Bertelsmann Transformation Index to discover correlates and contributors in the relationship between political corruption and environmental sustainability in five countries in West Africa. This study can inform policy decisions for countries where high levels of political corruption negatively affect environmental sustainability.

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**The Complex Reality of African American Mental Health: Beyond the Terminology**

Presenter's Name: Samia Bell
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Nicole Bao
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Mental illness has been a suppressed topic in the United States for hundreds of years, especially for African Americans. "The 2021 National Survey on Drug Use and Health (NSDUH) found that of the 21% of African Americans who had a mental health concern, only 39% of these individuals received mental health service."[1] While mental health is becoming a more prominent topic, the internal well-being of the African American community in the United States is just a topic of conversation rather than an important issue that needs to be addressed. And, for the ones who do reach out for help, the prescription of medication often reflects medical bias rather than a genuine effort to support their mental health and overall well-being. Overall, awareness of Black mental health has grown, but stigmas in both the Black community and the medical field with the over and underprescription of medication, as well as lack of access, heavily contribute to the overall lack of progress in Black mental health.

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**Looking Back to Go Forward: A Quantitative Analysis of Adverse Childhood Experiences, Coping Strategies, and Academic Achievement Among African American Community College Students**

Presenter's Name: Mharisi Bonner
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Mercedes Ebanks
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African American community college students often encounter early adversity and systemic inequalities that impact their ability to cope and succeed academically. This study explores the predictive relationships among Adverse Childhood Experiences (ACEs), coping strategies (assessed by the Brief COPE), and GPA among community college students. Guided by the Transactional Model of Stress and Coping and PVEST, the research investigates (1) the connection between ACEs and coping, and (2) how ACEs and coping strategies influence GPA. Participants complete the ACE Questionnaire (Felitti et al., 1998), the Brief COPE (Carver, 1997), and report their GPA.

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**Silent Alarms: The Double-Edged Impact of Crime Alerts on College Students**

Presenter's Name: Daniel Brewster
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Hope Hill
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Co-authors: Jamar Nash, Tamia Taylor, Karis Thomas

Crime alerts, though intended to keep students safe, can quietly shape perceptions of safety and contribute to daily stress. Research shows that repeated exposure to violence-related media can increase fear, anxiety, desensitization, and emotional disturbance (Strasburger, 2009). Because young people experience high levels of media exposure, such messaging can strongly influence how they interpret risk and vulnerability. Drawing on research on chronic stress, trauma, minority stress, and identity development, this project explores how campus crime alerts may function as ongoing psychological stressors rather than neutral safety tools. Pearlin et al. (1981) conceptualize stress as a cumulative process in which repeated exposures shape mental health outcomes over time. Similarly, Meyer (2003) argues that stressors tied to marginalized identities are "chronic, socially based, and additive to general stressors," compounding psychological burden. This study examines how repeated exposure to campus crime alerts impacts college students' mental and emotional well-being, with particular attention to students from marginalized backgrounds who may already experience heightened stress related to race, gender, sexuality, or prior exposure to trauma. It also considers how prior trauma and environmental violence may intensify reactions to crime alerts, potentially mirroring symptoms associated with trauma-related disorders. The proposed methodology is an exploratory mixed-methods design combining survey data assessing stress, perceived safety, and trauma exposure with in-depth interviews of students attending urban universities who regularly receive crime

alerts. This research aims to highlight the unintended psychological consequences of campus safety messaging and encourage universities to adopt trauma-informed, equity-centered approaches to campus communication and mental health support.

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**Association Between Residential Ward and Preterm Birth in Washington, DC**

Presenter's Name: Kamiya Bridges
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
Faculty Advisor: Bernard Kwabi-Addo
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Co-authors: Lauren Kobylski, Sophia Dalal, Huynh-Nhu Le, Jennifer Keller

Background: Preterm birth is a leading contributor to infant morbidity. Growing evidence links neighborhood socioeconomic disparities to preterm birth risk, though this association remains underexplored in Washington, DC, an urban setting with marked socioeconomic and demographic diversity. This study evaluates the association between maternal residential wards and preterm birth across Washington, DC. Methods: Electronic medical records data were collected from 2,446 birthing individuals in Washington, DC (54.3% Black, 7.4% Hispanic, Mage=32.2 years), grouped by ward of residence (Wards 1-6: n=1,535; Wards 7–8: n=911). Descriptive and bivariate analyses, logistic regression models, and geospatial mapping were used to assess the association between residential ward and preterm birth. Results: Residents of Wards 7-8 had a higher prevalence of preterm birth than those in Wards 1–6 (12.2% vs. 7.5%, $p<.001$) and were more likely to be Black, younger, publicly insured, and unemployed ($p<.001$). In unadjusted analyses, residence in Wards 7-8 was associated with significantly higher odds of preterm birth (OR=1.72, $p<.001$), though this association was not significant after adjustment. Geospatial analysis revealed significant clustering of preterm birth in Wards 4, 5, 7, and 8, whereas Wards 2 and 3 exhibited lower density with no statistically significant clusters. Conclusion: Results suggest that social and demographic factors, rather than ward of residence alone, contribute to preterm birth disparities. These findings underscore the need for targeted interventions that address structural barriers such as maternity care deserts, insurance instability, and gaps in continuity of obstetric care to promote equitable maternal health in high-risk neighborhoods.

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**Black Maternal Mental Health Matters: Elevating the Silenced Voices**

Presenter's Name: Deanna Briscoe
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Zoeann Finzi-Adams
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The United States is failing pregnant women, especially Black mothers. "Perinatal mental health challenges serve as a microcosm for the larger US health care landscape (Dossett 2024)." 40% of Black Women experience maternal mental health symptoms, nearly twice the rate of all women (March of Dimes). Why are Black women twice as likely to develop maternal mental health (MMH) conditions but half as likely to receive treatment in comparison to white women? Based on comprehensive review in literature, weathering, social determinants of health, socio-cultural stigma, and lack of cultural competence and distrust with medical providers are just a few barriers Black moms face. This poster presentation will propose a theoretical model to address the Black Maternal Mental health crisis and disparities in treatment. This model complements an afrocentric framework explicitly from traditional African birthing practices, emphasis on community as primary healing agent, and rejection of Western medical models. In addition this framework derives from Black feminists scholars who launched the reproductive justice movement 1994. This movement asserts an individual's bodily autonomy to not have children, as well as the right to have children, including identifying their birthing options and parent their children in safe and supportive communities with dignity (Matthews et. al, 2021). These practices emphasize the importance of community, family involvement, and rituals that foster a sense of belonging and emotional support during pregnancy. By elevating the voices of Black women's lived experiences, we allow for a more strongly informed set of recommendations and overall positive perinatal experience.

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**CTE, Suicide Risk, and Structural Disparities in Black Athletes: Implications for Cognitive-Communication Care**

Presenter's Name: Meghan Brooks
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Alaina Davis
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Co-authors: Tia Armstrong, Ronaldo Davis, Trinity Eason, Taylor Joyner, Sydney Leathers, Alaina Davis

Suicide among contact-sport athletes has drawn increasing attention in the context of chronic traumatic encephalopathy (CTE), a progressive tauopathy associated with repetitive head impacts. Emerging neuropathological evidence indicates that many athletes who died by suicide were later diagnosed with CTE post-mortem; however, the neurocognitive and neurobehavioral pathways linking CTE to suicidality remain insufficiently characterized, particularly among Black athletes who bear a disproportionate burden of exposure and risk for concussion through contact sports. This study examines multiple cases of former National Football League (NFL) players and other contact-sport athletes whose deaths by suicide were subsequently associated with CTE pathology. Using a neurodegenerative and sociocultural disparities framework, the lab analyzes converging clinical features across cases, including executive dysfunction, impulsivity, affective dysregulation, depression, paranoia, and progressive cognitive-communication decline. Preliminary cross-case analysis indicates consistent patterns of neuropsychiatric disturbance aligned with executive functions associated with the frontal lobe and degeneration characteristics of CTE. In addition, documented barriers to culturally responsive mental health care and post-career neurological monitoring among Black athletes. Findings are interpreted through the lens of speech-language pathology,

emphasizing how cognitive-communication changes (e.g., impaired self-regulation, social cognition, discourse organization, and insight) may contribute to psychosocial deterioration and suicide risk. Clinical implications include the role of speech-language pathologists in early identification of neurobehavioral change, interdisciplinary referral for mental health support, family education, and longitudinal surveillance of at-risk athletes. This work advances an equity-informed model linking CTE neuropathology to suicide vulnerability to guide prevention and intervention in contact-sport populations.

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**[Abstract Entry] Title has not been decided yet***

Presenter's Name: Zikei Brooks
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Kay Wright Lewis
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The focus of my research paper is the education and miseducation of Black football players in America. As Black men represent the dominant demographic in both college football and the NFL, my research aims to expose the disregard of the mind of the Negro at the expense of their bodies, which are highly desired and valued by white institutions. Beginning with the treatment, rhetoric, and perception of Black male bodies during slavery, I will explore how these historical foundations contributed to the modern stereotype of the Black athlete. By examining historical literature, firsthand accounts from athletes during the integration of college and professional football, and the broader cultural narratives surrounding Black players, I will demonstrate how these stereotypes are deeply rooted in racism and the legacy of slavery.The significance of this research is not to create division but to present an observation that encourages critical reflection on the systemic structures governing Black athletes' education and careers. Through this analysis, I hope to foster a greater understanding of how historical injustices continue to shape the experiences of Black football players today.

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**Marriage on Our Teams: How Black Women Conceptualize Commitment and Long-Term Partnership**

Presenter's Name: Sage Bryant
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Davis Dixon
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In the twenty-first century, African American women account for the prevalent amount of single parenthood and low marriage rates in America. Due to historical circumstances African Americans experience in the West, along with systematic oppression, African Americans have struggled to form the nuclear family household. Through the selling of family members and continued state violence, African Americans have experienced extreme disruptions in marital bonds. The consequences of this historical context can be seen in the lower marriage rates, higher divorce rates, and prevalence of non-traditional family structures. There are many existing factors to explain these patterns, and this literature review focuses specifically on how historical and contemporary racial challenges affect African American family dynamics, which then influence how African American adolescent women are romantically and sexually socialized. These socializations shape African American adolescent women's perceptions of the relevance of marriage and influence their desire to engage in committed marriages. By synthesizing literature and examining existing research and theories on culture, family structure, and socialization, this review intends to investigate how these interconnected factors lower the prevalence of marriage amongst African American adolescent women. By accounting for these factors, it is revealed that marriage is now a luxury for Black women that comes with age and experience. Most psychological research in discussion of African American relationships and marriage is comparative to white normatives and limited to lower-class Black Americans. This literature review seeks to generate research regarding parenting styles and Black adolescent women's attitudes towards marriage.

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**Partisan Duty or Civic Duty: Voting as a Means to an End**

Presenter's Name: Ethan Bryant
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Bernard Fraga
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Many eligible voters choose not to vote, not because of logistical considerations such as traffic, work, or issues with absentee ballot registration. Instead, these eligible voters abstain from exercising their right to vote because of their political security or political insecurity. This differs from political disillusionment in that political security is concerned with one's reasons not to vote as a nuanced and thought-out process, whereas those eligible voters who are disillusioned choose not to vote because they have lost significant faith in the electoral system. This study focuses on political security as a factor influencing one's decision about whether to vote. Using open-ended responses from the 2024 Cooperative Election Study (CES), this research analyzes individuals who selected "Other" when asked why they did not vote in the past. Through a combination of AI-assisted and manual coding, the study identifies recurring themes of preferred complacency among respondents in weighing whether or not to vote. To contextualize these findings, further analysis of the 2024 Cooperative Election Study (CES) is used to consider demographics related to party identification. The analysis expects to find that this segment of respondents chooses not to exercise their right to vote due to a disconnection from a sense of duty and an inherent attachment to their immediate surroundings, such as location or relationships. This research aims to provide insights on how to bridge the gap and mitigate one's preferred complacency in one's duty to vote.

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**Gabayan ang Babae: Promoting Mental Health Through Family & Community**

Presenter's Name: Monique Bucknor
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Rita Omekam
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Mental health challenges faced by young adolescent Filipina girls (12–15) in rural Bicol, where stigma, economic hardship, environmental risks, and limited access to mental health and youth services compromise emotional well-being. About 16% of Filipino children experience mental health issues, yet mental health receives minimal funding. The project adapts the BaSICS (Building a Strong Identity and Coping Skills) framework to strengthen resilience through communal healing, faith-based psychoeducation, and youth empowerment. This project proposes key adaptations of cultural values (e.g., family centrality, religiosity) to reduce stigma and support emotional regulation and parent-child communication. By fostering open expression and community support, this project highlights the importance of culturally sensitive mental health strategies in rural settings.

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**Testing the Boundaries of Configural Face Processing: Inversion Effects in Pareidolia**

Presenter's Name: Alexia Burford
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Lauren Williams

Have you ever wondered why we can easily recognize faces, but struggle when they are upside down? This study examines how orientation influences face perception through the Face Inversion Effect, a phenomenon in which faces are recognized more slowly and less accurately when inverted. Two questions guided this research: how face processing changes across intermediate rotations and whether pareidolia images (objects that resemble faces) engage similar face-specific processing. Two online experiments were conducted using Prolific with 235 participants. In Experiment 1, participants completed a flicker detection task in which they identified a changing image within arrays presented at orientations ranging from upright to inverted. Reaction times showed a clear inversion cost for real faces, with slower detection when images were upside down. However, pareidolia images did not produce the same pattern, suggesting they do not automatically recruit face-specific processing during identity-based tasks. Experiment 2 examined whether orientation alone influences perception of pareidolia images. Participants detected orientation changes while images appeared at varying rotations. Reaction time results followed a U-shaped pattern, with slower responses at intermediate orientations and faster responses at upright and fully inverted positions. This pattern differed from the classic inversion effect observed for real faces. Together, these findings indicate that pareidolic images are processed differently from real faces and that orientation effects depend on both stimulus type and task demands. The results highlight the complexity of visual perception and suggest that distinctions between face and object processing are more nuanced than previously assumed.

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**The Pursuit of Purpose: Developmental Implications of Psychosocially Toxic Events on Black Emerging Adults' Risky Behavior Involvement and Self-Actualization**

Presenter's Name: Elle Butler
Classification: Graduate Student
School/College: Graduate School
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Co-authors: Kamille Padgitt, Debra Roberts

Black youth are overrepresented in the school-to-prison pipeline. This dissertation challenges Western perspectives that place the onus of Black youth criminal activity on alleged moral failings and cultural deficits (Ellis & Walsh, 1997). These perspectives fail to acknowledge the overwhelming weight of normalized poverty and structural racism. Subsequently, this dissertation refutes the idea that this overrepresentation in the criminal justice system (CJS) is a result of a lack of prioritization of education or cultural apathy. This researcher hypothesizes that CJS overrepresentation can be explained through psychosocially toxic event exposure (PTEs), personal risky behavior involvement (RBIs), limited Black Joy exposure, and an inability to pursue childhood aspirations Essentially, the distraction of limited resources (high PTEs), results in higher criminal activity (RBIs), due to the lack of childhood aspiration exploration (self-actualization). In addition, Black joy exposure can buffer the negative association between PTEs and RBIs. Thereby, when Black Joy is low, the relation between PTEs and RBIs is stronger. Then, when Black Joy is high, PTEs have a less detrimental effect on RBIs. These relationships will be analyzed using Andrew Hayes' Model 8 of moderated mediation along with traditional regression analysis. Findings from this dissertation will have real world implications on the life satisfaction and longevity of the Black population. Further, this work also addresses education policies that target restorative justice interventions within impoverished communities.

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**An Evaluation of Disparities in Sports-Related Concussion Care Among Collegiate Athletes at an HBCU**

Presenter's Name: Olivia Byer
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Research shows that there are significant healthcare disparities associated with race. An example of racial disparities in healthcare is shown in sports-related concussions (SRC) between Black and White athletes. Black athletes, particularly those in underserved and low-

income communities, often face limited access to healthcare resources like licensed athletic trainers, neuropsychological baseline testing, and appropriate recommendations for returning to play after concussion. Due to this there is a higher risk of delayed diagnosis, management, treatment, and underreporting of SRC, leading to poorer outcomes. This research aims to identify the reasons for disparities in the knowledge, resources, and treatment of sports-related concussion care among collegiate athletes at an HBCU by doing a cross-sectional quantitative survey.

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**Higher Education, Lower Returns: Racially Stratified Pathways from Degrees to Occupations**

Presenter's Name: Jaydyn Callender
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Jonathan Tebes
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While higher education is often seen as a pathway to upward mobility, its economic benefits are not equally shared across racial groups. This study examines how occupational outcomes and earnings vary by race among college degree holders. Using microdata from the American Community Survey and STATA software, 1 analyze occupational fixed effects to assess wage disparities among individuals with similar credentials. The model accounts for sample variation across racial subgroups: White, Asian, Hispanic, and Black, applying subgroup reweighting. Findings reveal persistent racial disparities in both earnings and occupational prestige, even after controlling for degree type and field. White and Asian graduates are more likely to enter high-paying STEM and corporate roles, while Black and Hispanic graduates are disproportionately represented in lower-paying but socially vital fields like education and social work. These occupational sorting patterns lead to unequal wage returns despite comparable educational attainment. The analysis combines descriptive statistics, regression modeling, and occupational clustering to quantify these gaps. Results suggest that structural barriers, such as labor market discrimination, differences in social capital, and geographic opportunity, contribute to enduring inequalities. This research challenges the narrative that education alone guarantees economic mobility and highlights the need for policies that go beyond access to address racial disparities in post-college outcomes.

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**Distinct Thresholds for Decision Complexity: Evidence from Immigrant and Native-Born Adults in PIACC**

Presenter's Name: Nandi Chase
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*Presentation Type: Poster Presentation*
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Immigrants regularly navigate foreign institutions and linguistic barriers that together create a uniquely complex decision environment likely to influence their chosen decision-making approach. Moreover, they play a crucial role in the American economy. It is necessary, then, to examine whether immigrants and native-born adults respond differently to increased complexity and cognitive load while performing tasks. This study will leverage data collected by the Organization for Economic Cooperation and Development's (OECD) Program for the International Assessment of Adult Competencies (PIACC) study, which contains internationally representative microdata about decision-making patterns for both immigrants and native-born adults. Finding early descriptive evidence of distinct thresholds for complexity, it is plausible that PIAAC data is uniquely suited to uncover whether sensitivity to complexity varies across nativity groups and, perhaps, update existent models of economic behavior.

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**Food Swamps, Deserts, and Oases: Examining Community Food Environments and Health Outcomes in Virginia**

Presenter's Name: Emmanuel Christian
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*Presentation Type: Poster Presentation*
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This study examines how living in a food swamp, food desert, or food oasis shapes community health outcomes with a focus on trends in Virginia Beach and Richmond, Virginia. For the purpose of this study, food swamps are defined as areas where more than 65 percent of food outlets are convenience stores, fast food establishments, restaurants, or liquor stores; food deserts as areas where fewer than 35 percent of outlets are grocery stores; and food oases as areas where more than 65 percent of outlets are grocery stores offering healthy options. Drawing on 29 public interviews and quantitative analysis of U.S. Census data on income, health outcomes, and food outlet distribution, spatial maps reveal that lower-income, predominantly Black communities are more likely to be classified as food swamps and exhibit higher rates of obesity, hypertension, and diabetes compared to higher-income, predominantly non-Black communities. These findings underscore the relationship between structural food access inequities and health disparities.

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**From Knowledge to Action: Caregiver Identified Priorities for Strengthening Pediatric Asthma Management in Subsided Housing**

Presenter's Name: Jae eun Chung
Classification: Senior Faculty
School/College: Communications
*Presentation Type: Poster Presentation*
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Co-authors: Jae Eun Chung, Janet Currie, Samuel B. Little, Irene Park, Dharmil Bhavsar, KyAus Washington, Willem Maniago, Angelina McNeill, Minna Abdella

Introduction: Washington, DC's pediatric asthma rate (9.7%) exceeds the national average (7.0%), making it a critical setting to examine

opportunities for strengthening care. Because asthma management is largely enacted within the home, caregivers serve as primary manager, translating medical guidance into daily routines and responding to acute episodes. Centering caregiver perspectives offers insight into real world implementation, barriers, and gaps between recommended care and lived practice. Methodology:Guided by a community-based participatory research (CBPR) approach, the study prioritizes the voices of residents and local stakeholders to generate actionable insights into caregivers' asthma management knowledge, needs of resources, preferred modes of receiving asthma education, and broader systemic challenge. Data were collected through a survey of 137 caregivers of children with asthma residing in D.C. subsidized housing.Results: Participants ranked practical supplies first (53.5%) followed by asthma education (22.8%) and in-home interventions (23.8%). The majority (74%) prioritized holding housing authorities accountable for enforcing violations. The mean asthma knowledge score across six statements was 77% correct, indicating good knowledge of asthma triggers and risk factors. The pediatrician was the most reported source (61.3%, n=94) among caregivers who had received asthma education. Caregivers preferred receiving asthma information through virtual platforms (56.2%, n=77). However, many caregivers (35%, n=49) preferred in-person meetings. Implications These results suggest that a combination of resources, professional guidance, and accessible education could enhance caregivers' ability to manage pediatric asthma effectively. Policies that address environmental triggers and structural barriers are likely to have the greatest impact on asthma outcomes at home.

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**Affirming or Harming? Exploratory analysis of restraint usage among incarcerated youth**

Presenter's Name: Amaria Clark
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*Presentation Type: Oral Presentation*
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Nation-wide there is a high prevalence of incarcerated youth, particularly male youth of color. While incarcerated, these youth are still expected to meet normative developmental milestones (i.e. cognitive and socioemotional development); thus, it is essential to understand how current carceral practices may support or hinder their psychological development under such adversarial and rather rigid practices. This exploratory study analyzed the use of restraints among incarcerated youth across four regions of the United States of America (West, Midwest, Northeast, and South). Analyses were conducted with consideration of Erik Erikson's Psychosocial developmental model. This study examined whether the use of restraints among incarcerated youth is developmentally affirming or harmful. The data was obtained from a secondary databank compiled by the Center for Improving Youth Justice. The sample is disproportionally comprised of Black male youth (n= 4113; Black = 2297, White =982, Hispanic = 481, Native American = 130, Other = 223), ages 14-23 years old, incarcerated between April 2024 and October 2024. The frequencies of different restraints were analyzed regarding their nationwide prevalence: chemical restraints, mechanical restraints, physical restraints, peer-assisted restraints, restraint beds/chairs, and other restraints. Upon these practices, physical restraints were identified as the most frequently used form of restraint (58.7%, f=2414), followed by mechanical restraints (31.7%, f=1302). The significance of these results centers on the implications for healthy youth development, showing that the use of such restrictive practices is not only in opposition to normative developmental practices but also places these youth at increased vulnerability for future psychological harm.

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**Reactive Regulation: FDA Warning Letters and the Visibility Bias of Drug Shortages**

Presenter's Name: Brooke Cobos
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School/College: Graduate School
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Background: As public concern about contaminated food and drug products grew, the Pure Food and Drug Act of 1906 prohibited the sale of adulterated and misbranded products. Further, the Drug Quality and Security Act of 2013 (DQSA) extended and clarified FDA authority over compounding and strengthened oversight of the pharmaceutical supply chain. Understanding the intercommunication between FDA warning letters and drug shortages is highly relevant to both consumers and prescribers. Drug shortages are associated with a myriad of downstream negative effects for patients. FDA warning letters indicate violations of federal quality standards. Reactive regulation allows non-compliant manufacturers to operate undetected when their products are not in shortage. Examining this relationship can identify whether drug shortages may serve as indicators of manufacturer noncompliance and whether earlier intervention could prevent patient harm. Methods: The temporal relationship between FDA regulatory enforcement actions and drug shortages was quantified through assessment of drug shortages and FDA warning letters. Data extracted from FDA databases identified manufacturers who met the criteria. The time interval between the issuance of each warning letter and the corresponding drug shortage announcement was calculated. Results: Preliminary analysis shows that, on average, FDA warning letters precede the onset of drug shortages by 1066 days (SD= 1291.7184), with a median of 868 days (IQR (-74)-(-2032)= 1958). Conclusion: This pattern raises implications that supply chain or manufacturing instability may precede and drive both regulatory intervention and subsequent shortages, underscoring the need to examine upstream determinants of quality failures.

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**Rat Foraging Decisions in a Virtual Floor Patch Task**

Presenter's Name: Naomi Cole
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Foraging decisions require balancing patch quality and travel costs to maximize food intake. Typically, laboratory paradigms use spatially discrete patches with declining reward rates. Here, we developed a virtual foraging task with declining opportunity rates, where rats control reward timing. This design probes rats to actively take rewarding opportunities during virtual patch navigation. Behavioral sessions were conducted in a square, opaque-walled environment with flexible control over the environment floor (n = four Long-Evans rats). Each session began with a travel period, after which rats chose between two stimuli (patches). Each patch was associated with a distinct floor pattern. Within a patch, individual stimuli (opportunities) were presented at a random location, and rats earned a reward for each opportunity they selected. Rats could leave the patch by selecting a distinct "leave" stimulus, returning them to the travel period. Sessions were randomly assigned a long or short travel time. Patches within a session were randomly assigned a slow, medium, or fast declining opportunity rate. Across all sessions, rats selected 50-70% of the opportunities presented, and stimulus selection increased with decreasing patch quality. Speed profiles showed that rats could differentiate between the opportunity and leave stimuli. Latency between pellet deliveries increased as rats stayed longer in a patch, with separation between patch qualities emerging after the fourth pellet. These findings suggest that while rats distinguish travel and opportunity stimuli, they behave differently in the virtual foraging task compared to spatial foraging tasks. Future work will apply modeling and protocol adjustments to improve task engagement.

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**The Association Between Black Women's Work-Related Beliefs and Their Overall Wellbeing**

Presenter's Name: Aamori Connor
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Mismanaged occupational stress may produce strong physical and emotional symptoms. As a Black woman in a workplace, this stress can be coupled with workplace discrimination and negative stereotypes. Studies have shown that classism, gendered racism, and stress can lead to disruptions in psychological functioning and adverse health effects. There is little research, however, into how occupational stress can impact Black women's belief in the value of work and how these beliefs impact their wellbeing. The present study addresses this gap by focusing on how Black women's work-related beliefs can influence their executive functioning and quality of life. Belief system was evaluated using 4 categorical questions selected from the Dispositional-Affective Frequency Questionnaire: (1) "The world (does/does not) owe me anything", (2) "Hard work (does/does not) pay off", (3) "In uncertain times I usually (expect/don't expect) (the best/ the worse/anything)", (4) "Successful people (work harder/do bad things/are just lucky)." Additionally, the time interference scores of a digital Stroop Test and WHOQOL-BREF total scores were used to evaluate the well being of Black women. Preliminary results from this study show no statistically significant difference in the quality of life and executive functioning of participants based on belief system questions. However, future analysis will focus on exploring neuropsychological measures, methods, and sampling techniques to evaluate the results of this study in context. Goals for the application of this study include using this knowledge to refine and contribute to future research on the association between neuropsychological constructs and social structures.

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**Everyone Watches Women's Sports: Black Women College Athlete Mental Health**

Presenter's Name: Brittany Copeland
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*Presentation Type: Poster Presentation*
Faculty Advisor: Zoeann Finzi-Adams
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The experiences of Black women college athletes remains an area of growing research even though they are highly visible in college sports. These athletes compete at the intersection of multiple marginalized identities while contending with racialized and gender expectations both within and beyond their sports. Gendered racial microaggressions (GRM) the everyday verbal, nonverbal, or visual expressions of oppression rooted in both race and gender are embedded within academic and athletic environments (Pierce, 1970; Solorzano, Ceja, & Yosso, 2000; Sue, 2010; Lewis et al, 2013; Krane, 2001; Smith et al., 2014). Experiences of GRM and discriminatory events has been associated with depressive symptoms (Erving et al., 2022; Sadberry & Mobley, 2013). Forced community, marginalization, demanding schedules, and limited representation in athletic leadership contribute to anxiety and sense of belonging (Ojemaye et al., 2024; Woods Giscombe et al., 2016; Hyman, 2021; Quash, 2023). Research indicates that Black student athletes underutilize mental health resources even though they experience mental health needs at the same rate, or in some instances, higher rates than their non athlete peers (Tran, 2021; Ballesteros and Tran, 2020; Kilcullen et al., 2022). However, studies have found that participation in sport can serve as a protective factor to mental illness and cultivate positive emotions. Black Feminist Thought, Intersectionality, and Ecological Systems Theory are employed to center Black women college athletes and contextualize their experiences. This poster presentation offers a holistic and intersectional analysis of the layered stressors shaping Black women college athletes' mental health and mental health service use.

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**Food and Nutrition Insecurity Among Medical Students at a Historically Black Medical School**

Presenter's Name: Amber Courtland
Classification: Professional Student
School/College: Medicine
*Presentation Type: Poster Presentation*
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Co-authors: Daniel Holguin, Yayin Fang

Food and nutrition insecurity (FNI) is increasingly recognized as a barrier to academic performance and well-being in higher education, yet most data are drawn from predominantly white institutions. This study aimed to assess the prevalence and impact of FNI among medical students at Howard University College of Medicine (HUCM), a historically Black institution. In Spring 2025, a cross-sectional survey incorporating the USDA Six-Item Short Form Food Security Scale was distributed to all HUCM medical students. Additional questions assessed demographics, financial concerns, and the perceived academic impact of FNI. Responses were anonymized and analyzed using descriptive statistics. Of 120 respondents, 79% identified as Black, 85% relied on loans, and 49% met USDA criteria for food insecurity, with 23% experiencing very low food security. Thirty-one percent reported unreliable access to healthy foods, and 71% skipped or downgraded meals due to financial or time constraints. More than four in five students expressed concern about basic living expenses, and 35% reported that FNI negatively impacted academic performance in the last month. A majority (92%) endorsed the need for on-campus food resources, and 83% indicated willingness to contribute to a student-run garden. These findings provide the first institution-level data on FNI in a majority Black medical student population and highlight the urgent need to reform financial support models in medical education.

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**Designing Ethical AI for Marginalized Communities: A Community-Engaged Large Language Model (LLM) Interview System in Pediatric Asthma Research**

Presenter's Name: Dejamarie Crozier
Classification: Graduate Student
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*Presentation Type: Oral Presentation*
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This study examines the community-engaged development and preliminary evaluation of a large language model (LLM)–powered interview system to support qualitative data collection with caregivers of children with asthma living in subsidized housing in Washington, DC. Guided by community-based participatory research (CBPR), community partners co-shaped interview content, linguistic framing, usability features, and ethical boundaries to promote cultural responsiveness, accessibility, and trust in a context marked by housing-related and environmental health inequities. Iterative prototyping incorporated community feedback, including visual design and voice-based features to accommodate varied digital literacy. The system was implemented through a hybrid human–AI model to provide relational support, technical assistance, and ethical oversight. Preliminary results from interviews and post-interview evaluations with 29 caregivers indicate that the LLM-supported interviews were feasible and generally acceptable. Participants reported high clarity and comfort, frequently describing the system as "listening" and "not judging." Accessibility features supported participation among caregivers with varied digital literacy, and human presence was identified as essential for building trust and addressing technical challenges. While most participants expressed openness to the tool, some voiced skepticism about AI's role in research, underscoring the importance of transparency and community governance. Supported by funding from the Princeton Alliance for Collaborative Research and Innovation (PACRI), this DC-based project demonstrates how locally grounded, CBPR-guided approaches can inform ethical AI design for public health research, with implications for equitable, community-centered innovation.

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**I'm Just a Girl: The Effect of Pop Culture's Adaptation of Anti-Feminist Rhetoric on Gen-Z and Millennial Women in the Digital Age**

Presenter's Name: Zoe Cummings
Classification: Undergraduate Student
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This study will evaluate the way that "anti-feminist" rhetoric is spread on social media through digestible phrases, and its effects on Gen-Z and Millennial women. The researcher will evaluate the language of previous feminist waves, as well as how that language was communicated through different media outlets during each period. It will also evaluate the language and dissemination techniques of those opposed to the women's rights movement, and how the media plays a role in influencing people on both sides of the movement. Using historical context as the foundation of this research, the study will employ a mixed methodology that evaluates the modern-day phenomenon categorized as "anti-feminist" language and its dissemination on social media. The goal of this study is to evaluate the impact of antifeminist language on Gen-Z and Millennial women of different racial groups.

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**Predictors of Improvement in Autistic Adults Following a Remote Mindfulness-Based Intervention**

Presenter's Name: Ramyla Dahmer
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Dominique Pritchett
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Autism is a neurodevelopmental condition characterized by maladaptive differences in social communication and behavior, with many autistic individuals also experiencing mental health challenges such as anxiety and depression. While therapy is a common treatment for adverse symptoms associated with autism, it can be inaccessible or expensive to maintain long-term. Emerging evidence indicates that remote mindfulness-based interventions that promote mindfulness, the state of being aware of your surroundings in a nonjudgemental way, offer an accessible and cost-effective approach to alleviating negative mental health outcomes in autistic adults. However, little is known about how baseline measures of autistic individuals such as autistic traits, anxiety, stress, and trait mindfulness, predict their likelihood of improvement following a remote mindfulness-based intervention. Here, we sought to reveal any significant baseline predictors through analyses of covariance and multivariate multiple regression models between baseline and

change scores of collected measures. We found that a lower baseline mindfulness significantly predicts a higher improvement in mindfulness alongside anxiety, affect, and stress improvement. Most notably, we found that sex is the only demographic serving as a significant predictor of mindfulness with females predicting a higher improvement. These findings were not observed in similar experiments with non-autistic populations, suggesting an underlying relationship between mindfulness, autism, and sex. Further analyses of this relationship could contribute to more targeted, efficient, and potentially generalizable care for autistic populations with remote mindfulness-based interventions.

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**Examining Social Media Usage among Black Women**

Presenter's Name: Mia Dean
Classification: Graduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Zoeann Finzi-Adams
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Co-authors: Chloe Hightower

Studies have shown that Black American women are among the most active social media users in the United States (Matsuzaka et al., 2023; Pew Research Center [PRC], 2017, 2021). Social media provides a virtual space for Black women to obtain culturally specific social support while also celebrating Black womanhood and practicing social-political activism. Thus, scholars have suggested that Black women may utilize social media to combat structural oppression through the accessibility to social resources (Gray & Stein, 2021; Peterson-Salahuddin, 2022). However, virtual platforms can also pose risks to those depending on how social media is used. Problematic social media usage has been associated with depression and anxiety and is also related to reduced real-life social support and increased social isolation (Meshi & Ellithorpe, 2021; Marino et al., 2018). Additionally, a study by Stanton et al. (2017) found a positive association between the frequency of using Tumblr, a social blogging platform, and depressive symptoms among Black American women. Black women also tend to face online victimization when they discuss racism on social media platforms, such as Facebook (Gray & Stein, 2021). A model will be constructed based on comprehensive review of the literature on the varying psychological and social implications of social media usage on the mental health of Black women. This model will explore the varying ways and approaches Black women use social media and how those approaches and avenues support or hinder connection and mental wellness for Black women.

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**Relationship Between Foreign Bank Ownership and Central Bank Independence in Latin America**

Presenter's Name: Clayton Detant
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*Presentation Type: Poster Presentation*
Faculty Advisor: Ronald Smith
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Central bank independence (CBI) is the level of autonomy a country's central monetary institution, or central bank, possesses relative to the national government. Existing literature explores how domestic monetary determinants and policies are operationalized to produce the measure of CBI and assesses how well the institution maintains national economic equilibrium. The study of how foreign determinants influence the level of CBI across individual countries in dynamic regions, defined as regions in which central bank autonomy is relatively volatile like Latin America, is lacking. I argue that foreign bank ownership within a country negatively influences the level of central bank independence in Latin American countries. Foreign stakeholders lobby the government officials of their host country to limit the independence of their central bank, thereby limiting their regulatory power. Utilizing existing data from the Quality of Government Dataset, I estimate linear regressions to examine the relationship between foreign bank ownership and central bank independence in Latin American countries. The study expands knowledge on the determinants of central bank independence that contribute to its volatility in regions that have low scope of exploration.

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**Wheels of Misfortune: The Automotive Decline and the Rise of Crime in Detroit, Flint, and Pontiac, Michigan (1970–2005)**

Presenter's Name: Leila Diallo
Classification: Undergraduate Student
School/College: Arts & Sciences
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This study investigates the socio-economic consequences of the deindustrialization of Michigan's "Big Three" automakers—General Motors, Ford, and Stellantis—focusing on the relationship between the industry's decline in the late 1970s and subsequent shifts in crime rates in Detroit, Flint, and Pontiac. Once the epicenters of American industrial success and a primary destination for Black southern migration, these cities were built upon an economic guarantee which was devastated during the market failures of the 1980s. I hypothesize that the collapse of this formal labor market forced displaced workers to resort to informal economic activities, leading to a significant increase in crime. Utilizing a time-series analysis from 1970 to 2005, this research models yearly vehicle sales against rates of robbery, assault, burglary, and larceny-theft. By isolating these specific offenses, this paper aims to demonstrate how the absence of government intervention and the loss of community identity drove a transition into the informal economy, framing the rise in crime as a direct response to systemic labor market failure.

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**Representational Constraints and Semiotic Incompetencies in Multimodal AI**

Presenter's Name: Thane Douglass
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Jaye Nias
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As generative artificial intelligence (AI) systems are increasingly used to translate and re-express cultural materials, questions arise about the representational resources through which translation occurs. This paper examines how generative AI systems express culturally grounded symbolic knowledge when operating within a standardized visual vocabulary. Using Ghanaian Adinkra symbols and the Unicode emoji standard as a case study, we show that generative AI systems produce a representational vocabulary that delimits what kinds of meaning can be expressed, approximated, or excluded. We analyze how generative models produce emoji-based representations of Adinkra symbols under different forms of cultural context, including symbol names, associated proverbs, and attributed meanings. Our analysis distinguishes between form-level and referential correspondence, and documents recurring patterns of convergence, approximation, and omission across model outputs. Our findings suggest that standardized representational systems mediate cultural expression in AI-assisted contexts, shaping what becomes legible, translatable, or lost. In particular, this work underscores the need for alternative representational resources that move beyond globally standardized symbol sets.

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**The Communication of Black Women with Their Natural Hair on Social Media**

Presenter's Name: Armani Durham
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School/College: Communications
*Presentation Type: Oral Presentation*
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The problem studied in this research is the impact that White beauty standards have on the American societal views of Black women's hair. It will also study how Black women express their identity with their hair, despite their hair not being considered the beauty standard. When Black women go on social media, they are shown multiple women who are considered the beauty standard but do not resemble them. This study will investigate how Black women at Howard University use the styling of their hair as a form of communication. The methodology that will be used to conduct this research is a quantitative analysis.

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**TikTok Made Me: The Impact of Social Media Sites in Ethnic & Racial Identity Development**

Presenter's Name: Nia Dyson
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Kamilah Woodson
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This study examines how modern social media platforms contribute to the development and maintenance of ethnic and racial identities. In the current era of virtual networking, technology provides spaces for interaction and connection based on group identity and belonging. Prior research highlights the importance of belonging in shaping ethnic-racial identity, with strong in-group ties serving as protective factors against negative mental and physical health outcomes. Racial socialization processes, including identity salience and belonging, are also central to this development. At the same time, social media research shows that belonging needs can be met online through social interaction. However, limited work has explored how these online experiences influence ethnic and racial identification, particularly within today's highly racialized U.S. context. Guided by Social Identity and Social Categorization theories, this study proposes a theoretical model describing how social media content may be integrated into individuals' self-schemas, either strengthening group identification or leading to the dismissal of identity-relevant information. As users engage with online content, they likely make ongoing, often unconscious, self-relevant judgments that shape their sense of belonging. This process may represent a modern pathway for ethnic and racial identity socialization, which has traditionally occurred through in-person interactions. Future research will test this model and further examine social media's role in individual and group identity development.

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**Inside the Lockeroom: The Mental Health Experiences of Historically Black Colleges and Univerisities' (HBCUs) Athletes**

Presenter's Name: Jailyn Edwards
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As mental health has become one of the most prominent concerns for collegiate athletics, research is emerging about athlete's mental health experiences. While there is information about Black college athletes and their specific needs, there is minimal information regarding the mental health needs of Black college athletes who attend Historically Black Colleges and Universities (HBCUs). This literature gap is not only a mental health issue, but it is also a higher education concern. This poster presentation will highlight a review of empirical articles that examines the mental health experiences of HBCU athletes. In doing so, it will increase representation in academia for this population and bring forth their most salient issues. The Black student athlete is at heightened mental health risk because they may encounter racial and cultural stressors in comparison to their counterparts (Auerbach & Stokowski, 2020; Wilkerson et al., 2022). However, HBCUs have cultural protective factors that may lower HBCU student athletes' psychological stress level (Sadberry & Mobley, 2013). Despite those factors, the institutions they attend face structural inequities that directly impact these student athletes' mental health care, leaving minimal information about their overall mental health experiences (Lee et al., 2026). Overall, this poster presentation review addresses a critical gap, synthesizes existing information, and identifies what future research should target.

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**Conversations Between Parents and Their Biracial Children: Their Impact on Identity and Blackness**

Presenter's Name: Gabby Ervin
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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"Racial attitudes are crucial to the development of self-identity, especially for minority group members" (Massey et. al, 2003, p.1). The conversations parents have with their children at a young age are key parts of a child's development. Then as children age, these conversations can become the foundation for core principles or attitudes about the world. This makes what is communicated by parents, about topics related to identity and race, important and necessary to help shape their child's identity. Furthermore, for biracial people it can be hard to determine what their identity is because their identity is blending with at least two other identities. The present study will examine the conversations parents are having with their biracial children and how those conversations impact the latter's feelings of their Blackness and identity. For the methodology, the researcher will use a qualitative analysis and carry out a series of interviews with biracial Howard University men and women aged 18-24 and each of their parents. This will be done in order to gauge how the biracial person identifies with their Blackness, how their parents played a role in building that identity and how that translates to who the person is today.

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**Addressing Postpartum Depression in Black Women: Community Support Groups vs. Individual Therapy**

Presenter's Name: Miracle Ezeakachi
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Cassandre Jean-Anotoine
Faculty Advisor's email: c.jeanantoine@howard.edu

Co-authors: Isioma Ugwu, Kimese Keyes, Jada Henery, Nephertiti Mairs, Chisom Chikezie

Background Postpartum depression (PPD) affects approximately 38–44% of Black mothers, yet disparities in screening, referral, and culturally responsive treatment contribute to underdiagnosis and limited access to care. Black postpartum women experience systemic racism, discrimination, socioeconomic hardship, and inadequate postpartum support, all of which increase vulnerability to depressive symptoms. Untreated perinatal mood disorders also create significant social and economic burdens. Community support groups have emerged as a promising strategy to reduce isolation and address cultural and systemic barriers not fully targeted by individual therapy. Aim This systematic review examined whether community support groups are more effective than individual therapy in reducing depressive symptoms among postpartum Black women. Method A systematic search of PubMed, CINAHL, and Google Scholar identified peer-reviewed studies published between 2020 and 2025. Eligible studies included randomized controlled trials, cohort studies, qualitative studies, scoping reviews, and systematic reviews. The primary outcome was reduction in depressive symptoms, particularly Edinburgh Postnatal Depression Scale (EPDS) scores. Results: Community and blended group interventions significantly reduced depressive symptoms, including a decrease in high EPDS scores from 38.5% to 17.2% in one study. Group prenatal care reduced severe PPD cases and improved resilience, self-esteem, and perceived social support. While individual therapy, particularly CBT-based approaches, was effective, it did not fully address systemic stressors such as racism and social isolation. Implications Culturally tailored community support groups may strengthen engagement and address social determinants of maternal mental health. Conclusion Community support groups offer broader protective responsive benefits and may help reduce PPD disparities among Black women.

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**Opportunity Zones in Washington, D.C.: In-Place Improvement or Compositional Turnover? Evidence from Poverty, Rent Burden, Mobility and Employment**

Presenter's Name: Risav Ganguly
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Jevay Grooms
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This paper evaluates whether observed poverty changes in Washington, D.C. Opportunity Zones reflect in-place improvement for existing residents or compositional turnover. I assemble a tract-level panel combining ACS demographics and housing outcomes, LEHD LODES employment, geocoded crime incidents, and building permits. The main comparison is designated Opportunity Zone tracts versus federally eligible but not designated tracts. I estimate long-difference difference-in-differences models, event studies, permutation inference and synthetic difference-in-differences. Preliminary estimates show no statistically strong evidence that designation reduced poverty relative to controls, while rent burden rose more in designated tracts. The design contribution is to separate "poverty fell" from "who remained in the tract," which is central for policy interpretation in gentrifying urban contexts. Time permitting, I will extend the mobility module with tract-year demographic mover breakdowns (race, age, education, and income) from ACS mobility tables such as B07004, B07007, B07009, and B07010.

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**Testing the Wage-Maximization Logic of Skilled Migration in Ghana through Panel Data and Institutional Analysis**

Presenter's Name: Payton Garcia
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Gbadeo Odularu
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This project interrogates how sector-specific foreign direct investment (FDI) affects the migration calculus in the immigration decision-making of skilled graduates in Ghana, with a focus on the University of Cape

Coast (UCC). Traditional models, notably Nyarko's wage-maximization framework, view migration as a rational response to global income disparities. Educated Ghanaians invest in domestic schooling with the expectation of maximizing returns through higher wages abroad. Yet this model may understate how domestic institutional shifts, particularly those catalyzed by FDI, can create viable career pathways that encourage high-skilled labor to remain in-country as they matriculate through tertiary education. Methodologically, the study employs a mixed-methods design. It draws on the Ghana Socioeconomic Panel Survey (2009–2019) to conduct longitudinal analysis of employment and migration outcomes, focusing on whether exposure to FDI-intensive sectors (e.g., ICT, healthcare, agro-processing) correlates with higher domestic retention among university graduates. These quantitative findings are contextualized through qualitative analysis of UCC's career services, internship programs, and partnerships with foreign firms, aiming to trace how institutional mechanisms mediate the impact of FDI on student decision-making. Preliminary analysis suggests that graduates in sectors with strong FDI-linked professional development infrastructures, such as structured internships and continuing education, are more likely to anticipate long-term returns from staying in Ghana, even when immediate wage differentials favor migration. This challenges the prevailing assumption that wage levels alone drive skilled emigration. By linking macro-level capital flows to micro-level institutional environments, this study contributes a new theoretical lens to migration and development debates, one that foregrounds how FDI can influence not just job creation, but also the future orientation and domestic commitment of skilled workers.

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**Tourism, Culture, and the Arts Industry in Trinidad and Tobago: Can These Sectors Expand Their Share of Gross Domestic Product?**

Presenter's Name: Elise Garner
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Cyril Hunte
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This study examines whether the Tourism, Culture, and Arts Industry (TCAI) can expand its share of Gross Domestic Product (GDP) and export earnings in Trinidad and Tobago, thereby contributing to economic diversification away from long-standing dependence on the energy industry (oil and gas). Grounded in the Plantation Economy Model articulated by Lloyd Best and Kari Levitt, also complemented by Sir Arthur Lewis' theory of Industrialization by Invitation, the research situates the TCAI within the broader historical and structural context of Caribbean economic dependency. Using a qualitative research design with elements of descriptive and econometric analysis, the study draws on secondary data from national budget statements, GDP accounts, and official government and international development reports spanning 2018–2024. A simple linear regression analysis reveals a strong, statistically significant positive relationship between public investment and sectoral GDP contribution ($R^2 = 0.879$, $p < 0.05$). Cost-benefit and return-on-investment analyses further demonstrate that the TCAI generates high economic returns relative to its modest share of the national budget. The findings suggest that strategic increases in public investment, strengthened policy frameworks, and deeper public–private sector partnerships are essential to positioning the TCAI as a viable pillar of sustainable economic diversification in Trinidad and Tobago.

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**The Impact of School-Based Nutrition Programs on Childhood Obesity in School-Aged Children**

Presenter's Name: Falyn Gill
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Cassandre Jean-Antoine
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Background: Childhood obesity remains a major public health concern in the United States, disproportionately affecting children from low-income and minority communities. Obesity during childhood increases the risk of chronic diseases, including type 2 diabetes, cardiovascular disease, and long-term metabolic complications. School environments play a critical role in shaping dietary behaviors and physical activity patterns. School-based nutrition programs have been proposed as a strategy to improve dietary intake and reduce obesity rates among school-aged children. Aim: This review examined the impact of school-based nutrition programs on childhood obesity outcomes among school-aged children. Method: A systematic review of peer-reviewed studies published between 2020 and 2025 was conducted using scholarly databases. Studies included randomized controlled trials, cohort studies, quasi-experimental designs, and systematic reviews evaluating school nutrition interventions, dietary intake, physical activity, and body mass index (BMI) outcomes in children. Results: Findings indicate that structured school-based nutrition programs improve dietary behaviors, increase fruit and vegetable consumption, and reduce intake of sugary beverages. Several studies demonstrated modest but meaningful reductions in BMI and obesity prevalence when programs included nutrition education, healthier meal options, and physical activity components. However, effectiveness varied based on program duration, implementation fidelity, and community context. Implications: Strengthening comprehensive school nutrition policies and addressing social determinants of health may enhance obesity prevention efforts. Conclusion: School-based nutrition programs contribute to improved dietary behaviors and modest reductions in childhood obesity, highlighting their importance in promoting long-term health among school-aged children.

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**Abstract**

Presenter's Name: Kalyssa Gillespie
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Debra Roberts
Faculty Advisor's email: ddroberts@howard.edu

This thesis aims to analyze portions of secondary data to find a correlation between parental abuse during childhood and subsequent engagement in certain criminal and violent activities. The research involves a statistical analysis that utilizes secondary quantitative data from an Add Health Study to determine whether there is a correlation. The analysis

examined the trauma of physical abuse, sexual abuse, and neglect and their associated risks of outcomes, including general criminal activity, interpersonal violence, and sexual offending. The research utilized statistical tests for mean comparisons to evaluate the differences among the diverse abuse categories and the risk categories. The findings support other criminological and psychological perspectives by highlighting the risk of partaking in illegal activity later in life due to childhood trauma along with the necessity for trauma-informed strategies in prevention and intervention efforts. Moreover, according to a developmental perspective, the data substantiates a cycle of abuse that transcends stereotypical explanations that link criminal activity to merely race, socioeconomic status, or sexuality.

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**White Flight and the Persistence of Residential Segregation in Mobile County, AL**

Presenter's Name: Ethan Gwinn
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Nathan Alexander
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Co-authors: Nathan Alexander

This study analyzes changes in Black and white racial demographics across census tracts in Mobile County to assess the persistence of residential segregation over time. We hypothesize that white flight has sustained racial stratification and maintained a high index of dissimilarity despite formal desegregation. Using decennial census data and spatial analysis from 1950 onward, this study examines shifts in neighborhood racial composition and broader structural and historical forces shaping segregation. Findings contribute to understanding how spatial inequality endures in the post–civil rights era through demographic change and entrenched residential patterns.

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**Tracing the Roots: How Early Environments Shape Resilience Across Generations**

Presenter's Name: Vicky Hackshaw
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Amy Yeboah Quarkume
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This project examines how early childhood experiences and caregiving environments influence mental health outcomes in young adulthood through an intergenerational lens. It considers how caregivers' histories and social determinants of health shape mental health development and resilience across generations. By examining social determinants of health, family environments, and sintergenerational influences, this study seeks to identify factors and risks that can inform interventions and strategies to support coping and well-being among young adults. This study utilized a researcher-designed survey examining childhood experiences, family-based influences, healing, resilience, and social determinants of health. Emerging patterns in the data highlight the central role of maternal caregiving, with most participants identifying their mother as their primary caregiver, demonstrating the emotional weight of maternal relationships and the potential concentration of intergenerational stress. Despite varied responses related to financial instability, neighborhood safety, and environmental context, resilience was present across all socioeconomic contexts. Most participants reported some access to mental health support, though a significant proportion did not, and perceived helpfulness varied, aligning with research suggesting that mental health support is often reactive rather than preventative. Findings related to resilience indicate that resilience does not mean experiences are easy and can coexist with emotional strain. These results challenge the idea that resilient college students are simply "fine," even when carrying emotional stress and intergenerational family influences. Overall, this study highlights resilience as an ongoing process shaped by intergenerational caregiving environments and social context.

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**Social Determinants of Health and Depression**

Presenter's Name: Zoey Hall
Classification: Undergraduate Student
School/College: Engineering & Architecture
*Presentation Type: Oral Presentation*
Faculty Advisor: Aniete Andy
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socioeconomic and psychosocial stressors. This study investigates which demographic and social factors best predict depression severity and whether these relationships differ across underserved groups. Using cross-sectional data from the Midlife in the United States (MIDUS) Refresher Study (2011–2014), a nationally representative sample of adults aged 25–74, depression severity was modeled as an ordinal outcome (none/minimal to severe). Predictors included age, sex, race, income, marital status, unemployment, perceived discrimination, and social support. Ordinal logistic regression analyses identified perceived discrimination as the strongest predictor of increased depression severity. Higher depression levels were also observed among women, younger adults, and individuals who were separated, widowed, or never married. Income, race, unemployment, and social support were not significant predictors in the final model. Interaction patterns suggested that depression severity increased more rapidly with discrimination among women and non-married individuals. These findings highlight discrimination as a key psychosocial pathway to depression and underscore the need for targeted interventions to support vulnerable populations.

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**On Her Level: Narratives of Black Women's Leadership, Resilience, and Persistence in Corporate America**

Presenter's Name: Mewelau Hall
Classification: Graduate Student
School/College: Social Work
*Presentation Type: Oral Presentation*
Faculty Advisor: JaNeen Cross
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African American women remain underrepresented in senior leadership roles within corporate organizations despite high levels of educational attainment and professional expertise. This study explores how African American women make meaning of their workplace experiences, navigate racialized and gendered power structures, and sustain themselves in environments not designed with their advancement in mind. Using a qualitative narrative inquiry approach, this research centers the lived experiences of African American women working across corporate sectors in the United States.Data were collected through in-depth, semi-structured interviews with eight African American women, supplemented by pre-interview questionnaires to capture professional background and organizational context. Narrative analysis was employed to examine how participants constructed their professional identities, interpreted workplace interactions, and articulated strategies of resistance, adaptation, and self-preservation. Preliminary findings reveal four interrelated themes: (1) heightened visibility paired with diminished institutional protection, (2) strategic self-monitoring and emotional regulation as survival tools, (3) the burden of informal leadership and unpaid labor, and (4) the intentional cultivation of boundaries, purpose, and self-definition as mechanisms of retention. Participants described navigating expectations to overperform while managing racialized and gendered stereotypes that constrained authenticity and advancement. This study contributes to scholarship on intersectionality, organizational culture, and retention by foregrounding African American women's narrative knowledge as a source of organizational insight. Findings have implications for equity-centered leadership practices, workplace policy reform, and institutional accountability aimed at creating environments where African American women can thrive—not merely endure.

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**Exploring Beneficial Programs and Values for At-Risk Students in DC Public Schools**

Presenter's Name: Najla Hall
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Davis Dixon
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Studies show that school components like culturally-responsive teaching and intentional social and emotional learning can offset academic disparities for at-risk students. However, less is known about how schools can embody these values in their programs and self-descriptions to best serve at-risk students. This study utilizes the Positive Youth Development (PYD) model to explore how the programs and values of DC Public schools (k-12) with a high at-risk population are related to the reading and math scores of their students. The websites and profiles of schools with high (70% or above) at-risk populations within DCPS were analyzed for evidence of community partnership, culturally responsive teaching, social-emotional learning, and well-rounded school enrichment programs. This was done through thematic analysis of the schools' mission and vision statements and identification of their community partnerships and any school enrichment clubs or programs. A public dataset with the average standardized test scores for reading and math for each school was used to compare scores across schools. Further analyses will explore the relationship between the programs and values within each DCPS School and the related test scores. Preliminary results suggest that students in schools that display a strong endorsement of family-school relationships, high expectations for students, and a commitment to developing the "whole-child" performed better on standardized math and reading tests. This study gives insight into what programs and values are most beneficial in improving at-risk students' success.

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**Preventing Ecological Pathways to Juvenile Justice Affecting Black Students**

Presenter's Name: Amira Harris
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Celeste Malone
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This proposed research focuses on the traumatic childhood experiences within and outside of school settings for Black youth. Along with the contributions to their emotional and behavioral challenges, there is also the question of how these behaviors may consequently lead to Black students becoming a part of the juvenile justice system. Using Bronfenbrenner's Ecological Systems Theory as an approach to comprehending how childhood trauma, environments, and school experiences impact why some students engage in severe behavioral issues, leading to their involvement in the juvenile justice system. Identifying current correlations between students' environments and school behaviors is a key tool for identifying possible changes to protect students. This information will be gathered through a qualitative research study, using related scholarly articles and interviews with school officials who work closely with students to identify possible interventions to reduce students' juvenile involvement. Furthermore, through this research, the plan is to gather information that highlights how a student's environment can make or break their future. This research will show how to navigate a student's ecological environment to implement positive intervention methods that allow school officials to assist students in effectively working through their behavioral challenges, ultimately keeping them out of the juvenile justice system. The significance of this study lies in its ability to emphasize how the neglected trauma of Black students is often misinterpreted as noncompliance or misconduct. This research seeks to support schools in pinpointing at-risk students, minimizing the escalation of behavioral challenges, and improving the ecological environment of Black students.

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**Seen but Misunderstood: An Intersectional Analysis of the Portrayal of Black Women within Pop Culture**

Presenter's Name: Lauryn Hash
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
Faculty Advisor's email: fatou.sow@howard.edu

This research aims to aid in unveiling how Black women are portrayed in popular (pop) culture, a term that describes the most prevalent

values, beliefs, and practices in a society and is transmitted through mass media. This thesis will provide an overview of intersectionality and its relevance to the experiences of Black women within pop culture. Furthermore, it will delve into the various ways in which Black women are portrayed in media, including the different stereotypes that they have been associated with. This research seeks to determine whether or not the intersectional experiences of Black women influence the content produced by pop culture. It will also aid in determining if the exposure to specific representations of Black women in pop culture affects societal perceptions of Black women. This analysis will yield both quantitative and qualitative data to complete this research. Finally, this thesis will serve as an analytical contribution to the study of intersectionality and its effects on Black women within pop culture, emphasizing their experiences shaped by race and gender.

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**Whose Maps Matter? Participatory Cartography with D.C. Youth**

Presenter's Name: Rodolfo Hernandez perez
Classification: Post Doc/Resident/Fellow/Research Associate
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Aara'L Yarber

Mainstream mapping platforms like Google Maps systematically exclude the spatial narratives of historically marginalized communities, limiting whose stories are considered geographically legitimate. This National Geographic Society-funded project addresses this gap by developing a geography education strategy for middle and high school teachers serving these communities in Washington, D.C. Grounded in the tradition of participatory mapping—including social cartography and qualitative GIS (Denwood et al., 2022)—the strategy utilizes an inclusive pedagogical approach that prioritizes contextualized information, territorial scope, and culturally responsive messaging (Blanchet-Cohen & Reilly, 2013; Gay, 2022). The strategy aims to bridge students' daily experiential knowledge with formal spatial data by integrating the digital capabilities of the National Geographic MapMaker web-based platform with qualitative mapping activities. This integration empowers students to bridge technical proficiency with qualitative spatial storytelling. Ultimately, this poster seeks to foster collaborations with STEM education initiatives at Howard University, exploring non-traditional methods to engage school communities through localized, participatory research.

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**From Surviving to Thriving: An Integrated Model of Afrocentric Coping and Stages of Change in Black Women**

Presenter's Name: Chloe Hightower
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Zoeann Finzi-Adams
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The Shift-and-Persist model includes a cycle of adaptive cognitive reframing and pursuit and maintenance of hope in the face of adversity; it has been found to be a protective factor against discrimination and poor mental health in minority groups (Christophe et al., 2022). For Black women, these coping strategies are rooted in a legacy of adaptability and Afrocentric values. (Peterson et al., 2025) This presentation introduces a culturally grounded approach to substance use treatment that centers the lived experiences of Black women. This poster will present an integrative model, merging the Shift-and-Persist model with the Stages of Change through an Afrocentric lens, built on empirical literature which highlights the protective power of Afrocentric principles, such as community, collective responsibility, and spirituality, cultivate cognitive flexibility (shifting) and hope (persisting), which facilitate behavioral change (Lateef et al., 2024, pp. 678-690). By centering Black womanhood and Afrocentric values, this approach fills a critical cultural gap in substance use research. (Johnson et al., 2024) It offers clinicians, policy makers, and researchers a strengths-based path forward (Jones et al., 2023).

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**Digital Disruption: Exploring the Long-term Effects of AI in the Media and Entertainment Industry**

Presenter's Name: Robert Hill
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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Artificial intelligence (AI) refers to efforts used to develop simulations of human intelligence within computers to do tasks such as reasoning and decision-making. Integrating artificial intelligence into the media and entertainment industry has initiated a transformative era of technology in all types of media outlets. As AI was designed to contribute to the world, many critics are in an uproar of fear. Those against the use of AI feel that it will potentially take their jobs especially within the media and entertainment industry. Public figures, expressing how they feel about the advanced technology helps identify the problem that will be studied, which is AI's lack of effective governance in the media and entertainment industry. Due to the lack of regulations of AI, the purpose of this research is to investigate the long-term effects that AI may have when spreading information and disinformation, creating potential biases in journalism, and on the creation process in the media and entertainment industry in the future. A qualitative analysis will be used to find different perspectives on AI in the media and entertainment field. As AI steadily progresses, this research will correlate the intersection between technology and creativity to address the contributions and challenges brought to the media industry.

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**Social Commentary and Its Effect on Behaviors and Self Perception of Black Women**
Presenter's Name: Morgan Hunt
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
Faculty Advisor's email: atou.sow@howard.edu

Introduction: "The embodiment of female evil" (Allison, 2019). A line of words strung together to describe what society describes Black women as. When something is said so harshly, there has to be a reasoning to back behind it. Or, maybe it is something that was learned and taught without concrete evidence. Over time, Black women have built and created so much for themselves and the people around them, yet do not get the support they need. Black women are the brunt of a plethora of demeaning stereotypes and ideals, mostly due to the enslavement of Black Americans. Black women in particular were often seen as ugly and inferior by their slave masters. This, along with many other instances have led Black women to take on more masculine roles to accommodate for that. Since Black families have suffered for so long due to not being provided adequate resources it has in turn created broken families. Due to this, a lot of those leftover burdens are put on Black women. Which then can possibly lead to Black women struggling to discover femininity, when the construct of it is skewed to only accommodate a White female audience. This can create a sense of self hatred within a Black woman, or a lack of structure and direction which can be difficult to counteract.

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**Articulating Racial Uplift in the Writings of Anna Julia Cooper**
Presenter's Name: Rita Jacobs
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Terri Adams
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This study will examine how Anna Julia Cooper exemplifies a "race woman" within her writing. A race woman concerns herself with the moral, intellectual, and social character of the (Black) race. As an educator, Cooper believed that formal education would help uplift Black Americans, many of whom possessed a low social status as former slaves. Anna Julia Cooper's manuscripts from the Moorland-Spingarn Research Center will be used to conduct a qualitative content analysis. Through thematic coding, the study will look for themes of racial uplift. This project adds to the growing body of scholarship that highlights how Black women contributed to the uplift of Black Americans during a time when researchers tend to focus on the contributions of Black men.

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**The Intersection of Black Maternal Mortality, Misogynoir, Psychological Distress**
Presenter's Name: Anaya Johnson
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Nicole Bao
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Co-authors: Lakeiya Dulcio

This research examines the intersection of Black maternal mortality, misogynoir, and psychological distress to analyze how systemic bias shapes Black women's healthcare experiences. Structural inequities manifest through inadequate postpartum support, misinformation, and gaps in culturally competent care, which contribute to persistent disparities in maternal outcomes. Historical stereotypes rooted at the intersection of racism and sexism result in the minimization and dismissal of Black women's pain, delayed treatment, misdiagnosis, and underdiagnosis. Chronic exposure to discrimination further produces stress-related health risks that adversely affect Black women before, during, and after pregnancy. Contemporary maternal mortality patterns, in which Black women are significantly more likely to experience pregnancy-related death than White women, reflect the persistence of gendered racism within healthcare systems (Patterson et al., 2022; Jackson, 2023). Literature consistently documents the neglect, unnecessary medical interventions, and failures to provide comprehensive emotional, mental, and physical care, contributing to trauma and medical mistrust within healthcare systems.Black maternal mortality must therefore be understood as a consequence of systemic inequities. Misogynoir is the intersectional convergence of racism and sexism uniquely targeting Black women (Bailey, 2010) that provides a critical framework for understanding these disparities. Addressing these inequities requires the centering of Black women's lived experiences and conceptualizing maternal mortality and maternal mental health disparities as products of intersecting systems of oppression (Crenshaw, 1989; Collins & Bilge, 2022; Hardeman et al., 2021). An intersectional, culturally responsive framework is therefore essential to advancing equitable maternal healthcare and restoring trust for Black women.

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**Dissecting The Soft Life: How Controlling Images In The Media Affect The Way Black Women Perceive Themselves**
Presenter's Name: Jada Johnson
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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Media today exposes individuals to glimpses of other people's lives, often sparking comparisons that can lead to feelings of inadequacy, loneliness, and anxiety (Miller et al., 2016, p. 202). The media can inspire individuals to pursue their goals or leave them feeling insecure and doubtful of their attainability. This study examines how labels like soft Black woman, luxury Black girl and baddie on reality T.V. and social media, influence the self-esteem and confidence of young Black women, ages 18-25,

particularly in the context of self perception and economic gaps. By exploring the impact of how luxurious lifestyles are communicated, the research seeks to determine whether these trends genuinely promote empowerment or perpetuate a cycle of self-doubt and dependency on external validation, ultimately leading to economic disparities in the Black community. Through analyzing media such as reality T.V. and social media, using the Rosenberg Self-Esteem Scale, and focus groups with participants from diverse socioeconomic backgrounds, this mixed-methods approach reveals how the media's idealized narratives impact both mental well-being and economic positioning, underscoring the need for critical media literacy to navigate these pressures.

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**Who Are You Listening to?: Black LGBTQ perspectives in R&B and its influences on Black LGBTQ students attending Howard University**

Presenter's Name: Gillian Joseph
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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This thesis will analyze the queer expression of Black artists in R&B and how they convey their persona and sexuality within the media. It will examine if their art influences how Black LGBTQ Howard students, ages 18-22, form their perceptions and sexual and gender expression among other Black LGBTQ students attending Howard University. This study seeks to understand how social identity and music interact within social groups using a mixed methodology. Several queer Howard students will be interviewed to investigate if there is a correlation between the racial and gender-queer themes in R&B, and how Black queer audiences attending Howard University express desire and engage with intimacy. While the study examines music Black queer musicians produce, the study will simultaneously highlight how American culture and modern attitudes towards Blackness and queerness play a factor in the curation of the music and its significance in the lives of Black students at Howard University. This present study's purpose is to uncover whether Black queer R&B artists impact the social identities of Black LGBT college students attending Howard University.

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**The Digital Plantation?: The Influence of American Capitalism on Black Artistic Integrity and the Psychological Well-Being of Black Creatives.**

Presenter's Name: Jaleen Kairys
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Ryan Hill
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There is no question that Black creatives in the United States have long produced culturally and politically transformative art. The Harlem Renaissance, the Black Arts Movement of the 1960s and 70s, and the contemporary Afrofuturism movement each demonstrate how Black artistic expression has continuously reshaped American culture and expanded the possibilities of creative freedom. Yet, in this day and age, Black creatives do so within a capitalist system that often reduces their labor to marketable content rather than honoring it as authentic self-expression. While scholars have examined racial capitalism and cultural commodification, there remains a gap in research addressing the impact of capitalism on Black artists. This thesis explores how racial capitalism affects the psyche, mental health, and creative autonomy of Black creatives. Drawing on archival research frameworks from Black cultural studies and qualitative interviews with Black creatives in Washington, D.C., this study analyzes how capitalist structures shape artistic identity and psychological well-being. It argues that systemic commodification disrupts not only the integrity of Black art but also the psychological health of its creators. By naming these effects, the research seeks to inform equitable cultural policies, improve access to mental health resources, and promote liberatory creative practices that allow Black artists to thrive beyond the constraints of a profit-driven world.

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**Malama ʻāina (To Care for the Land); A Socio-Economic Analysis of the Puʻulani Agroforestry Restoration Project**

Presenter's Name: Kawika Keys
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*Presentation Type: Oral Presentation*
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Amidst worsening climate change and economic inequality, Ecosystem-based and Indigenous-led Resource Management offer practices that advance sustainability, protect biodiversity, and restore socio-economic and biocultural systems—yet they are often overlooked. Those involved in the processes (economists, environmentalists, private capital, community members, etc.) must have a thorough understanding of the socio-economic costs and benefits associated with implementing agroforestry restoration. Drawing upon the framework of the Collaborative Management Model for the Heʻeia National Estuarine Research Reserve, along with both qualitative and quantitative data, we present a Socio-Economic analysis of the Puʻulani Agroforestry Restoration Project. Using historical and ongoing data collected regarding costs, labor, communal responses for baseline assessments, and environmental literature on He'eia and Agroforestry, we aim to shed light on the socio-economic and environmental costs and benefits of practices such as Indigenous-led Resource Management and Agroforestry. Therefore, we view the Puʻulani Agroforestry Restoration Project Analysis as an opportunity to calculate the economic benefits and costs associated with agroforestry, reduce carbon emissions/increase above-ground and soil organic carbon, and demonstrate the restoration of ʻŌiwi (Native Hawaiian) ideology and rights.

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**The Impact of Gender Socialization on Gender Ideology and Coping Among Diverse Socio-Cultural Groups.**

Presenter's Name: Hoyt King
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Studies have revealed the adverse relationship between gender socialization, gender ideology, and coping mechanisms. With that being said, it is imperative to expand this knowledge base to understand the aforementioned association between different socio-cultural groups, to compare and understand to what degree those interactions differ. Per Lisa Vogel, capitalism requires the generational reproduction of labor-power, which then necessitates both the social and biological reproduction of human beings, therefore giving women and men a unique role in the social reproduction of labor power. Therefore, capitalism socializes women to internalize their role as objectified sexual objects, as well as to internalize their role as subservient to the home and men. Additionally, men are conditioned to socially reproduce labor power as well. To do so, they have been socialized to over prioritize work, over emphasis their sexual libido, and ignore emotional intimacy in exchange for work over-prioritization. We believe that across races, all men and women will showcase positive relationships between socially traditional gender conceptualization, concurrent traditional gender ideology, and poor coping. However, among the race x sex interactions we believe that based upon participant groups socio-cultural groups, specific race x gender dyads will showcase vastly different scores.

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**The Art of Belonging: Transracial Adoptee Identity & Conceptualization**

Presenter's Name: Joanie Kinsella
Classification: Undergraduate Student
School/College: Education
*Presentation Type: Poster Presentation*
Faculty Advisor: Elizabeth Ricks
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Transracial Adoption presents complex questions surrounding identity, belonging, and cultural integration. Preliminary findings of pilot interviews suggest that transracial adoptees' identity development is shaped by cultural connection and familial relationships, as feelings of love alongside limited cultural support and experiences of isolation contrast with evidence that adoption openness and proactive racial socialization foster resilience and a stronger sense of self. This qualitative study explores how transracial adoptees conceptualize their ethnic identity within those contexts and negotiate their sense of belonging within a society that is often structured by racial categorization. Utililizing semi-structured focus group interviews, this study centers on the narrative of 12 adult transracial adoptees adopted across racial/ethnic lines during childhood. Participants will engage in 2-hour virtual discussions guided by 7 open-ended questions designed to capture meaning-making processes and experiences of racial socialization. This research will be informed by the Five-Stage Racial and Ethnic Identity Development Model for Transracial Adoptees, which provides a framework for understanding how adoptees align with, reject, or negotiate their identities over time. Prior research has largely focused on adjustment outcomes and adoptive parents, leaving out adoptees' active construction of their identity at the intersection of trauma, race, and societal placement. The findings aim to deepen scholarly understanding of identity construction among transracial adoptees and ultimately contribute to a broader conversation on cultural connection and identity, not only among adoptees but also for all individuals.

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**Advancing Evaluation: The CR-TIE Model for Culturally Responsive, Trauma-Informed Practice in Evaluation**

Presenter's Name: Najam Knobloch
Classification: Graduate Student
School/College: Education
*Presentation Type: Poster Presentation*
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Co-authors: Veronica Thomas

Traditional evaluation practices can inadvertently cause harm—and weaken evaluations—when cultural context, histories of marginalization, and the prevalence of trauma are overlooked. This poster presents the Culturally Responsive–Trauma-Informed Evaluation (CR-TIE) framework, an integrated model that centers both culture and care across the evaluation cycle to strengthen ethics, equity, and validity. Drawing from Culturally Responsive Evaluation (CRE) and trauma-informed approaches, CR-TIE introduces universal precautions that assume trauma may be present without requiring disclosure; relational, strengths-based engagement; and strategies to prevent retraumatization. We map CRE to SAMHSA's Four R's—Realize, Recognize, Respond, Resist retraumatization—to show how CRE deepens each R by explicitly attending to culture, history, identity, power, and structural inequity. CR-TIE also emphasizes evaluator well-being, acknowledging emotional and psychological risks to evaluators in trauma-proximal or inequity-laden work. The model incorporates reflective practice, positionality work, pacing, debrief protocols, and collaborative structures to support evaluators as ethical, relational practitioners. Practical tools—including a one-page checklist and visual models—translate CR-TIE into day-to-day decisions, offering guidance for safe in-person and virtual protocols, participant choice and agency, trigger reduction, and justice-oriented data practices. By strengthening both participant safety and evaluator sustainability, CR-TIE enhances rapport, participation, and data quality while reducing distress-related measurement error. Embedding cultural humility, reflexivity, and community partnership, the framework positions evaluation not only as harm-reducing but also healing-supportive, aligning evidence generation with dignity, accountability, and equity. This model supports evaluators, researchers, and institutions committed to transforming evaluation into a relational practice that honors lived experience and advances social justice.

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**Evaluating the Psychological Effects of Harmful Media Exposure on Black Young Adults**
Presenter's Name: Lia Laurita
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Tunisha Singleton
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This mixed-methods study examines the psychological effects of exposure to negative, violent, and race-based media content among Black college students. Increased circulation of media depicting racialized violence and stereotypical portrayals has raised concerns about its potential for secondhand trauma. This study investigates whether exposure to race-focused media content is associated with emotional distress, post-traumatic stress symptoms, and self-esteem. Participants completed measures assessing frequency of exposure, vivid recall of a media-related memory, post-traumatic stress symptoms using the Impact of Event Scale–Revised, and state self-esteem using the Rosenberg Self-Esteem Scale. Preliminary analyses indicate that greater exposure was associated with higher stress-related symptoms and increased emotional distress during recall. An independent samples t-test revealed that participants in the experimental recall condition reported significantly lower self-esteem ($M = 3.17$, $SD = 0.43$) compared to the control condition ($M = 4.00$, $SD = 1.44$), $t \approx 2.19$, $p < 0.05$, $d = 0.77$, indicating a moderate-to-large effect. These findings suggest that recalling exposure to race-based and violent media content may meaningfully impact psychological well-being among Black young adults. This study contributes to media psychology research by highlighting the role of secondhand trauma in shaping emotional and self-evaluative responses to media targeting marginalized communities.

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**"Urban Class Structure in Post-Apartheid South Africa: Case Studies from Johannesburg and Tshwane"**
Presenter's Name: Daquan Lawrence
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Krista Johnson
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Amid the 32nd anniversary of South Africa's transition to a democratic and post-apartheid society, this dissertation research project consists of an investigation of the class structure in post-apartheid South Africa's municipalities of Johannesburg and Pretoria. The study seeks to discover how race continues to shape urban class constructions in South Africa, and how the middle class is defined in urban South Africa. The project seeks to construct rudimentary but sophisticated class categories that are informed by South Africans. Utilizing class analysis tools provided by African diaspora scholars, the theoretical bases of class in advanced industrialized societies of Western civilization are revised in order to allow application to 21st century, urban South African conditions.

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**Filtered Realities: Algorithmic Socialization, Identity Formation, and Internalizing Symptoms in Adolescent Girls**
Presenter's Name: Nia Layne
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Nkechi Enwerem
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Adolescence is a critical developmental period marked by identity formation and heightened sensitivity to peer evaluation. Social media platforms employ algorithm-driven content curation that amplifies appearance-based comparison, peer validation, and influencer modeling. National surveillance data indicate increasing rates of depression and anxiety among adolescent girls over the past decade, prompting examination of digitally mediated environments as potential contributors to internalizing vulnerability. This study aimed to synthesize existing literature examining associations between algorithmically curated social media exposure, identity development processes, and depressive and anxiety symptoms among adolescent girls. A structured literature review was conducted using peer-reviewed studies identified through bibliographic database searches including PubMed, PsycINFO, Scopus, and Google Scholar. Articles published between 2010 and 2025 were screened using predefined inclusion criteria addressing adolescent girls, social media exposure, algorithmic content curation, identity formation, social comparison processes, and depression or anxiety outcomes. Findings were systematically synthesized to identify recurring developmental and psychological patterns. Across studies, higher social media engagement and intensified social comparison were consistently associated with elevated depressive and anxiety symptoms. Algorithmically curated content was linked to increased appearance-based self evaluation and identity instability, which corresponded with greater internalizing distress. These findings highlight the need for developmentally informed digital literacy interventions and public health strategies that address algorithmic influence on adolescent identity formation and mental health outcomes. Algorithmically curated digital environments may intensify identity-related vulnerabilities during adolescence and are associated with elevated depressive and anxiety symptoms among girls. Addressing these influences represents an important priority for adolescent mental health prevention efforts.

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**Anticolonial mobilization across Francophone Africa under the late IIIe, IVe, and early Ve republics: Work in Progress**
Presenter's Name: Daniel Lee
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Krista Johnson
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In the last 15 years we have seen rising tensions between France and their former colonies with seismic flashpoints since the pandemic. The eviction of French military, diplomatic, economic, and scientific footholds across the Sahel represent some of the most striking dynamic shifts in Franco-African relations this century. Even peoples integrated within the French national fold seek to renegotiate their post-colonial relationship—as

French Guiana, Guadeloupe, and New Caledonia have all had sizeable movements against the current state of their power dynamics with Paris. Many of the loudest voices in those movements point to failures from both their own leadership and the French in developing truly independent and mutually-beneficial relations—whether through a failure to redress harm from colonization and opposition to decolonization or through the entrenchment of neocolonial dynamics. The explicit invocation of (neo)colonialism as a core component of recent waves of civil conflict in French Africa present challenges for researchers in this field—many of whom do not prioritize or even incorporate colonial perspectives and histories within the models and theories of civil conflict. This project presents a reinterpretation of Francophone African civil conflict by incorporating colonial history and neocolonialism into civil conflict models by tapping colonial archives.

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**Neighborhood and Socioeconomic Factors Influence on Atopic Dermatitis**

Presenter's Name: Delaney Leonard
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Darren Bernal
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Participant electronic health records from the All of Us Research Hub indicate that of 354,400 records, 28.74% cited inflammation of skin and/or subcutaneous tissue as a condition, not accounting for patients under 18. Of the child population, Black children in the U.S. experience atopic dermatitis at a rate 1.7 times higher than white children and are twice as likely to suffer from severe disease (Polaskey & Chovatiya, 2025). It is not only Black youth impacted, however, but rather an entire social class of historically marginalized communities in American society herein defined as the "other." Using a content analysis, this research examines neighborhood, and socioeconomic factors influence on atopic dermatitis – also known as eczema – with a particular focus on the implications for marginalized or "othered" groups such as Black, queer, or disabled individuals. Previous studies which examine social determinants of health in relationship to the prevalence of atopic dermatitis will be summarized and analyzed to extend preexisting scholarship and provide adequate background for understanding the health and social impacts on disempowered communities. Whereas a deeper and holistic analysis of these groups is often overlooked in mainstream research, this study aims to critically discuss the implications of social determinants of health in relation to "othered" communities, with particular regard to quality-of-life impairment and meditations on potential health interventions that must be waged.

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**The Power of "Nappy": Texturism and Racialized Beauty Standards as Social Determinants of Traction Alopecia Risk Among Black Women**

Presenter's Name: Nia Long
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Nicole Bao
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Background/Purpose: Traction alopecia (TA) is a form of hair loss caused by sustained tension on hair follicles with biphasic characteristics. TA disproportionately affects Black women, with research attributing the cause to cultural hairstyling such as braids, cornrows, and dreadlocks. Additional hairstyles linked to TA include wigs, sew-ins, adhesive and heat-based styles, ponytails, and chemical relaxers. Preventive measures focus on patient education and cessation of high-risk hairstyling practices, while acknowledging these practices may be difficult to avoid due to manageability. However, research does not sufficiently address social determinants, including texturism and racialized beauty standards, that influence hairstyling practices. Texturism and racialized beauty standards may contribute to internalization of negative perceptions of type 4 hair and encourage the use of tension-based or chemically altering hairstyles despite known risks. Therefore, instructing patients to avoid these practices may not address underlying factors influencing hairstyling decisions.Methods: This study will examine whether texturism is an underrecognized social determinant of TA risk among Black women and whether patient education alone is sufficient for prevention. A cross-sectional survey of Black women aged 18 and older will assess experiences with texturism, racialized beauty standards, and hair discrimination. The study will explore links between these experiences, hairstyling choices, and self-reported TA symptoms or diagnoses. Expected Results: Greater exposure to texturism and racialized beauty standards is expected to be associated with increased use of high-risk hairstyles and higher prevalence of self-reported TA symptoms. Implications: Findings aim to support culturally aware prevention strategies and enhance the effectiveness of existing methods.

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**Safety and Efficacy of Medications Used in the Management of Asthma Among Children Aged 6–12 Years (2020–2025)**

Presenter's Name: Yasmine Lopez
Classification: Graduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Nkechi Enwerem
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Co-authors: Nkechi Enwerem

Background: Asthma is a common chronic disease among children aged 6–12 years. Selection of pharmacological agents for this age group, must balance efficacy, safety, and adherence. The aim of this study is to synthesize evidence on the safety and efficacy of pediatric asthma medications. Methods: We focused on articles published between 2020 and 2025. We searched for articles in: clinical trials, cohort studies, systematic reviews, and national and international clinical practice guidelines and the reference lists of articles. Research Question:

Commonly used asthma medications in pediatric populations, including inhaled corticosteroids (ICS), long-acting beta-agonists (LABA), leukotriene receptor antagonists (LTRA), and biologic therapies. Results: Our studies revealed that a combination therapy with inhaled corticosteroids and long-acting beta-agonists (ICS–LABA) was effective in asthma control compared with inhaled corticosteroid monotherapy. Children with severe, uncontrolled asthma responded better to Biologic therapies. Children on Montelukast showed an increased neuropsychiatric adverse effect thus necessitating for careful monitoring. Better asthma control was seen when medications are used as prescribed across all treatment regimens. Implications: Our finding recommends the use of personalized, guideline-based care to enhance asthma management in children. Research studies also emphasized the importance of long-term pediatric safety data especially for newer and emerging asthma therapies. Conclusion: An individualized, family-centered approach to asthma management improves clinical outcomes by addressing each child's unique treatment needs, promoting adherence, and engaging families in the care of their child and in decision-making.

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**Task-Shifting Mental Health Support to Resident Assistants at HBCUs: A Proposed Peer-Led Model for Expanding Access to Care**

Presenter's Name: Janeen Louis
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Ezer Kang
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Background: Historically Black Colleges and Universities (HBCUs) face a critical shortage of licensed mental health professionals, leaving many students without timely or culturally responsive care. Task-shifting, reallocating specific care responsibilities from specialists to trained non-specialists, has demonstrated effectiveness globally in expanding mental health access in resource-limited settings. Within HBCUs, culturally responsive and community-centered strategies are needed to address mental health disparities and barriers to care, including stigma and mistrust. Methods: This project proposes a peer-led, task-shifting intervention that would train resident assistants (RAs) to provide preliminary mental health support within campus dormitories. RAs would receive structured training to recognize early signs of anxiety, depression, and related disorders, conduct brief check-ins, host peer conversations, and facilitate referrals to professional services when appropriate. The proposed model emphasizes culturally responsive communication, stigma reduction, and integration within existing residential life structures. Results: If implemented, the intervention is expected to increase early identification of mental health concerns, improve help-seeking behaviors, and decrease the strain on campus counseling services. Embedding support within peer networks may also reduce cultural barriers to care and normalize mental health discussions across HBCU campuses. Conclusions: This proposed task-shifting model offers a scalable and sustainable framework for strengthening mental health infrastructures at HBCUs. By leveraging trusted peer leaders, the intervention has the potential to reduce disparities in access to care and promote culturally grounded wellness support.

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**Different Worries, Different Outcomes? Examining Domains of Youth and Caregiver Worries About Anxiety Treatment**

Presenter's Name: Janeen Louis
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Co-authors: Rachel Reynolds

Background: Many children and caregivers begin therapy with treatment-related worries that may influence engagement and outcomes in cognitive-behavioral therapy (CBT). Greater treatment worries have been linked to higher anxiety, depressive symptoms, and functional impairment, and may interfere with therapeutic alliance (Rabner et al., 2023). This study examined whether domain-specific pre-treatment worries reported by youth and caregivers predicted post-treatment outcomes following CBT for anxiety. Methods: Secondary data analyses were conducted on a sample of youth (N = 124) who received the Coping Cat program, a CBT anxiety treatment, at Temple University. Pre-treatment worries were assessed using the Treatment Worries Questionnaire (TWQ), Parent and Child versions. Post-treatment outcomes were evaluated using the Clinical Global Impression scales (CGI-I/S), the Children's Global Assessment Scale (CGAS), and the Multidimensional Anxiety Scale for Children (MASC). Linear regression analyses were conducted. Results: Youth reported the greatest worries in the Difficulty domain, while caregivers reported the greatest worries regarding Adverse Reactions. Youth-reported worries did not significantly predict outcomes. In contrast, greater caregiver-reported Stigma and Adverse Reactions worries predicted higher post-treatment anxiety and greater functional impairment. Caregiver Process worries predicted lower anxiety symptoms, and Inconvenience worries predicted better clinician-rated functioning. Conclusions: Caregiver treatment worries were significantly associated with CBT outcomes, more so than youth-reported worries. Addressing caregiver concerns prior to and during treatment may enhance engagement and improve CBT effectiveness for youth with anxiety disorders.Results: Youth reported the greatest worries in the Difficulty domain, while caregivers reported the greatest worries regarding Adverse Reactions. Youth-reported worries did not significantly predict outcomes. In contrast, greater caregiver-reported Stigma and Adverse Reactions worries predicted higher post-treatment anxiety and greater functional impairment. Caregiver Process worries predicted lower anxiety symptoms, and Inconvenience worries predicted better clinician-rated functioning.Conclusions: Caregiver treatment worries were significantly associated with CBT outcomes, more so than youth-reported worries. Addressing caregiver concerns prior to and during treatment may enhance engagement and improve CBT effectiveness for youth with anxiety disorders.

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**Holding Space: Culturally Responsive Digital Tools for Black Women's Mental Health**

Presenter's Name: Janeen Louis
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Amy Yeboah Quarkume
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Background: Black women face distinct mental health challenges shaped by the intersections of race, gender, and societal expectations, including the pressures of the "strong Black woman" stereotype, racialized stress, and stigma surrounding help-seeking. Although AI-driven mental health tools and online therapy platforms are increasingly available, most are designed for the general population and do not account for the cultural and social context of Black women's experiences. This gap limits engagement, relevance, and the potential effectiveness of digital mental health resources for this population. Methods: This project uses a mixed-methods approach, combining a literature review, analysis of existing AI chatbots and online therapy platforms, and comparative evaluation. The evaluation focuses on accessibility, cultural relevance, and integration of peer-centered support. Both the content and functionality of the platforms are assessed to determine how well they meet the mental health needs of Black women. Results: Preliminary findings indicate significant gaps in current tools, including a lack of culturally relevant content. These shortcomings suggest that existing platforms may unintentionally perpetuate disparities in access, engagement, and effectiveness for Black women seeking digital mental health support. Conclusions: Findings will guide evidence-based recommendations for designing a culturally grounded intervention, such as an AI-assisted peer support space, that integrates community, cultural identity, and accessible mental health resources. By addressing these gaps, this project contributes to ethical AI development, public interest technology, and the creation of inclusive digital mental health tools. Conclusions: Findings will guide evidence-based recommendations for designing a culturally grounded intervention, such as an AI-assisted peer support space, that integrates community, cultural identity, and accessible mental health resources. By addressing these gaps, this project contributes to ethical AI development, public interest technology, and the creation of inclusive digital mental health tools.

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**Exploring Racial Differences in Mother-Daughter Communication about Sex and Relationships, and Their Impact on Women**

Presenter's Name: Haley Lucas
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Poster Presentation*
Faculty Advisor: Fatou Sow
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This thesis aims to explore the ways mothers from diverse racial backgrounds communicate with their daughters about sex and the implications the communication has on the women they become. The researcher strives to find out how mothers from diverse racial backgrounds navigate these topics and how the conversations contribute to the development of their daughters. By looking at the experiences of both mothers and daughters, the study seeks to understand the long-term outcomes of these conversations on women. To achieve these goals, a mixed-methodology approach will be employed, incorporating surveys and private interviews to collect quantitative and qualitative data from Black and White daughters, aged 18 to 23 and their respective mothers. No age restriction will be placed on the mothers, as motherhood can begin at any age, and the focus will remain on their role in raising daughters within the specified age range.

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**Addressing Educational Inequities: Focus Group Findings Informing a Gamified Intervention Supporting First-Generation Students**

Presenter's Name: Mwela Lufumpa
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
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Co-authors: Brooklyn Compton, Bree Arceneaux

Historically Black Colleges and Universities (HBCUs) serve students from diverse sociocultural backgrounds, yet first-generation college students (FGS) remain at elevated risk of non-completion. Just over half (56%) of FGS complete their baccalaureate degree within six years compared to 74% of non-FGS. These disparities are shaped by inequities in cultural capital, defined as knowledge, skills, or other advantages that facilitate success in higher education. Limited access to this capital contributes to difficulties navigating the hidden curriculum and exacerbates sociocultural and financial barriers. We are presenting findings from phase one of Trailblazers, a novel gamified evidence-based intervention designed to improve outcomes for FGS enrolled at HBCUs. Phase one uses focus groups to gather FGS perspectives on the intervention's relevance, structure, and content across five domains: social support, academic preparedness, financial challenges, psychological well-being, and student transition. This phase ensures the intervention is shaped by the voices of those it is intended to serve. Findings from phase one will illustrate key themes shaping FGS' college experience and inform refinement of the intervention's structure and content. This presentation will highlight thematic findings, discuss their implications, and outline next steps in intervention implementation and evaluation.

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**Stories That Speak: How Storytelling Shapes Public Speaking Confidence**

Presenter's Name: Ssanyu Lukoma
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School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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Public speaking is an essential skill that significantly impacts students' confidence, academic success, and leadership development. However, glossophobia, or the fear of public speaking, affects nearly 75% of individuals, particularly students (Dwyer, 2000). This study investigates

the role of storytelling and structured public speaking instruction in K-12 classrooms to reduce public speaking anxiety and enhance communication skills. Using three key methodologies—surveys to measure anxiety levels, focus groups to gather personal experiences, and classroom observations to assess real-time interactions—this research aims to determine the effectiveness of storytelling-based instruction. Previous studies suggest that incorporating storytelling can reduce public speaking anxiety by up to 23% (Hashemi et al., 2017). The hypothesis is that students exposed to this method will demonstrate greater confidence and decreased anxiety, potentially leading to improvements in classroom engagement and long-term communication skills.

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**Emotional, Behavioral, and Somatic Outcomes of Pediatric Sickle Cell Disease: A Comparison to Thalassemia and Non-Hemoglobinopathy Controls**

Presenter's Name: Mariam Ly
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Oral Presentation*
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Sickle Cell Disease (SCD) is a hereditary hemoglobinopathy where abnormal hemoglobin (Hgb S) causes red blood cells to form a sickle shape. SCD occurs in 1 in 365 Black births, increasing risk of childhood stroke by over 200 times. Children with SCD are at higher risk for emotional, behavioral, and somatic conditions associated with medical complications and psychosocial stressors. Thalassemia, another hemoglobinopathy, served as an affected comparison group. It is hypothesized that children aged 0-17 with SCD will exhibit significantly greater emotional, behavioral, and somatic outcomes compared to controls. Children with Thalassemia will also exhibit these differences, though less pronounced. This study used secondary data analysis merging data from the 2022 & 2023 National Survey of Children's Health, (≈109,265 children). After excluding children with both SCD and thalassemia, the final SCD sample included 73 children, who were then matched by race to controls, yielding a control group of 801. Children diagnosed with thalassemia (n = 152) served as an affected comparison group. Adjusted logistic regressions were conducted using STATA 12 ($p < 0.05$). Children with sickle cell disease had significantly greater difficulties with executive functioning, chronic pain, ER visits, and hospitalizations compared to controls; these differences were not significant in thalassemia. Their caregivers reported greater reductions in work hours due to their child's health. No differences were observed in headaches, breathing, or coordination. Findings highlight the unique burdens of pediatric sickle cell disease and underscore the need for early, targeted interventions and further longitudinal research with larger samples.

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**The Impact of Cultural Orientation on Self-Esteem and Coping Mechanisms**

Presenter's Name: Leonie Manafa
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Davis Dixon
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Cultural Orientation is defined as the set of archetypes or generalizations that allow for the general tendencies of a cultural group to be studied. Our research examines how those archetypes and behaviors influence self-perception (ie. self-concept and self-esteem) of individuals across racial demographics. We will utilize the Cultural Orientation Scale, the Rosenberg Self Esteem Scale, and the COPE Inventory to examine the intersectionality of the concepts of cultural orientation as it relates to behavioral patterns. Past research has shown that racial socialization can promote a positive sense of self when it comes to ethnic-racial identity. This leads to increased usage of adaptive coping strategies and serves as a resilience factor in the face of stressors. Our scale of cultural orientation explores the behavior of participants through a self-reported measure to understand the endorsement of communal orientation; an idea that places a focus on social interdependence, reciprocity, group duty, and identity. With this scale, we aim to investigate if cultural orientation influences self concept and the kind of coping mechanisms a person may use under stress.This study seeks to understand how it differs among race, and if previous findings are consistent with our data set.

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**The Relationship Between Academic Pressures and Creative Self-efficacy Among Black College Students**

Presenter's Name: Imani Marc
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Davis Dixon
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This study investigates the relationship between academic achievement pressures,how much internal pressure individuals experience to meet academic expectations, andcreative self-efficacy, the degree of confidence one has in generating new and original ideas,among African American college students attending Howard University. The study uses across-sectional correlational design at a single time point and examines the relationship between the amount of pressure to perform academically and students' beliefs about their creative abilities. Creative self-efficacy is defined as the degree of confidence students havein developing unique ideas and/or solutions within an academic setting. To assess this concept participants will complete an online survey that includes previously established self-report scales measuring academic achievement pressure, perfectionism discrepancy, creativeself-efficacy, and student demographics (cumulative grade point average). Descriptivestatistics, bivariate correlation analysis, and multiple regression analysis will be used toexamine the associations between the variables in this study while accounting for cumulativeGPA. This study extends the body of research regarding the ways in which academic environments that place an

emphasis on achievement and performance may relate to students'views of their own creativity during the undergraduate years.

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**Hope as a Catalyst for Mothers**

Presenter's Name: Melodie Marsh
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Objective: What if hope was as essential to survival as food or shelter? For mothers raising children under financial hardship, it may be. This study explores the impact of Rx Kids, a universal, unconditional prenatal and infant cash transfer program in Flint, on maternal hope and wellbeing. Rx Kids mothers receive $1,500 during pregnancy and $500/month for 12 months. Methods: Survey data was extracted from the 2024 Maternal Wellbeing Survey of women who gave birth at Hurley Medical Center from July 2023-June 2025. Researchers conducted a multivariable difference-in-difference analysis comparing four cohorts, focusing on households earning under $40,000 annually.Results: Exposure to Rx Kids is linked to a 39.0 percentage point (ppt) increase in the likelihood of lower-income mothers reporting feeling more hopeful about life, a 34.0 ppt increase in reporting that hope improved their quality of life, and a 38.0 ppt increase in feeling more hopeful overall. Additionally, exposure to Rx Kids is associated with a 37.0 ppts increase in lower-income mothers rating their mental health as good or better. Conclusion: These findings suggest that Rx Kids may improve hope and maternal wellbeing; this may lead to empowering mothers to invest in their futures and parent with confidence. Hope is not a soft outcome, it is a measurable, motivating force shaping healthier families and communities. Programs like Rx Kids demonstrate that investing in families' wellbeing and financial foundations can yield social benefits.

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**Public Water Accessibility in Ghana**

Presenter's Name: Chelsea Mason
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Benjamin Talton
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Ghanaian residents face struggles in accessing public water. Most residents get their water from privatized vendors. The government has programs to distribute water, but it is not enough. Ghana has more than enough water to provide for its citizens; the problem, however, arises from purifying and distributing it. To better understand the government's failure in this regard, this paper asks, "To what extent do government policies and management affect public access to water in Accra in comparison to California?" There are multiple government agencies responsible for water management; despite this, weak regulation and limited resources prevent consistent water access. The government has difficulties providing the resources for underserved communities, especially those in rural regions. The approach to answering this question is both qualitative and quantitative. The qualitative aspect is interviewing locals in Accra to see how they get their water and their thoughts on why there are water problems. Another lens of analysis is examining the current laws in place and observing how they are affecting water management. The quantitative side is manipulating a dataset covering water accessibility in Ghana and highlighting key factors shaping it. Then there is comparing what is found about water accessibility in Ghana to water accessibility in Southern California. The project will look at the similar water policies of Accra and California and see how they led to different results in public water accessibility. The goal of this project is to examine, analyze, and find solutions to the lack of public water access in Ghana.

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**America's Perception of the Black Community: Has It Been Influenced by American Television?**

Presenter's Name: Madison Maynard
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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The poor characterizations of the Black community has affected Black people for decades. This mixed-methods study will investigate Black representation in American television shows over the generations and how it has impacted America's perception of the Black community. How the Black community is portrayed in television impacts all Americans, because Americans of all races are consuming this media. Adams-Bass, Bentley-Edwards & Stevenson's (2014) research shows:Repeated exposure to television shows that feature stereotyped Black characters create negative perceptions of Black people by others. These racially-based arche- typologies may have a negative impact on the psychosocial development of Black children and youth as well. (p.79) In recent years, there has been a shift in how Black people are portrayed, with more positive representation in American television. This trend is evident in series such as The Cosby Show and Black-ish. Furthermore, this study seeks to determine if the change of portrayal of Black people, over the years, has altered how other racial groups view Black people or if the offensive stereotypes are what the audience still believes to be true.

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**Understanding and Addressing Resource Underutilization in Bronx Communities**

Presenter's Name: Justine Mccarthy
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Nicole Bao
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This research investigates why residents of the Bronx underutilize community resources—despite their availability—through a qualitative, ethnographic lens. While the borough is home to numerous programs

in healthcare, education, housing, and economic development, many of these resources remain out of reach for the very populations they aim to serve. Rooted in lived experience, this study explores the complex web of barriers—ranging from institutional mistrust and cultural disconnection to logistical and informational gaps—that prevent meaningful engagement. Drawing on immersive fieldwork and community-based participatory research, the project centers Bronx residents as co-creators of knowledge. It examines how historical injustices and systemic inequities have shaped attitudes toward public institutions, often eroding trust and reinforcing disengagement. The research framework—grounded in the Institutional Mistrust Framework—also explores how transparency, cultural competence, and community engagement can act as key drivers in rebuilding this trust.Through interviews, participant observation, and collaborative journaling, the study aims to uncover the daily realities of navigating public services in the Bronx. It also seeks to highlight grassroots efforts and informal support networks that emerge in response to institutional failures. Ultimately, this research aspires to inform more culturally responsive and equitable interventions. It challenges extractive research models by placing the Bronx community at the center of both inquiry and impact—offering not only insight into barriers but also pathways toward transformation.

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**Beyond Ego, Hierarchy, Injustice and Incoherence: Toward Community Power and Collective Peace**

Presenter's Name: Harold Mcdougall
Classification: Senior Faculty
School/College: Law
*Presentation Type: Oral Presentation*
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My article in progress envisions society as a single living body of collective bioelectric energy, where health depends on the free flow of connection and resources. Currently, a socially constructed "ego" creates mental walls, leading to hierarchies that hoard power and commodify human relationships into mere transactions. This "incoherence" results in societal sicknesses like poverty and environmental destruction. To heal, we must reclaim "Cultural DNA"—ancient, indigenous wisdom, algorithms of cooperation, that align social structures with our natural biological rhythms. Central to this is the creation of "civic infrastructure" through small, face-to-face collectives, cooperatives, and exchanges of mutual aid. These local organisms can scale their impact through "confederation," a horizontal network mirroring Martin Luther King Jr.'s "World House," where power flows sideways rather than vertically. This transformation requires "vernacularization," the process of translating universal justice into local traditions to ensure it resonates with everyday life. Furthermore, education must shift from competitive "factory" models to "Liberation Schools" that prioritize connection and spirit. This vision is reinforced by the science of bioelectricity, which suggests humans share a bioelectric field where emotional states broadcast signals to the whole. Achieving a "coherent" society means moving away from the ego's "hall of mirrors" and toward a system sustained by empathy and mutual aid.

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**How does perceived stereotype threat influence the identity development of African American male student-athletes?**

Presenter's Name: Michael Mcmillan
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Shanter Alexander
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African American male student-athletes occupy a unique and complex social space at the intersection of race, gender, academic status, and athletic performance. Their multiple identities place them in environments where racialized and athletic stereotypes can shape expectations and experiences. At the intersection of race, gender, academics, and athletics, African American male student-athletes may face stereotype threat. Constant exposure to negative racial and athletic stereotypes can affect how they think, how they see themselves academically, and how they envision their future careers. This research focuses on how perceived stereotype threat influences the identity development of African American male student-athletes. Specifically, it investigates whether working memory functions as a cognitive mechanism through which stereotype threat shapes academic self-concept and career aspirations. Additionally, the study compares experiences at Predominantly White Institutions (PWIs) and Historically Black Colleges and Universities (HBCUs). This will examine how institutional context influences outcomes. This research looks at how racially and socially embedded stressors affect identity, academic self-concept, and career development. Data will be collected using validated quantitative measures of perceived stereotype threat, working memory, academic self-concept, and career decision-making. The study is expected to reveal how stereotype threat shapes cognitive functioning, academic perceptions, and career aspirations, offering insights for culturally responsive interventions.

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**"He desperately wanted help": A causal analysis of the use-of-force policy and mental health outcomes among Black emerging adults**

Presenter's Name: Angelina Mcneill
Classification: Graduate Student
School/College: Social Work
*Presentation Type: Oral Presentation*
Faculty Advisor: Janice Edwards
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The purpose of this research was to utilize a social work perspective on police violence and analyze the national statistics on the use of force policies that impact Black emerging males with mental illness in urban areas. There are five fundamental goals of this research: (a)to examine current statistics, characteristics, and trends regarding excessive use of force; (b) to highlight the population of Black emerging males with mental illness as receivers of fatal use of force methods; (c) examine current methods in training social workers and law enforcement officers; (d) propose a new model for social workers and law enforcement officers, and (e) provide recommendations to eliminate harmful policing policies to address systemic problems within the mental health field. The proposal concludes with a discussion of its limitations, areas for future research, and a summary. Major findings of this proposal found that police brutality enforced upon Black adults in the United States has

always been a part of the inception of the use of force policy. Research has shown that racial minorities and individuals with mental illness are at a significantly higher risk of experiencing fatal use of force tactics and being killed by law enforcement officers at a higher rate. Lastly, a brief proposed model for collaboration between social workers and law enforcement to promote reform is presented. The preliminary results showcase that only 6% of national social service-related calls are mental health related, compared to the national data of 80% of police calls needing social service assistance.

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**Studying TikTok discourse around the 2024 US Presidential Election through Topics, Emotions, and Aggression levels**

Presenter's Name: Praise-el Michaels
Classification: Graduate Student
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Co-authors: Anietie Andy, Hyun Koo

During an election, e.g. a Presidential election, and the campaign period leading up to the election, individuals provide commentary related to the election on social media platforms such as TikTok. Analyzing these social media commentaries can provide insights about how election narratives and public sentiment evolve over time. In this work, we analyzed TikToK posts related to the 2024 US Presidential elections and the two major Presidential candidates i.e. Donald Trump and Kamala Harris. We study how the topics, emotions, and aggression, respectively, expressed in these posts evolved over time and were influenced by various political events.

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**Conceptualizing Racial Inequality in Drug Sentencing: A Systematic Scoping Review of Recent Scholarship on Cocaine-Related Offenses**

Presenter's Name: Angel Mochoge
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Nathan Alexander
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Co-authors: Nathan Alexander

This scoping review synthesizes peer-reviewed research published over the past decade on racial disparities in drug sentencing within the United States, with particular attention to how scholarship conceptualizes and analyzes punishment severity, access to trial, conviction outcomes, and structural inequality. Focusing on cocaine-related offenses as a critical case within the broader landscape of drug policy, our review examines how recent studies interpret the historical and contemporary mechanisms that produce disparate legal outcomes across racial groups. We hypothesize that the literature documents persistent racialized patterns in sentencing and criminal legal processing despite formal policy reforms. By mapping the conceptual and empirical trends in recent research, this review situates cocaine sentencing within the wider framework of racialized punishment and systemic inequality in the criminal legal system.

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**The Power We Hold: Why Do So Few Black Women Serve as U.S. Senators?**

Presenter's Name: Bria Nartey
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Black women have long been central to the expansion of American democracy, yet they remain dramatically underrepresented in positions of formal political power, particularly in the U.S. Senate. My research examines the multifaceted obstacles that limit Black women's political leadership, including structural barriers within campaign finance, limited institutional support from political parties and PACs, and systemic inequities that constrain voter access in communities of color. Drawing on scholarship by Prestage, Brown, Dowe, Simien, Jordan-Zachery, Tokeshi, and others, this research illustrates how Black women's political labor—often performed outside formal office—continues to shape electoral outcomes, community mobilization, and policy agendas. The analysis also highlights the persistent erasure of Black women's strategies, contributions, and leadership within traditional political science frameworks. By integrating historical examples, contemporary case studies, and theoretical approaches grounded in Black feminist politics, this paper argues that increasing Black women's descriptive and substantive representation requires both elevating Black women into elected office and implementing structural reforms that value their leadership, experiences, and political agency. Ultimately, a more equitable political future depends on collective investment in dismantling these barriers and recognizing the essential role Black women play in shaping democracy.

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**Building Generational Mental Wealth: The Role of Community and Family Mental Health Literacy and Caregiver Mental Health in the Resilience and Academic Flourishing of Black Adolescents**

Presenter's Name: Erin Neal
Classification: Graduate Student
School/College: Other
*Presentation Type: Oral Presentation*
Faculty Advisor: Debra Roberts
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Attachment theory suggests that in times of distress, a child with a secure attachment will seek proximity to their caregiver; once they feel safe and regulated, they will begin to explore the world. Further, Bronfenbrenner's bioecological model posits that children are shaped by proximal processes, individual characteristics, and temporal developmental processes that occur through interaction with their environments. Current literature is limited in its empirical examination of community-level assets that foster flourishing as measured by

curiosity for learning and promote positive developmental outcomes among Black youth. Flourishing, in particular, has been underexamined in Black communities and insufficiently contextualized within the sociocultural realities Black families navigate. Hence, we lack a clear understanding of what promotes flourishing among Black adolescents in the presence of systemic social stressors. This study seeks to address that gap by investigating mechanisms that foster flourishing and resilience among Black adolescents. Specifically, we will examine the relationship between caregiver mental health (CMH), community and family mental health literacy (CFMHL), school-based trauma-informed care practices (TIP), curiosity for learning (CL), and adolescent resilience, operationalized through academic engagement and emotional regulation. Participants will include Black middle school students in a metropolitan city. Using quantitative measures, we will conduct moderation analyses to test whether CFMHL and TIP moderate the relationship between CMH and CL; which will strengthen pathways toward resilience, reflected in improved academic and emotional functioning. These findings align with Healthy People 2030 objectives aimed at increasing youth resilience and trauma-informed school practices.

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**Breaking Barriers: Preliminary Findings on Help-Seeking Attitudes and Mental Health Service Utilization Among Black Men**

Presenter's Name: Danica Nestor
Classification: Graduate Student
School/College: Social Work
*Presentation Type: Poster Presentation*
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Black men experience disproportionately high rates of unmet mental health needs and remain underrepresented in mental health service utilization. While prior research has largely focused on barriers, less attention has been given to factors that promote engagement in care among Black men who are already accessing services. The purpose of this study is to examine help-seeking attitudes among Black men currently utilizing mental health services and to identify psychosocial factors influencing these attitudes, with particular attention to perceived social support and self-stigma. Guided by a strengths-based and culturally responsive framework, this quantitative cross-sectional study utilizes survey data collected through Qualtrics from Black men aged 18 and older currently engaged in mental health services. Participants completed validated measures, including the Attitudes Toward Seeking Professional Psychological Help Scale–Short Form (ATSPPH-SF), the Self-Stigma of Seeking Help Scale (SSOSH), and the Multidimensional Scale of Perceived Social Support (MSPSS), along with demographic questions. Data collection is ongoing, with preliminary responses indicating variability in help-seeking attitudes across participants. Preliminary findings suggest that higher levels of perceived social support are associated with more positive attitudes toward seeking professional psychological help, while higher levels of self-stigma are associated with less favorable help-seeking attitudes. These findings highlight the critical role of social support and stigma reduction in promoting mental health engagement among Black men. This research contributes to efforts aimed at informing culturally responsive, gender-specific interventions and advancing mental health equity within underserved populations.

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**Cinematic History, Lived Memory: How Film Shapes Public Understanding of African American History**

Presenter's Name: Aniya Northern
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
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The purpose of this study is to examine how films that depict African American history, either directly or with historical attributes, shape audience understanding and memory. By analyzing both the accuracy of these portrayals and the public's responses to them, this research investigates whether, and to what extent, audiences internalize the historical narratives present on screen. For this study, a historical methodology will be employed, utilizing both primary and secondary sources to investigate the past and compare those findings to what is being depicted on screen. This research will follow the production of films either based on historical events or that include historical attributes and examine the decisions made in how these events are retold on screen.

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**Silent Epidemic: The Reality of Black Maternal Morbidity and Mortality**

Presenter's Name: Maryshawntel Obilor
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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This research paper explores the maternal morbidity and mortality epidemic among Black birthing people in the United States by analyzing old myths in the health care system, exploring how to revitalize and reutilize midwifery, and proposing the extension of postpartum care. This is a very important topic to explore because maternal morbidity and mortality rates that represent the Black birthing community are disproportionately high because of deep-seated medical racism in the healthcare system. In order to tackle this issue, this paper will cover the start of the joint field of obstetrics and gynecology, myths that have specifically harmed Black birthing people, the treatment that they receive, and interventions that can support Black birthing people and improve morbidity and mortality rates. This will be achieved by reviewing present research and literature, including books and academic journals. This review proves that there is a serious crisis among Black birthing people and their times during pregnancy and after giving birth, showing that maternal morbidity and mortality are real threats to their lives and how they may change throughout the entire experience.

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**The Economic Future of Nigeria's Development**

Presenter's Name: Ryan Odita
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Mitchell Alvion
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Nigeria represents a paradox of economic potential and persistent underperformance. Despite abundant natural resources, a rapidly growing population, and significant cultural influence across Africa, the country continues to face structural constraints including weak institutions, high unemployment, infrastructure deficits, and heavy dependence on oil revenues. This research examines Nigeria's economic future by analyzing the interaction between long standing structural barriers and emerging opportunities for development. The study focuses on the political economy of oil dependence, regional integration under the African Continental Free Trade Area, the growth of fintech, renewable energy adoption, infrastructure gaps, youth unemployment, macroeconomic instability, and the expanding role of Chinese development finance. Particular attention is given to China's involvement in Nigeria's infrastructure and energy sectors, evaluating its capacity to address critical development bottlenecks while also assessing risks related to debt sustainability, governance, and long term dependency. Using a mixed methods approach, the research combines secondary macroeconomic data, comparative case studies, and policy analysis to evaluate Nigeria's potential development pathways. The findings suggest that Nigeria's long term trajectory depends on coordinated reforms in governance, industrial policy, human capital development, regional integration, and the strategic management of external financing partnerships. Without sustained and complementary policy action, structural challenges are likely to persist and constrain growth. With effective reforms and prudent engagement with international partners, Nigeria has the potential to transition toward more inclusive and sustainable growth and to emerge as a leading economic force on the African continent.

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**Reading in Between The Fine Lines: A Privacy Policy Analysis of AI Mental Health Apps**

Presenter's Name: Erica Okeh
Classification:
School/College: Engineering & Architecture
*Presentation Type: Poster Presentation*
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Data transparency is even more critical in mental health applications that utilize AI to address emotional and well-being needs. However, the privacy policies presented within these applications are ambiguous and do not address integrations of data usage with third parties and AI frameworks used. We conducted a content analysis of 11 AI mental health applications to understand the ways in which their privacy policies communicated data practices, user agency, and accountability to users. We found that most privacy policies lacked transparency in data governance due to the use of broad language that reduced clarity to allow for legal coverage. Additionally, policy language allows users to exercise control of their data; however, their agency can be limited due to directions on how to exercise their rights. We found that privacy policies create narratives of trust and benefits for users to legitimize their platform without providing tangible metrics. We present policy recommendations for AI mental health apps and design considerations for users to effectively exercise rights of refusal when they no longer want to engage.

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**From Dust to Deficit: An Analysis of How Harmattan Winds Impact Agricultural Output and Food Security in Ghana.**

Presenter's Name: Jojo Okrah
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Harmattan is an annual season, typically lasting from November to March, that is characterized by dry, dusty winds that are blown into Ghana and other West African nations from the Sahara Desert. Although Harmattan brings cooler temperatures, dust and its arid weather can cause a myriad of health issues for people who live in those countries. There is a lot of research focused on the health consequences of Harmattan, however, scholarly attention is rarely given to the impact it has on Ghana's agricultural sector and food economy. Harmattan has detrimental effects on agriculture as it causes land degradation, extremely dry soil, and water scarcity. This deserves attention. Last year, Ghana experienced its driest Harmattan in 6 years with 70% of Northern cocoa farmers reporting significant crop loss. My research question is: to what extent do Ghana's annual Harmattan winds impact agricultural output and contribute to food scarcity? I plan on interviewing farmers who have personally dealt with crop loss, talk to the Cocoa Research Institute of Ghana because cocoa is one of Ghana's largest exports and its growth is jeopardized during Harmattan, and read academic journals such as Hydrological challenges and agricultural opportunities in Northern Ghana. My research aims to analyze how these winds influence agricultural profit in order to create sustainable solutions that help farmers become adequately equipped for the inevitable and reduce profit loss.

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**The Impact of Cultural Orientation on Self-Esteem and Coping Mechanisms**

Presenter's Name: Mariam Oyejide
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Cultural Orientation is defined as the set of archetypes or generalizations that allow for the general tendencies of a cultural group to be studied. Our research examines how those archetypes and behaviors influence self-perception (ie. self-concept and self-esteem) of individuals across racial demographics. We will utilize the Cultural Orientation Scale, the Rosenberg Self Esteem Scale, and the COPE Inventory to examine the intersectionality of the concepts of cultural orientation as it relates to behavioral patterns. Past research has shown that racial socialization can promote a positive sense of self when it comes to ethnic-racial identity. This leads to increased usage of adaptive coping strategies and serves as a resilience factor in the face of stressors. Our scale of cultural orientation explores the behavior of participants through a self-reported measure to understand the endorsement of communal orientation; an idea that places a focus on social interdependence, reciprocity, group duty, and identity. With this scale, we aim to investigate if cultural orientation influences self concept and the kind of coping mechanisms a person may use under

stress.This study seeks to understand how it differs among race, and if previous findings are consistent with our data set.

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**Community Violence Exposure and ADHD in Black Girls**

Presenter's Name: Kamille Padgitt
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*Presentation Type: Poster Presentation*
Faculty Advisor: Hope Hill
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Co-authors: Karis Thomas, Elle Butler, Jamar Nash, Tamia Taylor, Hope Hill, Debra Roberts

The historical neglect of communities of color has shown to be positively correlated with high rates of community violence. Current literature surrounding exposure to community violence emphasizes several negative psychological and physical health outcomes. However, the literature fails to evaluate how exposure to community violence may correlate with the presenting symptoms of Attention-deficit/hyperactivity disorder (ADHD) in Black girls. Additionally, studies demonstrate that ADHD in Black girls correlates with challenges with emotion regulation and executive functioning, which are components of self-regulation. Contextually, ADHD is a chronic neurobehavioral disorder that is characterized by consistent inattentiveness and hyperactivity-impulsiveness. Because ADHD presents differently in Black girls, it is usually regarded as clinically insignificant before adolescence, resulting in delayed diagnosis. This exploratory study seeks to test the hypothesis that self-regulation will mediate the relationship between community violence exposure and ADHD in Black girls. This study will administer online Qualtrics surveys to 65 college-aged Black women who have been diagnosed with ADHD. Questionnaires will assess their exposure to community violence, self-regulation, and ADHD symptomology. Researchers will analyze the proposed mediation using Andrew Hayes' Model 4 via Process on SPSS. To assess whether exposure to community violence is positively correlated with performance on ADHD assessments, researchers will run linear regression analyses. The purpose of this study is to inform future clinical evaluations of ADHD in Black girls to offer culturally competent interventions while also preventing late diagnosis.

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**Temperature Shocks and Child Malnutrition: Evidence from Sub-Saharan Africa**

Presenter's Name: Jones Paintsil
Classification: Graduate Student
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*Presentation Type: Poster Presentation*
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This paper investigates how temperature shocks affect malnutrition among children under five in Sub-Saharan Africa using Demographic and Health Survey data from 2005–2024. The study analyses 334,692 observations across 33 countries, organized into 724 regional-level panels. Child malnutrition is measured using both continuous indicators—height-for-age z-score (HAZ) and weight-for-age z-score (WAZ)—and binary outcomes (stunting and underweight), defined as z-scores below −2 standard deviations from healthy reference populations. Temperature data represents mean annual daytime land surface temperature within 2 km (urban) or 10 km (rural) buffers around DHS cluster locations. Using linear regression and fixed effects models, the analysis reveals an inverted U-shaped relationship between temperature and child malnutrition: moderate temperatures correlate with better nutritional outcomes, while extreme temperatures significantly worsen malnutrition. The study identifies important heterogeneities—temperature effects intensify with child age and are more severe among children with very small birth sizes. Maternal education emerges as a significant protective factor, buffering the adverse impacts of high temperatures on child nutrition. Interestingly, malaria incidence exacerbates temperature's negative effects on malnutrition. These findings highlight the complex interplay between climate, health, and socioeconomic factors in determining child nutrition outcomes. This study recommends policy interventions to expand women's access to higher education and to integrate climate-health literacy into educational curricula and community programs to strengthen household resilience. Additionally, intensifying malaria prevention efforts, such as free mosquito net distribution programs, could help mitigate the risks of temperature-related malnutrition in malaria-endemic regions across Sub-Saharan Africa.

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**Psychological Advantageousness: Hierarchical and Correlational Analysis of Beliefs and Quality of Life (QOL)**

Presenter's Name: Davynte Pannell
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
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What are the best beliefs? This philosophical question has been answered scientifically using several quality of life indicators. Researchers conceptualized Psychological Advantageousness (PA) as a metric to determine which beliefs are the best. PA refers to the differential impact of one's Mental and Emotional Intrapsychic Infrastructure (MEII) (or its components) on their Quality of Life. Researchers conducted two studies operationalizing the MEII by belief endorsements. Participants were administered the Dispositional-Affective Frequency Questionnaire (DAFQ), wherein 37 beliefs were divided into 11 categories. Participants assigned themselves to groups based on their belief endorsements. Participants secondarily completed a Likert scale (1-5, Strongly Disagree - Strongly Agree) rating how typically they feel a given disposition or affect (e.g. noticed, happy, sad). 57 items were included. Participants also completed the Patient Health Questionnaire 4 (PHQ4) and the Psychological Wellbeing Scale (PWS). Correlations were identified between belief endorsements and QOL, operationalized by the DAFQ, PHQ-4, and PWS. The Top 5 Highest Quality of Life yielding beliefs were identified (N=169). In study 2, participants were administered the DAFQ, a digital Stroop task, and electrocardiogram (ECG). The Top 5 Highest Quality of Life yielding beliefs were identified (N=95). The Top 5 from Studies 1 and 2 will be presented. This research has illuminated the PA of beliefs. Future studies will expand the belief items and QOL

indicators to illuminate more correlations between the MEII and QOL. This research is important because the findings empower individuals to make more informed decisions about how they edify their MEII and QOL.

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**School-to-Prison Pipeline: How Suspensions and Expulsions Contribute to Incarceration**

Presenter's Name: Sydney Parrish
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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This study examines how exclusionary school discipline, particularly suspension rates and zero-tolerance policies contribute to racial and socioeconomic disparities within the school-to-prison pipeline. Grounded in the integration of Labeling Theory at the micro level and Conflict Theory at the macro level, this research explores how individual students become labeled as disruptive or deviant while broader institutional policies disproportionately impact marginalized communities. Rather than attempting to prove direct causation between discipline and incarceration, my project focuses on structural patterns and mechanisms such as implicit bias, unequal resource distribution, and punitive policy frameworks that shape disciplinary decisions. The study uses a thematic literature review combined with descriptive analysis of existing datasets, including the U.S. Department of Education Civil Rights Data Collection and prior empirical research in criminology, sociology, and education policy. Real-world examples, such as zero-tolerance enforcement and disparities in suspension rates, are used to illustrate how labeling processes and institutional power interact in everyday school settings. Preliminary findings suggest that Black students and students from low-income backgrounds experience higher rates of suspension and harsher disciplinary responses even when engaging in similar behaviors as their peers. The research also reviews empirical studies on alternative approaches such as restorative justice and PBIS, focusing on their ability to reduce exclusionary discipline. By linking theory with empirical evidence, this study highlights how school policies can shape student trajectories and reinforce broader systems of inequality.

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**Understanding the Impact of Large Language Models on Stress and Cognitive Workload in Tactical Decision Making**

Presenter's Name: Reign Patterson
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*Presentation Type: Poster Presentation*
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Large language models have become more pervasive across industry and public sectors to help reduce information-seeking and complete everyday tasks. The use of these technologies for military tactical decision-making has been introduced as a level of support for warfighters. Despite the opportunity for tactical decision-making support from large language models, there is a set of potential new challenges that arise with its impact on warfighters' stress and cognitive workload. We posit that leveraging human-centered approaches to longitudinally capture the impact of stress and cognitive workload when using large language models for tactical decision-making can provide meaningful results in real-time scenarios. Our pilot study investigated students' cognitive load and perceived stress for decision-making task completion using an AutoRag within two environment settings: calm and noisy. Findings showed the noisy environment was challenging for information recall. Future research directions require a large-scale, longitudinal study with direct naval warfighters.

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**Big Box, Bigger Consequences: Walmart, Nutrition, and Food Access in Clarksdale, Mississippi**

Presenter's Name: Leah Peterson
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Michael Ralph
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Clarksdale, Mississippi, like many rural towns in the Mississippi Delta, faces high rates of diet-related health conditions including obesity, diabetes, and hypertension. At the same time, the town's retail landscape has become highly concentrated, with a single Walmart serving as the dominant food source for many households. This study examines how Walmart's pricing and product availability influence dietary quality and food access among low-income residents and considers the implications for nutrition-related health outcomes in rural communities. Using a combination of USDA Food Access Research Atlas data, the FoodAPS household food acquisition survey, local store audits, and county-level health statistics from the CDC, this research analyzes the relationship between retail concentration, food purchasing patterns, and health outcomes. Preliminary analysis suggests that while Walmart provides essential access to affordable food, limited product diversity and a concentration on processed foods may contribute to dietary imbalances among low-income households. Travel distance to alternative food sources further compounds access issues, highlighting the role of retail geography in shaping nutritional choices. By situating Clarksdale as a case study, this project provides a framework for understanding how Walmartization affects dietary behavior and health in rural populations. The findings have broader implications for rural development and public health policy, suggesting that access alone is insufficient; the composition of available products and pricing structures must also be considered to improve nutrition outcomes in small towns across the Mississippi Delta and similar rural regions nationwide.

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**Impact of Social Determinants on Cancer Screenings and Medical Trust among African American Adults**

Presenter's Name: N'dyah Rathod
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Finie Hunter-Richardson
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Co-authors: Finie Hunter-Richardson

Inequalities in cancer are a major public health concern. Social determinants of health have influenced access to cancer screening and medical trust. Historical events including the COVID-19 pandemic have contributed to medical distrust and inequitable health reliability to cancer-related health disparities in the Black community. Rising cancer diagnoses in younger adults has caused changes in evidence-based guidelines and earlier recommendations for cancer screening age. Delayed screening and follow-up have resulted in cancer diagnoses in later stages, limiting treatment options, and decreasing survival rates. A convenience sample of patients receiving primary care services at an urban hospital in Washington, DC. Adult patients who self-identified as Black/African American between the ages of 21-75, and scheduled or completed a cancer screening test for breast, cervical, colon, or prostate cancer during the COVID-19 pandemic. A cross-sectional survey was conducted to assess the prevalence of medical equity and quality of care characteristics of the healthcare system, and cancer screening behavior. This study will examine the relationship between age, education, employment, gender, income, insurance status, and geographic location in relation to cancer screening tests and patients' perception of health equity../;er45[j,The results of the pilot project will be used to better understand how medical practices can be improved surrounding cancer prevention and early cancer screenings. Findings will give medical providers insight into improving access to equitable care and strengthening patient trust. This study aims to bring awareness to the impacts of health disparities within the Black community post-COVID-19 era, regarding patient-provider communication and cancer prevention.

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**Geographic Information Systems and the Great Dismal Maroon**

Presenter's Name: Anjali Robinson-leary
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Michael Ralph
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This study explores the ways in which LIDAR and GPR systems may be leveraged to improve our understandings of maroon formations in the Great Dismal Swamp as it relates to geospatial movement and domestic life from 1630 to 1856. This project argues that GPR technologies can be used to detect remnants of Black life by detecting physical abnormalities in the Swamp and using those aberrations as sites of intrigue. LIDAR technologies are severely underutilized in the survey of archaeological sites relating to the African diaspora, particularly in those unruly geographies such as those to which the Great Dismal Swamp maroons were obliged. In centering the usage of geographic imaging systems, this proposal addresses a methodological and empirical gap in scholarship by centering use of LIDAR and GPR to understand the physical structures that allowed maroons to survive as well as the bidirectional relationship that maroons had to the land through the examination of the shortcomings of solely privileging artifactual and archival sources, ultimately aiming to enrich the field's understanding of maroon life while expanding the conceptual shape household and domestic archaeology can assume when applied to amorphous social conclaves and scission communities.

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**Theoretical Review of Racial Identity Models: What Models Best Describe the Protective Quality of a Cohesive Racial Identity for African American Males Who Vicariously Witness Police Brutality?**

Presenter's Name: Charles Robinson-snead
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Dr. Terri Dilmore
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Witnessing police brutality is a pervasive form of racialized trauma with significant psychological and physiological consequences for Black American men. Although prior research documents the harmful effects of racial discrimination and police violence (Alang et al., 2017; Bor et al., 2019; Eichstaedt et al., 2021), far less is known about factors that may protect psychological well-being following such exposure. This project examines theoretical models of Black racial identity to evaluate how a cohesive racial identity may buffer the psychological impact of witnessing police brutality. Racial identity refers to the meaning individuals attribute to their membership in the Black racial group, shaping self-concept and mental health (Sellers et al., 1998). Drawing on Cross's Nigrescence Theory (1971, 1991), Helms's People of Color Racial Identity Development model (1995), and Sellers's Multidimensional Model of Racial Identity (MMRI; Sellers et al., 1998), this paper compares the theoretical foundations and empirical utility of each framework in addressing racialized trauma. Police brutality—the excessive use of force by law enforcement—is a uniquely harmful stressor that disproportionately affects Black men and is associated with anxiety, depressive symptoms, hypervigilance, and physiological dysregulation (Smith et al., 2019; Yates et al., 2022). An extensive theoretical review identified the MMRI as the most suitable framework for examining racial identity as a moderator of psychological distress following vicarious police violence. Evidence links MMRI dimensions, particularly private regard and racial centrality, to more adaptive psychological outcomes under race-based stress (Sellers, 1993; Sellers et al., 1998, 2003, 2006; Chae et al., 2017).

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**Investing in our future: Financial and debt stress in psychology graduate student well-being**

Presenter's Name: Helena Sanchez
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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Co-authors: Janeen Louis, Joshua Dickerson, Darren Bernal

The student loan crisis in the United States has been increasing in severity over the past decade, impacting students' ability to pursue higher education and their mental health within such programs. Given recent changes made by the current presidential administration, such as The One Big Beautiful Bill, the security of federal loans and feasible repayment opportunities has become uncertain(Lockert, 2025, AccessLex Institute, 2025). The present study aims to understand how coping, life satisfaction, and sense of belonging influence the relationships among financial- and debt-related stress and mental health within this population. The goal of the study is to highlight the need for additional resources that may be critical to minimize this potential effect. An anonymous survey was sent to 140 clinical and counseling psychology doctoral programs. A final sample of N = 146 psychology graduate students was collected (median age = 27 years; 84.2% cisgender women; 56.8% White). Among those with debt, 34.0% owed $100,000 or more, and 51% of participants reported feeling as though finances control their life. Hierarchical regression analyses determined that debt stress and life satisfaction were significant predictors of anxiety, $F(2,78) = 12.15, p < .001$, and depression symptoms, $F(2,78) = 18.12$, $p < .001$. Financial stress was not significant due to low response rates (N = 68). The present study offers current data demonstrating the undue financial burdens placed on psychology graduate students. Given that clinical work is required within these programs, we argue that this issue stems beyond finances and poses potential ethical issues.

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**Bridging Distance and Opportunity: TransMiCable's Effect on Post-Secondary Enrollment in Ciudad Bolívar**

Presenter's Name: Raven Shaw
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Gbadeo Odularu
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This project examines the impact of the TransMiCable, an aerial cable car system in Ciudad Bolívar, Bogotá, Colombia, on post-secondary access for youth in the area. Ciudad Bolívar, an informal community in Bogotá, has historically been disproportionately affected by social and spatial inequalities. Recognizing that infrastructure can stimulate economic activity and enhance overall quality of life, this study builds on a limited but growing body of scholarship analyzing the TransMiCable's role in improving mobility for many Colombians. Specifically, it focuses on its effect on post-secondary access for youth in Ciudad Bolívar, an area that remains underexplored in the literature, particularly given that the TransMiCable has been in operation for only ten years. Using Datos Abiertos Bogotá (the city's government open data portal), this research links household transportation survey data with administrative enrollment records from tertiary and vocational institutions across the city. It employs a difference-in-differences model to track changes in post-secondary enrollment outcomes before and after the implementation of the TransMiCable, comparing Ciudad Bolívar with San Cristobal, a community that has not yet been directly served by the transportation system. Ultimately, this research contributes to broader scholarship on the role of infrastructure in shaping the multidimensional aspects of individuals who live in developing countries. It further supports the argument that transportation infrastructure can promote long-term human capital development.

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**The Cultural Socialization Scale Revitalization**

Presenter's Name: Sophia Shaw
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Debra Roberts
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Co-authors: Debra Roberts

Those with marginalized identities have higher school drop-out rates and lower academic achievement scores compared to their ethnic counterparts. However, there is a dearth of empirical studies examining culturally appropriate socialization tools that buffer the deleterious effects of exposure to psychosocially toxic environments (PTEs) among these youth. To fill this gap in the literature, the first version of the Cultural Socialization Scale (CSS) was constructed in 2008 to identify protective factors that may enhance student academic and social successes, even in the context of adverse conditions. Further, this scale aimed to encourage discourse of sociocultural issues impacting urban youth throughout the Diaspora. Previous studies found strong psychometric properties of the CSS; thus, the next phase of this project involves updating the current scale to be more reflective of present times. This current phase will administer the new scale to undergraduate Psychology students to (1) modernize the current language of the scale, (2) ensure that the cultural and linguistic adaptation matches our target population, (3) uncover if the factors remain the same, and (4) validate the updated version to ensure that high internal consistency remains. Authors will conduct an exploratory factor analysis, invariance tests, and pilot testing to test and validate the second version of the scale. Updating the Cultural Socialization Scale eliminates obsolete content, reflects the comprehension of our target population, and improves psychometric performance, to minimize the potential for outdated measures to compromise our ability to obtain accurate data and outcomes.

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**An evaluation of SCHOOL-RELATED gender-BASED violence in cameroon's schools**

Presenter's Name: Linda Silim moundene
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Florie Bugarin
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School-related gender-based violence (SRGBV) represents a critical yet understudied barrier to educational equity and student wellbeing in Cameroon. This research examines the prevalence, manifestations, and systemic factors perpetuating gender-based violence within Cameroon's educational institutions, encompassing primary, secondary, and tertiary levels. Drawing on mixed-methods research—including surveys of 250 students across urban and rural schools, interviews with educators and administrators, and analysis of institutional policies—this study reveals that SRGBV remains alarmingly widespread. Findings indicate that 62% of female students report experiencing some form of gender-based violence during their academic journey, ranging from verbal harassment and discriminatory practices to physical assault and sexual coercion by peers, teachers, and administrative staff. Male students, though less frequently, also experience gender-based violence, particularly related to masculine stereotypes and homophobic bullying. The research identifies key contributing factors: absence of comprehensive anti-violence policies in most institutions, inadequate teacher training on gender sensitivity, cultural normalization of certain forms of violence, lack of safe reporting mechanisms, and systemic impunity for perpetrators. Critically, the study demonstrates the devastating academic consequences of SRGBV: victims exhibit significantly higher rates of absenteeism, lower academic performance, and increased dropout rates. This thesis proposes evidence-based recommendations including mandatory codes of conduct with enforceable sanctions, establishment of confidential reporting systems, integration of comprehensive sexuality education curricula, and systematic teacher training programs. By documenting the scope and impact of SRGBV in Cameroon, this research contributes to the urgent imperative of creating safe, inclusive learning environments where all students can thrive regardless of gender.

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**To Be Young, Gifted,and Black: How Popular Media Shapes Consumer Behavior in the Black Community**

Presenter's Name: Shani Smith
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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This study investigates the intricate relationship between popular media, consumer behavior, and beauty standards within the Black community. Employing a qualitative approach, the research explores how media messaging—across film, music, fashion, and social media-shapes beliefs of identity, self-worth, and socioeconomic status among Black audiences. The study examines the normalization of luxury consumption, cosmetic body modification, and materialism, delving into the cultural, historical, and psychological factors driving these trends. Data collection includes surveys from Black men and women, aged 18 to 35, exploring Black men and women's attitudes toward Black media influence, beauty standards, and socioeconomic status and a comprehensive content analysis of media trends and imagery. The research emphasizes the role of Black celebrities and influencers in shaping cultural identity while shedding light on how media perpetuates ideals determine beauty and lifestyle standards. By critically analyzing these dynamics, the study advocates for enhanced media literacy and cultural awareness as strategies to foster authenticity, promote financial empowerment, and challenge the societal pressures embedded in media representations.

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**Does perceived lack of appreciation predict changes in resting heart rate?**

Presenter's Name: Darius Standifer
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Davynte Pannell
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The purpose of this study was to examine whether the belief that one who isn't appreciated influences the likelihood of experiencing a lower heart rate. Social interactions and the way we perceive appreciation play a significant role in emotional well-being and how we function socially, especially when it relates to stress and our quality of life. Through a quantitative approach, participants were assessed on their perceived level of appreciation through a self-report questionnaire, while their heart rate was measured using physiological monitoring equipment. It was also theorized that individuals who reported feeling less appreciated would exhibit higher heart rates due to increased stress from the experiments. Results indicated a relationship between perceived lack of appreciation and variations in heart rate, suggesting that social and emotional perceptions may influence responses. These findings highlight the importance of social validation and emotional support as factors that can impact health. Understanding how feelings of appreciation affect biological processes emphasizes the connection between psychological experiences and physical health, while understanding the role of positive social interactions in our lives.

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**Negotiating Faith and Self-Coherence: Identity Integration Among African American Queer Late Adolescents**

Presenter's Name: Assata Starks
Classification: Graduate Student
School/College: Education
*Presentation Type: Oral Presentation*
Faculty Advisor: Angela Ferguson
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Co-authors: Angela Ferguson

Late adolescence is a crucial period in development in which youth form a coherent sense of identity, establish values, and search for belonging. For African American queer late adolescents, this process can become even more complex when navigating religious doctrines that uphold beliefs that non-heterosexual and non-cisgendered identities

are sinful, in need of correction, or incompatible with perceived moral expectations. Using an intersectional framework, this presentation will focus on how race, faith, sexuality and age affects the way African American queer late adolescents make sense of belonging, shame, and sense of self. Religious messages and doctrine may feel both supportive and conflicting at the same time, influencing how African American queer late adolescents understand themselves and their place within their communities. The goal of this presentation is to highlight the internal tension between being authentic to oneself while remaining connected to faith and community. Due to religion being so deeply intertwined within the African American community, this population may struggle to negotiate their racial identity and communal support, while also wanting to embrace and/or acknowledge their queer identity, which is often seen as incongruent within certain religious doctrine. Rather than framing and conceptualizing religion to be solely harmful or protective, this presentation explores how internal conflict, reinterpreting religious teachings, and community dynamics contribute to self-coherence and psychological development among African American queer late adolescents.

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**Black Athletes, CTE, Cognition, and Mental Health: A Case Study of Phillip Adams**

Presenter's Name: Victoria Steele
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Bahar Bahrainian, Rose Langdon, Tiffani White, Alaina Davis

Chronic traumatic encephalopathy (CTE) has emerged as a critical neurodegenerative condition associated with repetitive head impacts in contact sports, yet its mental health sequelae and correlations to cognitive-communicative impairments remain insufficiently examined among Black athletes. Structural inequities in sport participation, injury burden, and access to appropriate health care place Black athletes at disproportionate risk for undetected neurotrauma and untreated concussion symptoms. This case study examines the life course of former National Football League (NFL) player Phillip Adams, whose death by suicide following the homicide of six individuals in 2021 was posthumously associated with advanced CTE pathology. Using a neurobehavioral and sociocultural health disparities framework, the investigators analyzed the cognitive, behavioral, and psychosocial indicators preceding the event, including concussion exposure, reported mood and behavioral changes, occupational instability, and barriers to care engagement. Preliminary analysis indicates a convergence of cognitive-communicative disorders (attention, memory, executive functions) and progressive neuropsychiatric symptoms consistent with CTE-related impairment (e.g., impulsivity, affective dysregulation, paranoia, and suicidality) alongside known disparities in post-career monitoring and culturally responsive mental health access for Black athletes. Clinical implications are discussed for speech-language pathologists and interdisciplinary providers, emphasizing early identification of cognitive-communication and behavioral changes, culturally responsive mental health referral pathways, family education, and longitudinal post-retirement surveillance models. The case underscores the urgency of equity-informed neurotrauma management frameworks to mitigate suicide risk and prevent catastrophic outcomes among Black contact-sport athletes.

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**Kitchen Remedies: Black Abortion Practices, Politics, and Holistic Care**

Presenter's Name: Ma'sha Summerville
Classification: Undergraduate Student
School/College: Nursing & Allied Health Sciences
*Presentation Type: Oral Presentation*
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Co-authors: Kalaya Jones, Adeola Oni-Orisan

Black communities have long relied on herbal and holistic methods of pregnancy release, yet these practices remain underexamined in contemporary reproductive health research, particularly amid increasing abortion restrictions and historical medical racism. While existing scholarship documents plant-based abortifacients in West Africa and their continuation during slavery as forms of reproductive resistance, less attention has been given to how these traditions are understood and practiced today. This exploratory study centers on a qualitative, semi-structured interview with a Black abortion doula in Northern California, contextualized by a thematic review of social media posts from Black-identified digital creators across three social media platforms. Through digital discourse analysis, we illustrate how ancestral reproductive knowledge is preserved, adapted, and shared within contemporary sociopolitical and technological constraints. Preliminary insights highlight: (1) continued references to herbal-assisted abortion and menstrual regulation; (2) framing of doula support as spiritual and ritual labor; (3) the use of coded or indirect language in response to platform moderation; and (4) reliance on grassroots and intergenerational networks rather than formal institutional pathways for reproductive education. This project contributes to emerging conversations on diasporic reproductive traditions and community-based care in the absence of institutional support.

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**Gold Mining and The Limits of State Authority in Mali**

Presenter's Name: Kimathi Talton
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Mazaher Koruzhde
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This paper examines how Mali's political geography and plural regimes of mineral governance constrain statecraft by fragmenting authority over gold extraction across space, scale, and legal order. It argues that Mali does not contain a single "concentric circle" of power radiating from Bamako, but multiple circles of authority emanating from mine sites themselves, where competing notions of property, taxation, and legitimacy are produced and enforced. These dynamics limit the

state's ability to regulate dispersed goldfields, extract revenue, and project sovereignty across distance—while simultaneously making ASGM a livelihood "safety valve" that governments struggle to close without provoking instability.Drawing on qualitative historical case-study methods, ethnographic scholarship, colonial and postcolonial land decrees, mining codes, and corporate and international financial institution documents, the paper conceptualizes Mali's industrial sector as organized through a "transnational investment bloc" that ties state elites to foreign capital. It concludes that Mali's governance dilemmas are rooted not only in capacity shortfalls, but in durable, spatially grounded orders that rival and reshape the state.It concludes that Mali's governance dilemmas are rooted not only in capacity shortfalls, but in durable, spatially grounded orders that rival and reshape the state.

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**Whose Recovery Counts? Lived Experiences of Wildfire Recovery in Lahaina, Hawai'i**

Presenter's Name: Lauren Taylor
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Oral Presentation*
Faculty Advisor: Terri Adams
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Wildfire recovery in the United States is often framed as a technical or logistical process, yet for communities of color, it is deeply shaped by long-standing inequalities that influence who receives aid, whose losses are recognized, and how recovery unfolds over time. This dissertation examines the lived experiences of residents in Lahaina, Hawai'i following the 2023 Maui wildfire to understand how race, identity, community ties, and structural inequities shape recovery trajectories in a climate-exacerbated disaster context. Using a qualitative research design, this study draws on in-depth interviews, multiple focus groups, and document analysis of over data sources. Findings highlight several interconnected patterns: residents' experiences of uneven access to recovery resources, feelings of exclusion from formal decision-making processes, and the critical role of informal social networks and cultural ties in meeting immediate and long-term needs. Participants frequently described recovery as fragmented and emotionally taxing, shaped by historical land dispossession, mistrust in government institutions, and bureaucratic barriers that disproportionately burdened Native Hawaiian and other marginalized residents. To interpret these findings, the dissertation advances a BIPOC Disaster Recovery and Resilience Model that integrates disaster racism, intersectionality, and social capital. This model demonstrates how structural inequities interact with community strengths to shape recovery outcomes. The study offers policy-relevant recommendations focused on culturally grounded recovery planning, inclusive governance, and the formal recognition of community-based networks as essential recovery infrastructure. While centered on Lahaina, the findings have broader implications for improving wildfire recovery and resilience strategies in other communities of color facing increasingly frequent climate-relate disasters.

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**TRAUMA, RACE, AND THE USE OF PSYCHOLOGICAL EVIDENCE IN JUVENILE SENTENCING**

Presenter's Name: Tamia Taylor
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
Faculty Advisor: Hope Hill
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Co-authors: Hope Hill, Karis Thomas, Jamar Nash, Kamille Padgitt, Daniel Brewster, Kiara Blecher

Despite increased attention to trauma-informed care, existing literature emphasizing service availability and post-adjudication treatment offers limited insight into how trauma-related information is incorporated into legal reasoning, leaving a gap in understanding how psychological research is interpreted and applied during sentencing for Black youth. Drawing on Bronfenbrenner's Ecological Systems Theory and Barbarin's extensions that emphasize the psychological consequences of structural inequality, this project examines how trauma-related behaviors—such as emotional dysregulation, hypervigilance, and distrust of authority—are frequently misinterpreted as indicators of criminal risk rather than as adaptive responses to harm. These interpretive decisions disproportionately impact Black youth, whose behaviors are more likely to be racialized and criminalized. Administrative court data will be analyzed to assess racial disparities in dispositions associated with trauma exposure and mental health diagnoses. Qualitative analyses of sentencing transcripts, interviews, and courtroom observations will examine how institutional actors engage with, reinterpret, or resist psychological evidence. By connecting research use to concrete youth outcomes, this work advances theory while offering actionable guidance for trauma-informed, racially conscious juvenile justice policy. This study argues that despite robust evidence linking trauma to youth behavior, psychological research is inconsistently and defensively applied in juvenile sentencing, resulting in the racialized criminalization of Black youth rather than the provision of care.

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**Adinkra Symbols through Generative AI: A Semiotic Analysis of Emoji-Based Translation**

Presenter's Name: Douglass Thane
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Co-authors: Jaye Nias

As generative artificial intelligence (AI) systems are increasingly used to translate and re-express cultural materials, questions arise about the representational resources through which translation occurs. This paper examines how generative AI systems express culturally grounded symbolic knowledge when operating within a standardized visual vocabulary. Using Ghanaian Adinkra symbols and the Unicode emoji standard as a case study, we show that generative AI systems produce a representational vocabulary that delimits what kinds of meaning can

be expressed, approximated, or excluded. We analyze how generative models produce emoji-based representations of Adinkra symbols under different forms of cultural context, including symbol names, associated proverbs, and attributed meanings. Our analysis distinguishes between form-level and referential correspondence, and documents recurring patterns of convergence, approximation, and omission across model outputs. Our findings suggest that standardized representational systems mediate cultural expression in AI-assisted contexts, shaping what becomes legible, translatable, or lost. In particular, this work underscores the need for alternative representational resources that move beyond globally standardized symbol sets.

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**Science as a Battleground of the Cold War: Soviet Innovations and Their Impact on the United States**

Presenter's Name: Mila Thomas
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Isabelle Kaplan
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Science and technology emerged as central battlegrounds of the Cold War, reshaping global politics around the ability to innovate, observe, and control. In the decades after World War II, the United States and the Soviet Union redirected scientific research toward nuclear physics, aerospace engineering, and computational systems, viewing technical superiority as essential to national survival. The launch of Sputnik accelerated this shift by demonstrating how scientific achievement could redefine geopolitical power. As the superpowers expanded their powers, new verification systems, seismic networks, atmospheric sampling, satellite imaging, and early-warning radar transformed how adversaries monitored one another. These tools replaced guesswork with measurable evidence and became crucial to arms-control frameworks that relied on transparency rather than trust. At the same time, false alarms and intelligence gaps revealed the fragility of deterrence and the risks embedded in highly automated defense infrastructures. The legacy of this scientific competition continues to shape twenty-first-century security dynamics. Modern surveillance architectures, AI-driven intelligence, and space-based monitoring operate within patterns first established during the Cold War, where technological innovation served as both shield and provocation. These scientific structures still continuously shape how countries wield technology manage an increasingly volatile security landscape.

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**Assessing Self-Awareness Through Self-Report & Self-Portrait: Implications for Life Satisfaction**

Presenter's Name: Anira Thomas
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
Faculty Advisor: Monique Major
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In recent years, the rise of digital self-portraiture through selfies has grown significantly (Souza et al., 2015), marking a cultural shift in how individuals engage with self-awareness. Self-portraits are often viewed as physical manifestations of psychological well-being (Suler, 2015), offering insight into how people perceive themselves within their environment. While self-awareness is a well-established concept in psychology, research exploring its relationship with life satisfaction remains limited. This study aims to address this gap by examining the dynamic between self-awareness and life satisfaction, introducing a novel approach to assessing self-awareness through self-portraiture. This research seeks to answer three questions: (1) Is there a relationship between self-awareness and life satisfaction using self-report questionnaires? (2) Is there a relationship between life-satisfaction and self-portrait when life satisfaction is being measured through a self-report questionnaire and self-awareness is being measured using a self-portrait? (3) Do self-portraits effectively measure self-awareness? Seventy-five Howard University students who identify as artists will participate in this mixed-method study. Quantitative data will be collected using the Satisfaction with Life Scale (SWLS) and the Self-Awareness Outcomes Questionnaire (SAOQ). Qualitative data will include self-portraits created via Canva, participant summaries, and responses to open-ended questions. Correlational and regression analyses will determine whether self-awareness predicts life satisfaction, while mixed-method analyses will explore patterns between self-portraits and questionnaire responses. Keywords: self-awareness, life satisfaction, self-portraiture, mixed-methods, psychological assessment.

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**"Improving Forensics to Prevent Wrongful Convictions"**

Presenter's Name: Mehlik Thomas
Classification: Undergraduate Student
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*Presentation Type: Oral Presentation*
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This paper will examine flaws and biases in forensic science that contribute to wrongful conviction cases with a specific focus on the black community. It draws from scholarly studies, historical research, case studies, and context from the National Institute of Justice. The paper explores (1) historical Context & foundational studies, (2) the role of false or misleading forensic evidence, (3) reform and solutions. The review identifies gaps in the literature around how there is still limited research on how we can apply the real-world effectiveness of forensic science solutions and methods, and actually start reducing wrongful convictions and increasing reliability back into forensics.. "While Black people represent 13% of the nation's population, "and" 40% of the incarcerated population is Black People, (Alexander, 2010; Haney, 2021)". "Faulty forensics is a contributing factor in roughly about 24% of cases, not only that"," but faulty forensics is the biggest factor being blamed in the criminal justice system, (National Institute of Justice, 2023)". My literature review will limit focus within the U.S. criminal justice system and how we can improve on current forensic technologies and sciences to ultimately help the black community in the criminal justice system .The literature review will examine wrongful conviction cases and mistakes made, forensic techniques, and how to take what solutions have been

given and apply them to the real world. The literature review will focus on post-2000 research.

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**How is She So Successful?: How Media Invalidates Black Women's Successes with Conspiracy Theories.**

Presenter's Name: Jayda Thomas
Classification: Undergraduate Student
School/College: Communications
*Presentation Type: Oral Presentation*
Faculty Advisor: Fatou Sow
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High-profile Black women, from Beyoncé to Kamala Harris, frequently face conspiracy theories that question their achievements. These theories, often rooted in historical stereotypes and systemic biases, frame Black women's achievements as fraudulent or unnatural. This research examines how such narratives are used to delegitimize Black women's successes. The study seeks to uncover the societal factors driving these narratives and how they influence public perceptions. It will explore the ways in which conspiracy theories about Black women serve to reinforce existing racial and gender hierarchies. The study explores the prevalence and social impact of these conspiracy theories through a mixed-methods approach.

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**Eldest Daughter Syndrome Research Project**

Presenter's Name: Amiyah Thomas-flemon
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Eldest daughters are often expected to assume caregiving, emotional support, and leadership roles within their families, a phenomenon commonly referred to as Eldest Daughter Syndrome (EDS). These responsibilities are shaped by gender norms, cultural expectations, and family dynamics, yet this phenomenon remains underexplored in sociological and psychological research. Existing literature on parentification and gendered labor suggests that early caregiving responsibilities may influence identity development, emotional well-being, and interpersonal relationships, but few studies center on the lived experiences of eldest daughters. This study aims to investigate how eldest daughters understand and experience their caregiving roles and how these roles shape their identity, mental health, and adult relationships. Using a qualitative research design, this project will conduct semi-structured, in-depth interviews with self-identified eldest daughters aged 18 and older. Participants will be recruited through university networks and social media platforms using purposive and snowball sampling. Interviews will be analyzed using thematic analysis and guided by Parentification Theory and Feminist Family Theory to examine the intersection of family roles and gendered expectations. This research is significant because it centers the voices of eldest daughters and contributes to emerging scholarship on gendered emotional labor and intergenerational family dynamics. Findings are expected to illuminate both the psychological burdens and strengths associated with EDS, offering insights for mental health practitioners, educators, and families seeking to better support eldest daughters.

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**National Trends in Telehealth Utilization Among Individuals With at Least One Prescription Past Year (2020-2023)**

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*Presentation Type: Poster Presentation*
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Co-authors: Faith Ogini, Rashidat Elesho, Carrie Crowther

The study aims to assess the trends of telehealth utilization among individuals with at least one prescription. Methods: A cross-sectional study was conducted using merged data from the National Health Interview Survey (NHIS) from 2020 to 2023 and included individuals with at least one prescription in the past year. The primary outcome was telehealth utilization determined by whether a participant had a virtual medical appointment in the past 12 months. Descriptive analysis was conducted and stratified by year. Weighted multiple logistic regression was conducted adjusting for sociodemographic factors, health status, and health access-related variables. The statistical analysis was conducted using SPSS and SAS at an alpha of 0.05. Results: A total of 83,721 individuals were included in the study. Overall, telehealth utilization was estimated at 41.3% with the highest use observed in 2021 (49.1%). Weighted logistic regression showed that females, those with at least a 12th-grade education, individuals of other races, and Hispanic ethnicity had higher odds of using telehealth at a significance level of $p<.05$ adjusting for other factors. Having health insurance, income above the poverty level, a recent doctor visit, and receiving home healthcare were also significantly associated with increased telehealth use at a significance level of $p<.05$ adjusting for other factors. Conclusion: Telehealth utilization was high with the highest levels observed in 2021 likely due to COVID-19. Education, insurance, income, recent healthcare visits, and home care were key predictors of telehealth. These important factors can help inform policy decisions on telehealth extensions in the future.

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**Psychological Distress Screening Outcomes at the Howard University Cancer Center**

Presenter's Name: Naomi Vinod
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School/College: Graduate School
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Faculty Advisor: Teletia Taylor
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Co-authors: Tiffany Pearson, Hernitte Altodor, Naomi Vinod, Jenna Warren, Alea Farmer, Ezer Kang, Teletia Taylor

Background: Distress screening has become an integral part of cancer care. However, distress screening outcomes from small, minority serving,

community-based cancer centers such as the Howard University Cancer Center (HUCC) are lacking. The aims of this report are to: 1) determine the prevalence of distress and sources of distress among HUCC patients, and 2) contrast distress across socio-demographic and clinical characteristics. Methods: Distress was assessed using the National Comprehensive Cancer Network's Distress Thermometer (NCCN-DT) and Problem List (sources of distress). Problems were categorized into practical, physical, social, emotional and spiritual concerns. Results: 203 HUCC outpatients (ages 18+years, all cancer sites) were included (mean age =65.9, 54.7% women assigned at birth) in our analysis. The mean distress score was 3.67 (SD=3.33; range 0-10). Top concerns identified by the NCCN-DT were: Finances (N=30; Practical); Pain (N=56; Physical); Relationship with Spouse/Partner (N=13; Social); Worry/Anxiety (N=60; Emotional); and Sense of Meaning and Purpose (N=8; Spiritual). Increased distress was associated with younger age (r=-0.13). Although non-significant (controlling for age), trends indicated that distress scores were lower among patients with professional degrees (M=3.26, SE=.68) compared to patients with less than high school degrees (M=3.26, SE=.68). Lower distress was also associated with increased length of cancer diagnosis (r=-0.13). Patients reporting no additional health concerns (M=3.23, SE=.36) had lower distress scores compared to patients with 3 or more additional health conditions (M=4.23, SE=.49). Conclusions: This report contributes to empirical evidence related to distress screening outcomes at a community-based, minority serving cancer center.

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**The Weight A Woman Carries: Legacies of Inequity and Dementia in Black Elderly Women**

Presenter's Name: Jayla Washington
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
Faculty Advisor: Lennox Graham
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The cognitive health of Black elderly women reflects the enduring effects of historical mistreatment, systemic racism, and limited access to care. This study examines how the abuse, neglect, and exclusion experienced by Black women during the Jim Crow and Civil Rights eras contribute to the higher rates of dementia observed today. Generations of racial trauma and medical discrimination created chronic stress and restricted access to quality healthcare, establishing a foundation for long-term cognitive disparities. The expectation for Black women to embody strength and self-reliance further discouraged vulnerability and emotional expression, reinforcing stigma surrounding mental health within the community. Over time, this suppression of distress, combined with systemic inequities,has manifested in higher dementia rates among Black elderly women. By analyzing historical records, public health data, and psychological research, this study connects historical mistreatment to present-day cognitive outcomes and emphasizes the need for culturally responsive care and trauma-informed policies to improve brain health across generations.

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**Burnout across specialties: Where does Psychiatry rank?**

Presenter's Name: Jerome Watts
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*Presentation Type: Poster Presentation*
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Objectives: Burnout has become increasingly recognized as a major contributor to medical errors and diminished career fulfillment with significant implications for the healthcare workforce and patient outcomes. This report compares demographic factors and contributors to burnout across medical specialties, providing a foundation for specialty-focused interventions to shape a healthier workforce. Design: We utilized demographic data from the Association of American Medical Colleges, specialty-specific insights from the 2023 Medscape Physician Reports, and peer-reviewed studies examining burnout risk factors across specialties. Data was plotted, compared, and ranked demographic factors across different specialties. Results: Of all 29 specialties examined, psychiatry was ranked 22nd in burnout. In regard to racial demographics: African-American (9th), Hispanic (10th), Asian (17th), Native American (8.5th), Multiracial (5th), and White (19th). Psychiatry ranked 9th in proportion of female-identifying physicians and 21st for male-identifying physicians. Psychiatry ranked 19th in physicians under the age of 40 and 4th for those over 65 years. In regard to practice type, psychiatry was ranked in the bottom 10 for Office-based (20th) but more likely to operate in administration (2nd), medical teaching (9th), research (12th), and hospital-based (6th) contexts. Additionally, psychiatry ranked 24th in happy marriages and 20th in annual compensation. Conclusions: Psychiatry is a relatively diverse specialty with a low rate of burnout when compared to the other specialties. Further investigation utilizing correlative and causal-comparative studies is necessary to establish relationships between factors such as workforce composition, practice type, and burnout to develop initiatives to promote wellness and stability among the workforce.

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**"How the gang pulled up to black history month": A Critical Analysis of Rihanna's Maternity Style Using Black Feminist Theory**

Presenter's Name: Natalie Weathers
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School/College: Communications
*Presentation Type: Oral Presentation*
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This paper critically investigates Rihanna's maternity style through the lens of Black feminist theory to explore how her self-representation on Instagram challenges dominant narratives of the Black female body and pregnancy in popular culture. The study employs Stuart Hall's critical method of textual analysis to assess 100 images spanning Rihanna's three pregnancies from 2022-2025 to assess how she reclaims agency by curating her own image within a media landscape shaped by white supremacy, capitalism, and the heteronormative patriarchy. Three central themes emerge: self-representation, decolonization of maternity style, and the balance of work and leisure.

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**An architecture of liberation: The evolution of Black architects and the shotgun house**

Presenter's Name: Maddison Wells
Classification: Graduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
Faculty Advisor: Marie Jipguep-Ahktar
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This paper examines the history and evolution of Black architects and the shotgun house, focusing on the role of race, racial solidarity, and social status in shaping Black architectural practices before, during, and after a key Black liberation movement, the Haitian Revolution. By analyzing how social stratification and intra-racial dynamics influenced the built environment, the paper explores how architecture served as a response to oppression and a means of asserting identity, autonomy, and class distinction within the Black and African diasporic community. The theoretical framework draws on C.L.R. James' theories of racial hierarchy and class conflict among enslaved Africans, mulattoes, and free people of color during the Haitian Revolution, and W.E.B. Du Bois' critical lens on the stratified socioeconomic positioning of free Black Creoles and free people of color in the antebellum South. These frameworks are employed to analyze how racialized class divisions informed architectural decisions and spatial practices. Through historical and theoretical analysis of the shotgun house, a typology widely associated with African diasporic communities in the Gulf South, this study argues that the shotgun house embodies the ingenuity and resilience of Black people across country and class lines, as well as the social fragmentation present within Black communities of this time period. The paper contends that architecture was a socially embedded practice through which Black and African diasporic individuals navigated power, belonging, and exclusion in a racially stratified society.

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**Culturally Responsive AI: Centering Afro-Latine Mental Health Experiences for Equitable AI Design & Development**

Presenter's Name: Melanece Wesley
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School/College: Graduate School
*Presentation Type: Poster Presentation*
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AI technologies, including machine learning algorithms and data-driven decision-making systems, are set to reshape mental health care by diagnosing conditions, predicting patient outcomes, and more (Gutierrez et al., 2024; Olawade et al., 2024; Thakkar et al., 2024). However, their deployment raises ethical concerns regarding their impact on vulnerable populations. For example, Rai and colleagues (2024) found that an AI algorithm used to predict depression was three times less predictive for Black individuals compared to White. As AI systems become increasingly integrated into diagnostic and treatment processes, their ethical deployment requires a nuanced understanding of racial and ethnic identity within groups such as Afro-Latine. Using qualitative interviews with 16 participants and thematic analysis, this study investigates Afro-Latine mental health experiences and how those experiences can inform equitable, culturally responsive AI-driven mental health tools while amplifying Afro-Latine voices in mental health research and AI. Preliminary results suggest Afro-Latine identity is often developmental and context-dependent, shaped by repeated racialization, the work of explaining identity across settings, and experiences of anti-Blackness and colorism within families and communities. Participants also described stigma and privacy norms that discourage disclosure and delay help-seeking, alongside healing pathways grounded in community connection, faith or spirituality, and culturally attuned therapy. Regarding AI, participants expressed cautious openness to tools that support psychoeducation or reduce administrative burden, while emphasizing concerns about privacy, surveillance, harmful outputs, and accountability. Cultural responsiveness, especially language, dialect, and cultural nuance, emerged as central to trust for AI mental health adoption.

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**Framing the Firsts: Media Narratives, Intersectional Identity, and Voter Perceptions of Barack Obama and Kamala Harris in Presidential Debates**

Presenter's Name: Willie White iii
Classification: Undergraduate Student
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Presidential debates function as critical moments in U.S. electoral politics, shaping voter perceptions of candidates' credibility, authenticity, and electability. This study examines how media framing of presidential debates influences voter perceptions of Barack Obama and Kamala Harris, two historic candidates whose race and gender position them outside traditional presidential norms. Drawing on scholarship in media framing, political psychology, debate performance, and intersectionality, this research analyzes how pre- and post-debate media narratives interact with voters' cognitive biases to reinforce or challenge existing racial and gender stereotypes. The literature demonstrates that media framing significantly affects how voters interpret debate performances, particularly through expectations set prior to debates and evaluative narratives that follow them. Studies on information processing reveal that voters rely on heuristics shaped by race and gender, while social role theory explains why candidates like Harris face heightened scrutiny regarding demeanor and emotional expression. Comparative analyses of debate performance further indicate that rhetorical strategies, nonverbal communication, and linguistic style influence voter behavior, especially among undecided voters. By situating Obama and Harris within these frameworks, this study argues that media portrayals during debates often amplify intersectional biases, shaping voter perceptions in ways that extend beyond policy substance or debate outcomes. This research contributes to the field by highlighting gaps in existing scholarship regarding the emotional and real-time psychological effects of debate framing on marginalized voter groups and underscores the need for more intersectionally grounded analyses of media influence in electoral politics.

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**Examining Exclusionary School Discipline, and the School-To-Prison Pipeline for Black boys**

Presenter's Name: Jaden Wilks
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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This thesis examines how school disciplinary practices particularly suspensions and punishing responses to truancy contribute to the school-to-prison pipeline for Black boys in the United States. Although discipline is typically used as a tool for maintaining order, exclusionary practices frequently remove students from instructional settings, interrupt academic progress, and increase long-term disengagement from school. Using Travis Hirschi's Social Bond Theory, this study argues that repeated disciplinary removal weakens key bonds that promote reliability and school trust: attachment, commitment, involvement, and belief. As these bonds break, Black boys may experience reduced engagement, lower educational expectations, and growing distrust of school authority, increasing vulnerability to future justice system contact. This thesis also includes Critical Race Theory to explain why Black boys experience more punishment, emphasizing how racialized perceptions of behavior and institutional bias shape disciplinary outcomes. Using a theoretical, literature-based qualitative synthesis, this project combines existing scholarly literature, dissertations, and policy-based research on discipline disparities, student engagement, and school-based criminalization. Preliminary findings from existing research shows that suspensions and punitive truancy responses weaken Black boys' school belonging and engagement, increasing vulnerability to academic removal and pushed into the justice system over time. Ultimately, this thesis highlights how exclusionary discipline functions as both a structural and interpersonal contributor to the school-to-prison pipeline and offers a foundation for considering policy approaches that emphasize support, belonging, and educational safety over punishment.

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**Gentrification, Campus Ecology, and the Student Experience at Howard University**

Presenter's Name: Hannah rose Williams
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School/College: Arts & Sciences
*Presentation Type: Poster Presentation*
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My thesis looks at how gentrification, the process of wealthier people moving into lower-income neighborhoods, affects the everyday lives of students at Howard University. Using "Campus Ecology Theory," I argue that a college is like an ecosystem where the buildings, the neighborhood, and the people all shape how a student feels. Because Howard is located in the Shaw neighborhood of Washington, D.C., which is changing very fast, it is the perfect place to study how outside economic shifts change a student's sense of belonging. Since I could not do official, recorded interviews, my research uses a "common sense" approach. I spent time observing the campus and the surrounding streets, and I had informal conversations with 5 to 10 Howard students about their experiences. I also looked at population data to show how D.C. has changed from "Chocolate City" to a city where the Black population is no longer the majority. My findings show that students feel "displaced" even while they are still on campus. A major example is seeing non-Black residents treat the historic Howard Yard like a public dog park, which students see as a sign of disrespect toward Black history. I found that gentrification does not just raise the rent; it changes the environment and overall sentiment of the school, making some students feel like outsiders in their own community. This research helps explain why protecting the culture of HBCUs is so important as the cities around them change.

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**Moscow's Model of Madness: Gray Zone Warfare and the Strategic Weaponization of Migration Against Europe**

Presenter's Name: Khalil Winzer-wilks
Classification: Undergraduate Student
School/College: Arts & Sciences
*Presentation Type: Oral Presentation*
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This thesis examines the role of migration manipulation within the Russian Federation's broader gray-zone strategy toward the European Union and the wider transatlantic alliance. It argues that the Russian state is complicit in fueling instability in regions along Europe's periphery, most notably in Eastern Europe, the Middle East, and parts of Africa, in ways that contribute to the generation and redirection of mass migration flows toward the EU.Through comparative case analysis, this research seeks to establish a strategic throughline across disparate regional crises, demonstrating how migration pressure functions as a sub-threshold coercion tool. By exploiting humanitarian norms, legal asymmetries, and political divisions within democratic societies, such tactics impose disproportionate strain on state capacity, polarize domestic politics, and test alliance cohesion while maintaining plausible deniability. Drawing on open-source intelligence, policy documents, social media, interviews and existing literature on gray-zone warfare, this study assesses the extent to which migration has been utilized as a deliberate strategy rather than as an incidental byproduct of conflict. In doing so, it situates Russia's approach within the evolving landscape of non-military competition, highlighting its implications for European security, NATO resilience, and US strategic interests.Ultimately, this thesis aims to contribute to a clearer understanding of an emerging form of statecraft that challenges traditional distinctions between war and peace. By identifying the mechanisms and risks associated with the weaponization of migration, it seeks to inform policymakers and security practitioners of a threat that remains under-theorized yet increasingly consequential for the stability of the Western alliance.

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**Reproductive Health in the Workforce: A White Paper on Reducing Absenteeism and Pay Loss**

Presenter's Name: Niah Woods
Classification: Graduate Student
School/College: Graduate School
*Presentation Type: Poster Presentation*
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Co-authors: Shoareged Phillpotts, MPH, LMSW, Andrew Sanderson, II, MD, MPH, FASGE, Pamela Carter-Nolan, PhD, MPH

Reproductive health conditions, such as endometriosis, uterine fibroids, and polycystic ovary syndrome (PCOS), and gynecological cancers significantly affect women's physical and mental health, often contributing to workplace absenteeism and decreased productivity. Black women and other women of color experience these conditions at disproportionately higher rates and face additional barriers due to systemic inequities, delayed diagnoses, and limited workplace support. Although the Family and Medical Leave Act (FMLA) provides critical job-protected leave, its unpaid nature and reactive approach fail to address underlying health and workplace inequities. The purpose of this capstone project is to develop a white paper that provides evidence-based recommendations to help both employers and employees increase awareness of reproductive and mental health conditions, strengthen employee benefits, and promote preventive workplace strategies that reduce reliance on FMLA. The project emphasizes flexible work arrangements, culturally competent health education, and proactive wellness initiatives as critical components for creating equitable and supportive work environments that support Black cis-, trans-, and gender-diverse individuals. The public health significance of this project lies in its potential to advance health equity, reduce organizational costs, and enhance employee retention and overall well-being. By focusing on preventive measures and inclusive workplace policies, this project underscores the need for organizations to recognize and address the intersection of reproductive and mental health in the workplace, particularly for employees from marginalized communities.

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**How Policy and Colonialism Affected Black Poverty Worldwide**

Presenter's Name: Naomi Wright
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Faculty Advisor: Gerald Daniels
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Author: Naomi Wright

Background: Colonialism started around the 15th century and it has shaped different regions' socio-economic status. Colonialism has also shaped the views and treatment towards Black individuals which vary between different countries around the world. Colonization had caused racism and prejudice against the Black community. This directly affects the policies that can either negatively or positively affect the Black community. This paper investigates how colonization and policy influences Black poverty in different areas of the world. The purpose of this research is to show how discriminatory policies towards the Black community influences Black poverty and how history of the region also influences Black poverty. This research matters because it can help policymakers shape the way they can help the Black community. It will also prove that the policy is systematically hurting the Black community and it has affected the Black community for decades. Methods: A systematic review of surveys, historical accounts, and statistics Results/ Conclusion: The results indicate that even countries that are considered highly developed (United States) still have relatively high Black poverty rates likewise to countries that are considered developing countries (Brazil and South Africa). The results also indicate that policy and colonization affect education, wealth gaps, unemployment, and health disparities.

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**Unmet Basic Needs and Cigarette Smoking among Black Americans**

Presenter's Name: Joi Wright
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School/College: Medicine
*Presentation Type: Poster Presentation*
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Social determinants of health (SDOH) play a significant role in tobacco use. Challenges accessing resources for basic needs are associated with smoking status. However, few studies have examined how unmet basic needs contribute to consumption and quitting behaviors. This study examined the relationships between unmet basic needs, tobacco consumption, smoking frequency, and quit attempts among Black American smokers. Black smokers (N=162) completed the National Health Interview Survey's cigarette/tobacco use questions. SDOH risk was calculated using a composite score of housing, insurance, and the inability to access essential needs, measured by the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences. Linear regression analyses were conducted to examine the relationship between SDOH risk and smoking behaviors. On average, smokers reported 6.38 (SD=7.17) cigarettes/day, smoking on 18.8 (SD=12.85) days, and 3.67 (SD=6.62) past year quit attempts. Unmet needs included housing (23.3%), food (26.4%), phone (17.8%), utilities (16.6%), medicine (15.3%), clothing (12.3%), and transportation for medical appointments (22.7%) and work (32.5%). SDOH risk (M=1.74, SD=1.77) significantly predicted past year quit attempts $\beta = .208$, $t(145) = 2.56$, $p = .012$. SDOH risk was not a significant predictor of tobacco consumption or past year quit attempts. Findings suggest unmet basic needs are directly linked to a higher number of quit attempts among Black smokers. These results emphasize the importance of creating sustainable interventions to address SDOH as a critical component of effective tobacco cessation. Further research exploring the impacts of integrating patient navigation addressing SDOH in tobacco cessation interventions is warranted.

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**When Discipline Speaks: A Reflective Functioning Framework for Understanding School Experiences**

Presenter's Name: Brianca Wright
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School/College: Education
*Presentation Type: Poster Presentation*
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Black male adolescents experience disproportionate rates of exclusionary and punitive school discipline, yet policy discussions often focus on behavioral outcomes without examining the underlying psychological processes shaped by these practices. This poster introduces a reflective functioning (RF) framework for understanding how school discipline operates as a developmentally active context. Reflective functioning refers to the capacity to interpret one's own and others' behavior in terms of underlying thoughts, feelings, and intentions—a skill central to emotion regulation, identity development, and interpersonal functioning during adolescence. Drawing from attachment and mentalization theory, this framework proposes that punitive or exclusionary discipline practices function as relational signals that may heighten emotional arousal, evoke shame or threat, and temporarily disrupt adolescents' capacity to mentalize. Repeated exposure to such environments may influence how youth understand themselves and their place within institutional settings. In contrast, relationally attuned adults—such as mentors and educators who engage youth with curiosity and validation—may scaffold reflective capacity and promote psychological resilience. By repositioning discipline as a psychological and relational experience rather than solely a behavioral management strategy, this framework highlights reflective functioning as a modifiable target for school-based intervention. Implications for discipline reform, restorative practices, and culturally responsive policy are discussed, with attention to how schools can create environments that support, rather than constrain, adolescent psychological development.

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**Beyond the Screen: Parasocial Bonds and their Impact on Human Behavior**

Presenter's Name: Amaar Zarrieff
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*Presentation Type: Poster Presentation*
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This research examines how parasocial relationships, one-sided connections formed through repeated media exposure, impact social media influencer culture and consumer behavior. Parasocial relationships cause individuals to invest time and energy supporting performers who rarely reciprocate, creating an imbalanced dynamic that influences fan behavior and decision making.Focusing on Generation Z (ages 18 to 25), the first generation raised with widespread social media access, this study employs a mixed methods approach combining surveys, interviews, and content analyses to investigate the psychological aspects of parasocial relationships and their effects on human behavior and social interactions. The research explores how social media influencers, who gained prominence in the late 2000s to early 2010s, shape consumer behavior, including purchasing decisions and communication patterns. Additionally, a content analysis examines how parasocial bonds impact politics and major elections, investigating their role in public figure success. Parasocial relationships are particularly evident in stan culture, a term popularized by Eminem and Dido's 2000 song (titled Stan) describing extremely loyal fans. The study analyzes how stan culture encourages fan bases to defend celebrities through extreme measures, including cyberbullying. Popular artists develop large, passionate communities such as the Barbz (Nicki Minaj fans), the Beyhive (Beyoncé fans), and Swifties (Taylor Swift fans) with dedicated online presences and strong allegiances. This research provides insight into stan culture within the music industry, where parasocial relationships are most prevalent, ultimately determining how these one-sided connections affect both individual behavior and the trajectory of public figures' careers.

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# TRANSLATIONAL & CLINICAL SCIENCES

**Racial Disparities in Obesity Among U.S. Adult Cancer Survivors: Findings from the 2016 Medical Expenditure Panel Survey**

Presenter's Name: Michael Aderinkola
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Purpose: Obesity adversely affects cancer survivorship by increasing recurrence risk, treatment complications, and reducing quality of life. Racial disparities in obesity may further worsen survivorship outcomes and contribute to inequitable long-term health trajectories. This study evaluated whether racial differences in obesity prevalence exist among U.S. adult cancer survivors and whether these disparities persist after adjusting for sociodemographic factors across diverse populations. Methods: A cross-sectional analysis was conducted using the 2016 Medical Expenditure Panel Survey (MEPS) Full-Year Consolidated File, including the Experiences with Cancer Survivorship Supplement and Preventive Care file. Adults ≥18 years with a self-reported history of cancer and complete preventive care data were included. Obesity was defined as body mass index (BMI) ≥30 kg/m². Race (White, Black, Other) was the primary independent variable. Covariates included age, sex, marital status, income, insurance status, food insecurity, and education. Survey-weighted chi-square tests examined associations between race and obesity. Multivariate logistic regression estimated adjusted odds ratios (aORs), accounting for MEPS' complex sampling design. Results: The weighted sample represented 18,453,274 U.S. cancer survivors. Most were female (57.8%) and aged ≥66 years (57%). Overall obesity prevalence was 33.4%. Obesity prevalence was highest among Black survivors (60.3%) compared with White (32.7%) and Other (22.6%) survivors ($p<0.001$). After adjustment, Black survivors had nearly threefold higher odds of obesity compared with White survivors (aOR 2.95, $p<0.001$).j Conclusion: Significant racial disparities in obesity persist among U.S. cancer survivors independent of sociodemographic factors. Equity-focused survivorship strategies, including pharmacist-led preventive counseling and multidisciplinary weight-management interventions, are needed to address modifiable risk factors and improve long-term oncology outcomes.

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**Black Longevity Research in All of Us**

Presenter's Name: Feyisara Adeyeri
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Co-authors: Fady Tawfik, Cedric Ahegbebu, Richard Gillum

Background. In the United States, age-specific Black mortality rates have historically been higher than those of White individuals before age 85 but lower thereafter, a phenomenon known as the "mortality crossover." The causes of this crossover remain unclear. All of Us (AoU), which aims to recruit one million diverse U.S. adults aged 18 and older, offers an opportunity to explore potential genomic and environmental explanations. We examine the number of Black participants aged 80–84 and ≥85 in AoU as of 4/1/2026, and compare these figures with those expected in a representative sample of one million based on the 2020 U.S. population. Methods: U.S. Census data were obtained from the CDC WONDER database, which includes 256,662,010 adults aged ≥18 years (34,745,727 Black; 201,059,733 White) with age top-coded at 85 years. Data from the National Health and Nutrition Examination Survey (NHANES) were used for comparison. Results: In 2020, 553,126 Black individuals and 5,733,090 White individuals were aged ≥85. In a representative sample of one million, expected numbers aged ≥85 were 28,514 Whites and 15,919 Blacks. As of 2/3/2026, 97,800 Black participants in the AoU Curated Data Repository had completed basic survey data, corresponding to an expected 1,556 individuals aged ≥85 years. By comparison, NHANES 2007–2020 included only 268 Black individuals aged ≥80 years. Conclusion:AoU CDR offers a superior resource for longevity research in Black individuals aged ≥85 compared to NHANES.

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**The Inhibition of PLK4 against Melanoma Progression in BRAF/PTEN Mice Model**

Presenter's Name: Nyla Adon
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*Presentation Type: Poster Presentation*
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Melanoma is an aggressive skin cancer caused by the overproliferation of melanocytes. Due to its aggressive nature, melanoma is responsible for 75% of skin cancer deaths despite accounting for 4% of skin cancer diagnoses, highlighting the need for novel targets to treat this disease. Polo-like kinase 4 (PLK4), a key regulator of centrosome duplication, is frequently overexpressed in melanoma and other cancers. When overexpressed, PLK4 can contribute to centrosome amplification, genomic instability, and tumor progression. This study investigates the effects of PLK4 inhibition on melanoma growth using the selective PLK4 inhibitor CFI-400945 in a BRAF^V600E^/PTEN-mouse model. Melanoma tumors were induced, and mice were treated with a vehicle or varying concentrations of CFI-400945 administered orally over a five-week period. Common metastatic sites were excised from the mice, including the liver and lungs. Results were analyzed using RT-PCR markers: PCNA, p53, and Vimentin, and tumor lesions were examined and counted on the lungs to assess metastatic growth. Treatment with CFI-400945 resulted in a significant reduction in tumor volume and tumor weight compared to vehicle-treated controls. PCR results show decreased PCNA expression, indicating decreased proliferation at the

mRNA level, and increased p53 expression, indicating increased tumor suppression. These findings suggest that PLK4 inhibition suppresses melanoma progression by disrupting centrosome amplification, promoting cytokinesis failure, and inducing cell death. Overall, this study supports PLK4 as a promising therapeutic target in melanoma and provides preclinical evidence of CFI-400945's efficacy in reducing tumor growth.

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**Diagnostic Patterns by Housing Status Among Youth Aged 16-25 with Schizophrenia Spectrum and Bipolar Disorders: A Multi-System EHR Study**

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Background: Housing instability is an important social determinant of health among adolescents and young adults with serious mental illness and is associated with disrupted care and adverse outcomes. While disparities in serious mental illness have been documented, less is known about how housing instability relates to diagnostic and demographic patterns in youth. This study examined demographic and diagnostic distributions among individuals aged 16–25 years with schizophrenia spectrum or bipolar disorders, focusing on housing instability. Methods: We conducted a retrospective cross-sectional study using the TriNetX research network. Individuals aged 16–25 years with schizophrenia spectrum disorders (ICD-10 F20–F29) or bipolar disorder (F31.*) were identified. Housing instability was defined using ICD-10 codes Z59.0 (homelessness) and Z59.1 (inadequate housing). Demographics and comorbid substance use disorders were compared across diagnostic groups, with subgroup analyses among youth experiencing housing instability. Results: The cohort included 17,797 individuals with schizophrenia spectrum disorders and 93,926 with bipolar disorder. Housing instability was more frequently documented among schizophrenia-spectrum patients. Schizophrenia-spectrum diagnoses were more common among males overall, whereas bipolar disorder showed greater female representation. Among housing-unstable youth, schizophrenia-spectrum disorders (n=2,267; mean age 22±2 years) were more often female and White, while bipolar disorder (n=191; mean age 23±2 years) was more commonly male and disproportionately Black or African American. Stimulant-related substance use disorders were more prevalent among housing-unstable youth with bipolar disorder. Conclusions: Housing instability is associated with distinct demographic and diagnostic patterns among youth with serious mental illness, highlighting the importance of incorporating housing status into equitable, youth-focused mental health care strategies.

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**Association of Childhood Sexual Abuse with Adult Loneliness in the United States**

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Childhood sexual abuse (CSA) is a severe early-life trauma with well-established psychiatric sequelae; however, its long-term association with adult loneliness—a risk factor for depression, cardiometabolic disease, and premature mortality—has not been rigorously evaluated in contemporary US populations using causal-inference approaches. We estimated the association between prior CSA and adult loneliness and assessed variation by sex, race/ethnicity, and age in a cross-sectional study of 54,468 adults participating in the 2023–2024 Behavioral Risk Factor Surveillance System, a nationally representative survey of US adults. Analyses incorporated complex survey weights and inverse probability weighting to approximate causal contrasts. The exposure was self-reported CSA (never, once, more than once), and the outcome was ordinal frequency of loneliness (never to always). Multinomial logistic regression models estimated adjusted predicted probabilities controlling for age, sex, race/ethnicity, marital status, educational attainment, body mass index, employment, primary language, and metropolitan residence; effect modification was formally tested. CSA demonstrated a clear dose-response association with adult loneliness. The probability of never feeling lonely declined from 38.4% among unexposed adults to 22.4% after one exposure and 19.2% after repeated exposure. Conversely, the probability of always feeling lonely increased from 3.6% among unexposed adults to 7.7% after one exposure and 9.2% after repeated exposure. Associations were consistent across demographic groups, with significant interaction by sex, race/ethnicity, and age (all $P < .001$). These findings underscore the enduring social consequences of early-life trauma and highlight the importance of trauma-informed prevention and intervention strategies.

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**Retrospective Study of Pain Management in NICU Surgeries**

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Around 1.5 million newborn infants undergo surgery annually with anesthesia. Pain management post-surgery in infants is variable and subjective, thereby lacking reproducibility for prolonged surgical pain.

Inadequately treated pain with excess or under-dose of opioid usage leads to long-term developmental issues. The current scale used to measure pain in infants are observer dependent and lack inter-rater reliability. It is crucial to develop a tool that can generate an objective and accurate way to detect pain and guide treatment outcomes. Development of a multi-modal biomarker model that can effectively measure infant pain objectively to improve postoperative pain management in the NICU. This retrospective study recruited 50 infants between 35-42 weeks gestation and aged less than 60 days at surgery. Collection of data on principal diagnosis, co-morbid conditions, surgical procedure(s), and anesthesia received (type, drugs, and total doses) were extracted from the EHR. Pain management from 12 hours before surgery and up to 72 hours after surgery was recorded. This study is a prerequisite to form a prospective study in order to investigate adding salivary cortisol as a biomarker for validation and camera surveillance to increase pain detection. Utilize these findings to adapt clinical guidelines of pain assessment from pediatric anesthesiologists to NICU physicians and nurses, which will impact overall quality in patient quality of life.

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**The Role of Leptin Resistance in the Pathophysiology of Type 2 Diabetes in African Americans**

Presenter's Name: Sydney Allison
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Introduction and Objective: Leptin (LEP), an adipocyte-derived hormone, plays a key role in energy balance and insulin sensitivity. Alterations of LEP signaling has been connected to obesity associated T2D; however, population-specific molecular evidence in African Americans (AAs) remains unresolved. Current work characterize LEP-linked transcriptional alterations and pathway dysregulation in AA adults with T2D from the DC area. Methods: Whole-blood RNA sequencing was performed on 34 AA participants recruited from the Diabetes Center, including T2D (n=23) and non-T2D controls (n=11). The sociodemographic, lifestyle, and medical histories were recorded. Differential gene expression analysis was conducted using Illumina sequencing, followed by Ingenuity Pathway Analysis to identify LEP-related signaling networks. Results: LEP gene expression was significantly downregulated (FC= -1.65) in T2D compared to controls. Pathway analysis revealed disruption of LEPR-mediated signaling in hypothalamic NPY/AgRP and POMC neuronal pathways, characterized by SOCS3 upregulation, and inhibition of JAK-STAT signaling. This suppression promoted persistent nuclear FOXO1activity, increased orexigenic NPY/AgRP expression, impaired appetite suppression, and features consistent with leptin resistance. Conclusion: These findings demonstrate LEP-pathway dysregulation at the transcriptional level in AAs with T2D providing a reasonable mechanistic insight into leptin resistance and metabolic dysfunction.

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**Hidden Drivers of Hospital Utilization in Sickle Cell Disease: Smoking, Opioids, and a Case for Genotype-Informed Risk Stratification**

Presenter's Name: Uchenna Amaechi
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Background: Adults with sickle cell disease (SCD) experience high rates of emergency department visits and hospitalizations, primarily due to vaso-occlusive crises and acute chest syndrome. Tobacco use may influence pain severity, opioid requirements, and healthcare utilization; however, these relationships remain poorly characterized. We aimed to evaluate the association between smoking exposure, opioid use, and hospitalization frequency across SCD genotypes. Methods: We conducted a narrative review of human studies from databases including PubMed/MEDLINE, Embase, Cochrane Library, Google Scholar, and relevant government agency publications from 2010–2025. Search terms combined "sickle cell disease", "smoking", "opioid", "hospitalization". Results: Twenty out of 24 identified studies informed this synthesis, representing clinical and population-based evidence, primarily derived from PubMed/MEDLINE and Cochrane reviews; four studies were excluded due to withdrawal status or lack of relevance to SCD-related utilization. Tobacco exposure was consistently associated with greater pain burden, pulmonary complications, and increased healthcare utilization, likely mediated through inflammation, hypoxemia, and vaso-occlusion. Opioids remain central to SCD vaso-occlusive crises management; however, a Cochrane review identified only nine randomized trials with very low-certainty evidence, highlighting persistent uncertainty regarding the efficacy and safety of pharmacologic interventions and contributing to prescribing variability. Notably, few studies stratified outcomes by genotype despite recognized differences in clinical severity across HbSS, HbSC, and HbSβ-thalassemia. Conclusions: Smoking and opioid exposure are modifiable drivers of hospital utilization in SCD. Prospective studies incorporating objective tobacco measures, detailed opioid metrics, and genotype-stratified analyses are needed to inform precision-based interventions and reduce preventable hospitalizations.

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**Introducing RALLM-O: A Retrieval-Augmented Large Language Model for Adjunctive Obesity Management**

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Background: Obesity affects over 40% of U.S. adults and is strongly associated with cardiometabolic disease. Sustained behavioral support, a cornerstone of obesity care, remains difficult to scale in routine

practice due to limited visit time and logistical barriers. Conversational artificial intelligence offers scalable engagement but raises concerns about outdated recommendations and potential safety risks. Retrieval-augmented generation (RAG) improves alignment with current guidelines by grounding responses in curated clinical documents. RALLM-O, available at ashklab.com/RALLM-O, is a retrieval-augmented large language model designed to augment physician-directed obesity management by delivering guideline-anchored counseling and structured education between visits. Methods:We propose a six-month parallel-group randomized controlled trial enrolling adults aged 18 to 65 years with BMI ≥30 kg/m². Participants will be randomized to standard care alone or standard care plus RALLM-O. The primary endpoint is the Composite Obesity Management Benefit Score (COMBS), which integrates clinical improvement, patient experience, clinician workflow impact, and safety into a standardized 0 to 100 scale. Intervention participants will undergo second-stage randomization to one of five top-performing foundation models identified in the Harvard-Stanford do NOHARM study. Analyses will follow an intention-to-treat framework using covariate-adjusted ANCOVA. Results: The RALLM-O platform has been developed and internally validated for functionality. Recruitment has not yet begun. Prior to participant enrollment, the model will be evaluated by clinicians for perceived harm using the structured do NOHARM framework. Conclusions: This protocol establishes a rigorous framework for evaluating retrieval-augmented AI in obesity care while systematically assessing benefit and harm across foundation models.

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**Bridging the Gap: Operational and Policy Strategies to Improve Maternal Health Outcomes for Incarcerated Birthing People**

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Roughly 1000 people in the incarcerated population in the United States experience limited access to comprehensive prenatal and postpartum treatment. This review will examine how incarceration functions as a social determinant of health and how disparities and systemic breakdowns in comprehensive healthcare within correctional facilities impact maternal morbidity and mortality. Addressing the healthcare disparities incarcerated birthing people encounter requires awareness of the existing barriers to equitable maternal healthcare within correctional facilities. To understand the restrictions on prenatal care, adequate support for high-risk pregnancies, delivery support and outcomes of delayed or inconsistent continuity of care for mother and infant, analysis on current practices to identify areas for improvement will be presented. Coupled with identifying healthcare management, public health and legal frameworks, this paper will explore evidence-based interventions proven to improve maternal outcomes; including doula support, trauma-informed care models and established partnerships between correctional facilities and community healthcare providers and facilities. From a healthcare administration perspective, this paper will showcase how regulatory gaps and disconnected care structures hinder the delivery of equitable prenatal and postpartum care for incarcerated individuals and will suggest opportunities for cross sector collaboration, policy reform and a functional shift that aligns correctional facility care to a healthcare model that is person-centered. In reframing incarcerated maternal care as a quality improvement issue, healthcare leaders can drive systemic change that improves health outcomes and advances equity across multiple healthcare settings. Keywords: continuity of care maternal health, population health, incarceration, quality improvement

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**UNDERUTILIZATION OF ADVANCED IBD THERAPIES AND DELAYED ESCALATION IN A MINORITY-PREDOMINANT URBAN POPULATION**

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Background: African American (AA) patients experience persistent inequities in inflammatory bowel disease (IBD) care, including lower biologic utilization and greater corticosteroid dependence. Structural barriers in AA-predominant cohorts remain understudied. We aimed to evaluate IBD treatment patterns and their associations with disease severity, follow-up adherence, and sociodemographic factors in a diverse urban cohort. Methods: We conducted a retrospective analysis of 197 IBD patients (88 Crohn's disease [CD], 109 Ulcerative Colitis [UC]) diagnosed between 2011-2024. Clinicopathologic, pharmacologic, and follow-up data were abstracted. Time-to-escalation was defined as time from diagnosis to advanced therapy initiation. Associations were assessed using chi-square testing and multivariable logistic regression. Results: Treatment patterns differed by subtype. UC patients more frequently received 5-ASA (67.9% vs.17.0%; p<0.001) and corticosteroids (37.6% vs. 21.6%; p=0.015). Advanced therapies wereinfrequently used overall (immunosuppressants 13.7%, biologics 8.1%, JAK inhibitors 0.5%). Escalation correlated with histologic severity, with immunosuppressant use in 36% of severecases versus ≤9% in mild/none (p<0.001), and biologic use in 20% versus ≤6% (p=0.023). Among patients initiating biologic/JAK therapy (n=13), escalation occurred a median of ~3 years post-diagnosis. Follow-up adherence was strongly associated with therapy. In multivariable analysis (N=132), female sex predicted immunosuppressant use (OR 4.5, p=0.029). Biologic use was independently associated with CD (OR 8.5, p=0.039) and younger age (OR 0.87/year, p=0.004). Conclusion: In this AA-predominant cohort, UC patients were more likely to receive 5-ASA and corticosteroids, while advanced therapies remained underutilized and delayed despite severe disease. Follow-up adherence strongly influenced escalation, underscoring critical gaps in timely, equitable IBD care.

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**Exposure to Childhood and Community Violence May be Associated to Cardiovascular Disease Risk: Biological and Behavioral Sex-Specific Pathways**

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Background: Childhood violence is an early-life stressor associated with long-term health consequences, including increased cardiovascular disease (CVD) risk. Violence exposure contributes to adverse behavioral and psychological outcomes through pathways involving depression, sleep disruption, inflammation, and autonomic dysfunction. Few studies distinguish behavioral and psychological mediators using a domain-based framework such as the Violence and Immune Function (VIF) model. The VIF study examined violence exposure among 440 self-identified African Americans aged 18–25 from socioeconomically disadvantaged wards in Washington, DC, using factor and regression analyses to assess associations with sleep disturbance and depressive symptoms. Objective: To present a framework linking childhood violence exposure to adult cardiovascular risk through behavioral (sleep disruption) and psychological (depression) mediators, examining sex-specific differences. Methods: We synthesize VIF findings and prospective cohort evidence evaluating associations between violence exposure, sleep disturbance, depressive symptoms, and cardiovascular risk by sex.
Results: Sex-specific differences were observed. Among males, gun use or witnessing violent death explained 62.9% of variance in combined sleep and depression factors, compared with 33.6% in females. Direct personal violence explained all variance in sleep and depression among females versus 57.8% in males. Gun/violent death exposure explained all variance in depressive mood among males and 62.3% among females. Direct personal violence accounted for all sleep variance in females but 15.6% in males. A cohort of >33,000 individuals showed coexisting depression and sleep disturbance increased heart disease risk 2.6-fold. Conclusion: Early-life violence is strongly associated with sleep and depressive disturbances that contribute to elevated cardiovascular risk, supporting trauma-informed prevention strategies.

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**Targeted Nanoparticle Delivery of miR-144/451 Modulator to Erythrocytes for Mitigatinng Oxidative Stress in Type 2 Diabetes and aging**

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This abstract introduces a novel therapeutic paradigm by targeting erythrocytes—long considered passive oxygen carriers—as active modulators of oxidative stress in Type 2 diabetes. The central innovation lies in the development of erythrocyte-targeted nanoparticles engineered to deliver the miR-144/miR-451 modulator cluster, a microRNA duo with roles in red blood cell homeostasis and redox regulation. Their application to mature anucleated erythrocytes, previously viewed as transcriptionally inert, remains virtually unexplored. This abstract challenges that dogma by leveraging the residual translational capacity and post-transcriptional regulatory machinery of erythrocytes to modulate their function in disease. Preliminary results citation: "Dysregulation of miR144 and miR451 Expression in the Circulating Human Erythrocytes from African American" Alsharif G, Jafri I, Berasa R, Hag Ahmed N, Nunlee Bland G, Fluitt MB, Gambhir KK. Dysregulation of miR144 and miR451 Expression in the Circulating Human Erythrocytes from the African American Adults. ARC Journal of Diabetes and Endocrinology. 2020;6(1):1–6. doi:10.20431/2455 5983.0601001

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**Racial Differences in Obstructive Sleep Apnea Diagnosis After Acute Myocardial Infarction or Cerebral Infarction**

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Study Objectives: Obstructive sleep apnea (OSA) is a common, underdiagnosed condition associated with significant cardiovascular morbidity. While prior studies suggest racial disparities in OSA recognition, large real-world analyses following major cardiovascular events remain limited. This study evaluated racial disparities in OSA diagnosis among Black and White adults following acute myocardial infarction or cerebral infarction. Methods: This retrospective cohort study used the TriNetX Global Collaborative Network. Adult Black and White patients with a history of acute myocardial infarction or cerebral infarction and no prior OSA diagnosis were identified. Cohorts were propensity score matched for demographics, BMI, tobacco use, hypertension, heart failure, and atrial fibrillation, yielding 481,817 patients per cohort. The primary outcome was incident OSA diagnosis; secondary outcomes included incident hypertension, heart failure, and atrial fibrillation or flutter. Results: Incident OSA was diagnosed in 7,415 White patients (1.5%) and 5,683 Black patients (1.2%). White patients had a significantly higher likelihood of OSA diagnosis compared with Black patients (risk ratio 1.305, 95% CI 1.261–1.350; odds ratio 1.310, 95% CI 1.265–1.356; $p < 0.001$). Time-to-event analysis confirmed a significantly higher hazard of OSA diagnosis among White patients. Conclusions: Among adults with major cardiovascular disease, White patients were approximately 30% more likely than Black patients to receive an OSA diagnosis despite similar clinical risk profiles, suggesting meaningful racial disparities in OSA recognition in real-world practice. Keywords: obstructive sleep apnea, racial disparities, cardiovascular disease, electronic health records, propensity score matching

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**Food Insufficiency**
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Background: Food insufficiency is a significant social determinant of health and may disproportionately affect families caring for children with chronic illnesses, including sickle cell disease (SCD). Prior studies show that children with complex medical disorders face higher rates of food insufficiency, underscoring the need for targeted intervention within pediatric clinical settings. However, limited evidence exists on the impact of nutritional education delivered in an urban clinical setting. Methods: We conducted a cross sectional survey of 72 families receiving care in an urban pediatric primary care and hematology clinic. Household food sufficiency over the prior seven days was measured using a single item screening tool. Insurance status (Medicaid vs private insurance) was collected and analyzed in relation to household food sufficiency. Families received modest financial support and nutrition education, and completed a qualitative survey. Results: Overall, 62.5% of households surveyed reported marginal to very low food sufficiency. Medicaid-covered families were more likely to report food insufficiency and all households reporting the most severe food insufficiency (often not enough to eat) were Medicaid recipients. Reports of food insufficiency trended higher in families with SCD compared those managing other chronic conditions. Caregivers noted short term improvements in grocery selection and food choices after support and nutrition education, with some changes maintained over time. Conclusions: Food insufficiency was highly prevalent among families of children with chronic illness in this urban pediatric clinic and strongly associated with economic hardship. Routine screening and targeted nutritional interventions may improve pediatric health, particularly for children with SCD.

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**Prevalence of lung cancer risk factors and predictors of screening willingness: a community-based cross-sectional survey**
Presenter's Name: Carl Boateng
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Background: Lung cancer is the leading cause of cancer-related mortality in the U.S. Despite advances in targeted therapy and immunotherapy, survival remains stage-dependent, making prevention and early detection essential. Low-dose computed tomography (LDCT) screening reduces lung cancer mortality, but uptake is low and eligibility focuses on cigarette smoking history, potentially underrecognizing non-tobacco exposures (secondhand smoke, occupational/environmental carcinogens, and household air pollution from cooking or other combustion sources). This study will survey adults in Washington, DC to quantify traditional and non-traditional risk factors and assess how self-reported exposures relate to perceived lung cancer risk and willingness to undergo LDCT if offered. Methods: Community-based, cross-sectional, minimal-risk anonymous survey of adults (age ≥18) recruited through Howard University Hospital and affiliated outreach events. The questionnaire, adapted from the Stanford "Health Matters" survey, will be administered via Qualtrics XM and completed in ~10 minutes. Measures include demographics and socioeconomic indicators; tobacco use and secondhand smoke; family history/comorbidities; occupational/environmental and cooking-related exposures; LDCT awareness/knowledge; perceived lung cancer risk; willingness to undergo screening; and perceived barriers. Preliminary results: Target enrollment is ~300.We will estimate prevalence with 95% CIs, quantify USPSTF eligibility, and model predictors of willingness using multivariable logistic regression with subgroup comparisons by race/ethnicity, sex and socioeconomic indicators. We hypothesize that elevated exposure burdens will be common among individuals outside USPSTF criteria and that willingness will vary with perceived risk and access barriers. Conclusions: Findings will inform clinician counseling and community-tailored education and navigation strategies to improve LDCT readiness and reduce screening disparities in DC.

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**The Forgotten Vitamin: A Modern Case of Niacin Deficiency Presenting with the Classic Three Ds' Manifestations**
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Background: Pellagra is a clinical syndrome caused by niacin (vitamin B3) deficiency and classically presents with dermatitis, diarrhea, and dementia. Although uncommon in industrialized countries, it remains a risk in patients with alcohol use disorder and malabsorptive conditions, including bariatric surgery. Case Presentation: A 64-year-old woman with chronic alcohol dependence and a history of sleeve gastrectomy presented with a diffuse pruritic rash, chronic diarrhea, cognitive decline, and severe bilateral leg pain. Physical examination revealed a symmetric hyperpigmented rash involving the forearms, neck, and upper back. Laboratory evaluation demonstrated a markedly low serum niacin level (<20). Initial concern for toxic shock syndrome and Stevens–Johnson syndrome was ruled out after skin biopsy showed nonspecific spongiotic dermatitis. Oral niacin supplementation resulted in improvement of gastrointestinal and dermatologic symptoms; however, cognitive impairment persisted. Her hospital course was complicated by sepsis, acute kidney injury, and multiorgan failure, ultimately progressing to brain death. Conclusion: This case highlights the diagnostic challenge of pellagra in modern clinical practice, particularly in patients with overlapping risk factors and atypical presentations. Delayed recognition and systemic complications may lead to irreversible morbidity and mortality. Early consideration of secondary pellagra and prompt niacin replacement are essential in at-risk populations.

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**Distinct Clinical Profiles of Barrett's Esophagus, Esophageal Adenocarcinoma, and Squamous Cell Carcinoma: A 15 Year Analysis in a Predominantly African American Cohort**

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Background: Esophageal cancer (EC), primarily squamous cell carcinoma (SCC) and adenocarcinoma (AC), remains associated with poor prognosis and distinct etiologic pathways. Barrett's esophagus (BE) is the premalignant precursor to AC. Aim: We compared demographic, clinical, and pathological characteristics among BE, SCC, and AC patients to identify risk factors, metastatic patterns, and spatial associations with socioeconomic variables. Methods: A retrospective review of 72 patients (2010-2024) assessed demographics, comorbidities, exposures, indications, and metastases. Comparisons among BE, SCC, and AC groups were performed using Chi-squared and Fisher's exact tests. Geographic mapping by District of Columbia ward integrated socioeconomic indicators, including median income and Food Insecurity Index (FII). Results: Of 72 patients, 31 (43.1%) had BE, 32 (44.4%) SCC, and 9 (12.5%) AC; 77% were African American, 61–78% male, and 93.1% over 50 years. SCC occurred almost exclusively in African Americans (96.9%), as did most BE cases (67.7%), while AC was more evenly distributed. Smoking and alcohol exposure were highest in SCC (43.8%) and AC (44.4%) and lowest in BE. GERD and hypertension were the most prevalent comorbidities. Diagnostic indications differed significantly; dysphagia predominated in SCC (75%) and AC (55.6%), while BE presented with abdominal pain (38.7%) and hiatal hernia (64.5%). Spatial mapping showed SCC clustering in lower-income wards (Ward 8, FII 96.8), whereas AC clustered in higher-income wards (Ward 5, FII 47.4), similar to BE (Wards 2–5). Conclusion: BE, SCC, and AC demonstrate distinct epidemiologic, clinical, and spatial patterns, highlighting socioeconomic disparities and supporting targeted screening strategies in underserved D.C. communities.

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**Independent and Interactive Effects of Race and Insurance on Preterm Birth Risk**

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Objective: To assess racial and ethnic disparities in preterm delivery in the United States and evaluate whether insurance type modifies these associations. Methods: We conducted a retrospective cross-sectional study using National Center for Health Statistics Vital Statistics natality data from 2018–2024, comprising 25,745,646 live births. Preterm delivery was defined as birth before 37 completed weeks of gestation. Multivariable logistic regression models with robust variance were used to estimate adjusted predicted probabilities and risk differences for preterm delivery across race/ethnicity and insurance categories, adjusting for maternal sociodemographic characteristics, pre-existing medical conditions, obstetric history, and year of birth. Results: Overall, 2,647,310 births (10.3%) were preterm during the study period. Annual preterm incidence remained relatively stable, ranging from 10.0% to 10.5% across years. Non-Hispanic Black, American Indian or Alaska Native, and Native Hawaiian or Other Pacific Islander women consistently experienced the highest risks of preterm delivery across all insurance categories. Insurance coverage attenuated but did not eliminate racial and ethnic disparities, with the largest absolute risk differences observed among uninsured women. Conclusion: Racial and ethnic disparities in preterm delivery persist in the United States despite insurance coverage, underscoring the need for policies that address both healthcare access and structural determinants of maternal health

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**Sickle Cell Disease and Its Dental Implications**

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Sickle cell disease (SCD) is a group of inherited hemoglobinopathies characterized by hemoglobin S polymerization, vaso-occlusion, and hemolysis-mediated endothelial dysfunction, resulting in multisystem morbidity and reduced life expectancy. Affecting approximately 100,000 individuals in the United States and disproportionately impacting individuals of African and Hispanic descent, SCD is associated with significant systemic complications, including stroke, acute chest syndrome, pulmonary hypertension, renal dysfunction, and chronic anemia. Advances in management—such as hydroxyurea therapy, monoclonal antibodies, gene therapies, transfusion protocols, and hematopoietic stem cell transplantation—have improved survival; however, patients remain medically complex and vulnerable to acute crises triggered by infection, hypoxia, dehydration, and stress. Oral health professionals play a critical role in the interdisciplinary management of patients with SCD. Common oral manifestations include mucosal pallor, papillary atrophy of the tongue, delayed tooth eruption, enamel and dentin mineralization defects, pulpal necrosis of clinically intact teeth, mandibular osteomyelitis, neuropathies such as numb chin syndrome, and malocclusion related to marrow hyperplasia. Dental infections and untreated inflammation may precipitate vaso-occlusive crises, underscoring the importance of preventive care and routine six-month screenings. Dental management considerations include stress reduction protocols, profound local anesthesia, cautious use of sedation, avoidance of hypoxia, careful pain management, and close monitoring for infection and bone complications. Emphasis on prevention, early detection,

and collaboration with medical providers is essential. By recognizing systemic and oral implications of SCD, dental professionals can enhance patient safety, improve quality of life, and contribute meaningfully to comprehensive care.

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**Discordance between Food Allergy Diagnostics Tests**

Presenter's Name: Zara Campbell
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*Presentation Type: Oral Presentation*
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Accurate diagnoses for food allergy (FA) are essential to reduce unnecessary dietary restrictions, prevent life-threatening exposures, and improve patient quality of life. However, current diagnostic tests, skin prick testing (SPT) and serum specific immunoglobulin E (IgE), have high rates of false positives, and their relevant predictive value when discordant is unclear. A single-center observational study was performed at the University of Chicago, where patients underwent one or more oral food challenges (OFCs). Chart review identified the most recent SPT and IgE results for the challenged allergens. Results were deemed positive if SPT >3mm, IgE >0.35 kU/L, and by clinician discretion for OFC outcome. Agreement between results was assessed using Cohen's kappa coefficient (K). Confidence intervals (CI), medians, and interquartile ranges (IQR) are reported. 110 OFCs were performed with 92 patients (range=4-35 years). 92 IgE results, 84 SPT results, and 65 SPT-IgE pairs were identified. SPT-IgE pair agreement was moderate (67.7%, K=0.30 [95% CI=0.07-0.54]), and matched outcomes in 61.4% of OFCs. Both OFC-IgE pair and OFC-SPT pair agreements were low, K=0.11 [95% CI=-0.14-0.35]) and K=0.18 [95% CI=-0.06-0.41]) respectively. IgE levels were significantly higher in patients who required medication during the OFC compared to patients who tolerated the OFC, p=0.004. SPT wheal and flare sizes showed a weaker association (p=0.26 and p=0.42, respectively). These findings suggest OFC outcomes are best predicted when SPT and IgE results agree. Improved methods for interpretation of diagnostic testing could reduce false diagnoses and test discordance, minimize unnecessary restrictions, and enhance patient clinical care.

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**A Propensity-Matched TriNetX Cohort of Dual Pathway Inhibition Compared to Aspirin Alone Following Lower-Extremity Revascularization**

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Background: The practice of adding an oral anticoagulant to aspirin following lower-extremity arterial revascularization is currently done inconsistently. We evaluated whether adding an oral anticoagulant to aspirin results in decreased 1-year major amputation risk compared to aspirin alone in the real-world setting. Methods: A propensity-matched retrospective cohort study identified adults (≥18 years) with PAD undergoing lower-extremity arterial revascularization. Patients receiving aspirin plus an oral anticoagulant (apixaban, edoxaban, rivaroxaban, or dabigatran) were compared to patients receiving aspirin alone. Those receiving dual antiplatelet therapy were excluded. The primary outcome was major lower-extremity amputation within 1 year of revascularization. Results: Prior to matching, cohorts included 4,611 patients receiving dual pathway therapy (i.e., ASA + anticoagulation) and 12,903 receiving aspirin alone. Following propensity-score matching, 4,426 dual pathway and 4,506 aspirin-only patients were included in the study. Major amputation occurred in 317 patients in each cohort (7.2% vs 7.0%; risk difference 0.1%, 95% CI −0.9% to 1.2%; risk ratio 1.018, 95% CI 0.876–1.183; p=0.815). Kaplan–Meier analysis was concordant (log-rank p=0.624; hazard ratio 1.040, 95% CI 0.890–1.215). Conclusions: In this analysis of patients undergoing lower-extremity revascularization, dual pathway therapy was not associated with a lower 1-year risk of major amputation compared with aspirin monotherapy.

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**Equity in Action: Advancing Pediatric Health Through Community-Centered Interventions**

Presenter's Name: Makayla Carroll
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Health disparities in pediatric care disproportionately affect marginalized and underserved communities in the United States, particularly within urban settings shaped by structural inequities and adverse social determinants of health. In Philadelphia and other metropolitan cities, where historic redlining, concentrated poverty, and chronic disease burden persist, pediatric patients from racial and ethnic minority backgrounds experience higher rates of hospitalization, delayed care, and increased caregiver stress. Addressing these disparities requires approaches that extend beyond traditional clinical settings and incorporate community-centered, equity-focused models of care. To examine the role of such models in advancing pediatric health equity, this study evaluates a series of initiatives implemented through the Center for Health Equity at the Children's Hospital of Philadelphia. Using a program evaluation framework, this research analyzes outcomes from community-based and clinical interventions, including the Community Asthma Prevention Program Plus (CAPP+), resource navigation follow-up for families screening positive for social needs, expansion and assessment of race and ethnicity (REaL) data accuracy, community outreach events through the Community Health Partnership Collaborative, and clinical engagement. Quantitative outcomes include emergency department utilization, inpatient hospitalizations, and demographic data concordance, while qualitative measures assess caregiver stress, quality of life, and engagement with follow-up care. Findings suggest that equity-driven, community-centered interventions are associated with reduced hospital

utilization, improved caregiver-reported well-being, and strengthened trust between healthcare systems and underserved communities. This highlights the importance of embedding equity into pediatric healthcare through inclusive data practices, community engagement, and integrated support services that address health across the hospital, home, and community continuum.

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**Psychological Sequelae of Ketamine in Pediatric Patients: Elevated PTSD Risk Without Increased Depression**

Presenter's Name: Nicole Chapman
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Introduction:Ketamine is widely used for pediatric procedural sedation, but its long-term psychological effects remain unclear. This study examines the incidence of post-traumatic stress disorder (PTSD) and depression in children receiving ketamine versus other anesthetics for fracture management. Methods:A retrospective cohort study was conducted on 677,189 children aged 6–18 who received ketamine or another anesthetic. After 1:1 propensity score matching, the final cohort included 15,250 cases and 15,250 controls for PTSD and depression analyses. PTSD and depression incidence were assessed at 1 week, 1 month, 6 months, and 1 year post-exposure using survival analysis and risk estimation. Results: Children in the ketamine group had a significantly higher risk of PTSD at 1 month (RR = 2.4, p = 0.016), 6 months (RR = 1.89, p = 0.026), and 1 year (RR = 1.70, p = 0.026). Kaplan-Meier analysis confirmed a lower probability of PTSD-free survival in the ketamine group. No significant difference in depression risk was observed at any time point (p > 0.05). Conclusion: Ketamine exposure in children was associated with increased PTSD risk up to 1 year post-exposure, while no impact on depression was observed. These findings highlight the importance of long-term psychological monitoring following ketamine administration. Further research is needed to explore underlying mechanisms and potential mitigation strategies.

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**Incidence of vitiligo after SARS-COV2 mRNA vaccination in autoimmune prone populations**

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Vitiligo is a T cell–mediated autoimmune disorder often associated with other autoimmune diseases. mRNA SARS-CoV-2 vaccines induce Th1-skewed immune responses implicated in vitiligo pathogenesis. Although case reports describe new-onset vitiligo following vaccination, incidence and relative risk remain unknown. Using the TriNetX Global Collaborative Network, adults with at least one diagnosis of type 1 diabetes mellitus, autoimmune thyroiditis, primary adrenal insufficiency, rheumatoid arthritis with rheumatoid factor, or alopecia areata were identified. Cohort 1 included patients who received an mRNA SARS-CoV-2 vaccine. Cohort 2 included patients without documented mRNA SARS-CoV-2 vaccination. Outcomes included incident vitiligo. After 1:1 propensity score matching, 223,240 patients remained in each cohort. Incident vitiligo occurred in 530 vaccinated patients (0.24%) and 250 unvaccinated patients (0.11%). The absolute risk difference was 0.1% (95% CI, 0.1–0.1; p<0.001). The risk ratio was 2.12 (95% CI, 1.82–2.46), and the odds ratio was 2.12 (95% CI, 1.83–2.47). Kaplan–Meier analysis demonstrated a significantly higher cumulative incidence of vitiligo in the vaccinated cohort with a hazard ratio of 3.13 (95% CI, 2.63–3.73). Among patients who developed vitiligo, the mean number of diagnostic instances did not differ significantly between cohorts (3.24 vs. 4.02; p=0.282). mRNA SARS-CoV-2 vaccination was associated with a statistically significant increase in risk of incident vitiligo among individuals with autoimmune conditions; however, the overall event rate remained low (<0.3%). Further mechanistic and prospective studies are warranted.

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**SAFFRON AS AN ADJUVANT THERAPY IMPROVES ULCERATIVE COLITIS: A MULTICENTER CLINICAL TRIAL ASSESSING INFLAMMATORY AND CLINICAL OUTCOMES**

Presenter's Name: Lakshmi Chirumamilla
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Background: Inflammatory polyps in patients with Inflammatory Bowel Disease (IBD) pose a significant risk for colorectal cancer (CRC). Dietary interventions targeting anti-tumor immunity are crucial in mitigating this risk. Methods: We retrospectively analyzed 485 colitis patients (70 IBD, 415 NIC) from Howard University Hospital and conducted a prospective multicenter trial of saffron in 63 patients. Primary endpoints included fecal calprotectin, CRP, disease activity (PMS, SCCAI), quality of life, and HDRS. In a subset of six patients, serum cytokines and stool microbiome were analyzed, with repeat treatment after a washout period. Results: Patients with inflammatory bowel disease (IBD) were found to have a 15.7% prevalence of polyps compared to 8.2% in Non-inflammatory colitis patients. Among 26 patients taking 50mg saffron at two sites, calprotectin levels improved (P=0.03). Among the enrolled 37 patients at site 1, in addition to improvement in mean calprotectin levels (318 to 187, P=0.007), improvements were observed in those taking 50 mg saffron for CRP (4.1 to 2.8, P=0.001) and in PMS (2.0 to 1.1, P=0.05) and SCCAI (2.6 to 1.56, P=0.03). Among 6 patients at site 3, 50mg saffron reduced CRP and calprotectin levels and improved PMS, SCCAI, and HDRS scores that reverted during the washout period and restored with second treatment. Pro-inflammatory cytokines decreased, while anti-inflammatory cytokines increased in response to treatment. Microbiome analysis revealed reduction in gamma Proteobacteria and enrichment in Ruminococcaceae. Conclusion: Saffron reduces inflammation markers and disease activity in mild-moderate UC patients,

and may reduce the risk of developing inflammatory polyps and hence CRC. (NCT04749576)

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**Hidradenitis Suppurativa: The Male Perspective**

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Hidradenitis suppurativa(HS)is a chronic inflammatory skin condition that causes painful nodules, and hinders patients' quality of life. While HS affects both sexes, it is often underdiagnosed in men. Compared to females, males with HS more frequently exhibit metabolic abnormalities, such as reduced HDL-cholesterol and elevated blood glucose. Males with HS are also less likely to report musculoskeletal symptoms. Although both sexes have increased risk for metabolic syndrome and cardiovascular disease, the specific comorbidity burden may differ by sex and race.Both sexes experience substantial quality-of-life impairment. Depression, anxiety, and suicidality are increased in both sexes, with some evidence suggesting higher rates in women. Furthermore, qualitative studies highlight that women are more likely to self-report experiencing feelings of shame and social withdrawal. In contrast, men more frequently report feeling less burdened by the disease, despite typically presenting with a more severe phenotype. Cultural norms often discourage men from discussing chronic pain, disfigurement, or emotional distress, particularly when linked to intimate body areas. As this stigmatization becomes internalized, it becomes associated with feelings of shame, embarrassment, and fear of negative social judgment. Many men with HS remain reluctant to seek medical evaluation, underscoring the need for greater awareness and targeted education among both patients and clinicians. Recent studies have shown that social media can aid in the early diagnosis of HS. Men with HS exhibit distinct comorbidity patterns, such as more frequent dyslipidemia.

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**Mother-Infant Separation Due to Incarceration: Implications for Attachment, Mental Health, and Intergenerational Trauma**

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In the United States, an estimated 55,000 to 60,000 pregnant individuals are admitted to prisons and jails annually, with approximately 1,000 to 1,300 births occurring during incarceration (American College of Obstetrics and Gynecologists [AGOC], 2021; Sufrin et al., 2019). Maternal incarceration disproportionately affects Black and socioeconomically marginalized women, who are incarcerated at significantly higher rates than their White counterparts. Mother-infant separation resulting from incarceration constitutes a form of structural trauma, with profound implications for attachment formation, maternal mental health, and long-term population health outcomes. Early infancy represents a critical developmental window during which secure attachment supports emotional regulation, stress resilience, and neurodevelopment. Forced separation during this sensitive period disrupts bonding and compounds psychological stressors already prevalent among incarcerated mothers, including postpartum depression, anxiety, and trauma-related disorders. Emerging evidence suggests these disruptions extend beyond the immediate dyad, contributing to intergenerational patterns of psychological distress, behavioral challenges, and elevated risk of justice system involvement among affected children.

Despite increased attention to trauma-informed care, correctional policies frequently fail to integrate attachment-preserving or family-centered frameworks, revealing a persistent gap between evidence and practice. This literature review synthesizes interdisciplinary research from maternal-child health, trauma theory, correctional health care, and public health. Databases searched include PubMed, MEDLINE, CINAHL, and Google Scholar, with inclusion limited to peer-reviewed articles published in the United States. Reframing mother-infant separation as a modifiable public health issue may inform policy reform, improve maternal mental health, and mitigate cycles of intergenerational trauma and health inequity.

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**Cultural and Anatomical Influences on Surgical Technique and Outcomes in Asian versus Caucasian Blepharoplasty**

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Blepharoplasty is one of the most frequently performed aesthetic procedures worldwide and represents the most common plastic surgery procedure in East Asia. However, limited literature directly compares surgical techniques, patient motivations, and postoperative outcomes between Asian and Caucasian populations. This distinction is important given anatomic differences and sociocultural influences that shape aesthetic preferences, procedural selection, and complication profiles. A literature review was conducted to compare motivation, sociocultural aesthetic preferences, and postoperative satisfaction in Asian versus Caucasian blepharoplasty patients and to examine their association with surgical approach and complication patterns. Asian upper blepharoplasty most commonly involves incisional or suture-based supratarsal crease formation with conservative, tissue-specific skin excision. Patients are typically younger and primarily motivated by aesthetic goals and cultural normalization, often with strong social support (81%). Reported satisfaction rates range from 89–98%, with FACE-Q eye appearance scores averaging 81.7–82. Complications—including asymmetry, suboptimal crease height, and crease regression—are reduced when preoperative anatomical classification and individualized planning are employed. In contrast, Caucasian blepharoplasty more commonly involves older patients seeking correction of functional impairment,

such as visual field obstruction. Standard approaches emphasize skin excision with conservative fat management; combined skin–muscle excision increases lagophthalmos risk. Preoperative expectations significantly influence satisfaction in both groups. Treatment satisfaction correlates strongly with appearance satisfaction, and higher perceived age discrepancy predicts greater postoperative satisfaction.
Although complication rates are low overall, dissatisfaction patterns differ. Ethnically informed, anatomy-driven surgical planning and expectation alignment are critical to optimizing outcomes and minimizing revision surgery.

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**IMPACT OF LIMITED ENGLISH PROFICIENCY ON GLP-1 USE IN U.S. ADULTS WITH DIABETES AND OBESITY**

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Background: Glucagon-like peptide-1 (GLP-1) receptor agonists are recommended treatments for type-2 diabetes and obesity, yet their use remains uneven. Limited English proficiency (LEP) may represent a structural barrier to equitable access to these high-cost, clinically impactful medications. Objective: To evaluate the association between LEP and receipt of GLP-1 receptor agonists among U.S. adults with diabetes and obesity. Methods: We conducted a cross-sectional analysis of nationally representative Medical Expenditure Panel Survey (MEPS) data among adults with diabetes and obesity. LEP was defined using MEPS language variables, and the outcome GLP-1 receptor agonist receipt was identified from prescription files. Survey-weighted regression with estimated prevalence ratios (PRs) and 95% confidence intervals (CIs), adjusting for sociodemographic characteristics and insurance status. Results: Overall, 20.5% of English-proficient individuals reported using GLP-1 agonists compared with 12.1% of those who were not English-proficient (p=0.003). English-proficient adults had higher GLP-1 use than those with LEP in unadjusted (PR=1.69; 95% CI, 1.12-2.56; p=0.014) and adjusted analyses (PR=1.86; 95% CI, 1.14-3.03; p=0.013). Older age and lack of insurance were independently associated with lower GLP-1 use (adjusted PR=0.62, 95% CI, 0.49-0.77, p=<0.001; and PR=0.32, 95% CI, 0.14-0.71, p=0.005, respectively). No significant associations were observed for sex, race/ethnicity, marital status, education, or poverty level. Conclusions: Limited English proficiency was independently associated with lower GLP-1 receptor agonist use among adults with diabetes and obesity, even after accounting for sociodemographic and insurance factors. These findings suggest language barriers may contribute to inequitable access to current diabetes therapies and warrant targeted equity focused interventions.

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**Cardiovascular Disease as a Risk Amplifier of COVID-19 Severity and a Potential Contributor to Long-Term Gastrointestinal Sequelae**

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Background: Cardiovascular disease (CVD) is a significant comorbidity influencing COVID-19 outcome. This study assesses its impact on hospitalized COVID-19 patients Howard University Hospital.Methods: A retrospective analysis was performed on a cohort of 1,580 hospitalized predominantly African American (AA) COVID-19 patients and were classified as CVD (n=428, 27%) and non-CVD (n=1,152, 73%) and further stratified by race to assess demographic, clinical, and laboratory differences. Results: CVD patients exhibited higher rates of hypertension (86% vs. 49%), diabetes (47% vs. 25%), and acute kidney injury (37%vs. 21%) compared to non-CVD patients ($p < 0.01$). ICU transfers (24% vs. 16%) and mortality (21% vs. 10%) were also statistically significant. CVD patients showed higher troponin, pro-BNP, and inflammatory markers, but lower substance use (13% vs. 23%). The study also highlights racial disparities in CVD outcomes. African Americans and Hispanics with CVD had higher ICU transfers (23% and 38%, $p<0.05$), whereas mortality was significant in AA but not in other races. Elevated sodium, potassium, creatinine, and cardiac biomarkers were significantly more common in AA and Whites with CVD had higher nursing home residency (15% and 27%, $p<0.05$). Race-based GI comparisons showed few significant differences. AA with CVD had borderline higher GI symptoms (59% vs. 53%, p=0.07) and elevated ALT peaks (61% vs. 25%, $p<0.05$). Whites showed higher ALP peaks (21% vs. 4%, $p<0.05$) with no significant changes in Hispanics. Conclusion: CVD substantially worsens COVID-19 outcomes, with AAs disproportionately affected. These results highlight the need for targeted race-specific strategies to improve management of COVID-19 in patients with cardiovascular comorbidities.

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**Spatial characterization of tumor-immune interactions in pMMR/dMMR African American colorectal cancer using attention-based modeling**

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Background: Colorectal cancer (CRC) disproportionately affects African American individuals, with 20% higher incidence and 40% higher mortality compared to non-Hispanic Whites. Tumor-immune interactions within the tumor microenvironment (TME) play a critical role in disease progression and treatment response, particularly across molecular subtypes such as MSI and MSS. Single-cell studies show that MSI tumors exhibit stronger anti-tumor immunity than MSS tumors, highlighting the need for spatially resolved analyses to better understand immune-tumor interaction networks. Aim: To investigate the spatial cellular organization of MSI and MSS tumors in African American patients using advanced computational and machine learning approaches to profile immunomarkers. Methods: We utilized 10x Genomics Xenium (5K panel) single-cell spatial transcriptomics to profile four CRC samples (2 MSI, 2 MSS) from African American patients. Advanced computational and machine learning approaches were applied for data preprocessing, artifact correction, and cell-type annotation using curated gene-marker sets to characterize spatial tumor-immune organization. Results: MSI tumors showed higher immune infiltration, enriched $CD8^+$ T-cell cytotoxicity (CXCL13, GZMA/B/K), and pro-inflammatory myeloid support (CXCL10), consistent with an immune-hot, therapy-responsive phenotype. In contrast, MSS tumors were stromal-rich, metabolically adapted (TGFB1, FAP, COL1A1, LDHA, SLC2A1), and immune-cold with limited T-cell infiltration. Using AMICI, we identified key spatial cell-cell interaction networks and gene-level signatures shaping tumor-immune communication in CRC. Conclusion: This study establishes an integrative spatial and computational framework to dissect MSI-MSS differences in CRC among African American patients. Future work will leverage AMICI to further define neighborhood-driven phenotypes and refine cell-cell communication networks in CRC.

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**Clinical Demographics of Food Allergic Patients at the Howard University Outpatient Clinical Practice**

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Background: Food allergy is an important allergic condition, impacting 33 million people in the US population. There is a high prevalence of food allergies in minoritized patients. Because Howard University College of Medicine serves a minoritized population, the aim of this study is to describe the demographic characteristics of patients at Howard University in the outpatient clinics with a diagnosis of food allergy. Methods: The outpatient electronic medical record (Altera Digital Health) at Howard University was queried for food allergy diagnosis codes, (ICD-9 codes - 995.60, 995.61, 995.7, 693.1, V15.01, V15.02, V15.03, V15.05, 995.0, 995.3, 477.1, and ICD-10 codes, Z91.01, Z91.010, Z91.011, Z91.012, Z91.013, Z91.018, K52.2, T78.1, J30.5, L27.2), date of birth, age, sex, race were characterized for each patient. Results: A total of 569 patients were identified, with ages ranging from 1 to 91 years and a mean and median age of 36 and 35 years, respectively, indicating that the population was predominantly composed of young to middle-aged individuals. The majority of patients were female, accounting for 70% of the cohort, suggesting a higher representation or burden of disease. Race data were largely unavailable, with only 2.8% of patients reporting their race, limiting the ability to assess racial distribution or identify potential disparities within the study population. Conclusions: Overall, the findings demonstrate a predominantly female cohort with a broad age range, but highlight significant gaps in demographic reporting, particularly regarding race, which may impact the generalizability and interpretation of subgroup analyses.

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**Urinary levels of complement membrane attack complex inhibitory protein CD59 correlate with hemoglobinuria, endothelial injury, and stages of sickle cell disease-associated chronic kidney disease**

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In sickle cell disease (SCD), ischemia-reperfusion and heme release from hemoglobin during hemolysis can activate the lectin pathway (LP) and the alternative pathway (AP) of complement, respectively. Increased C3 activation fragments and C5b-9 deposition have been observed in the kidneys of the Townes SCD mouse model.Our previous global urine proteomics analysis indicated 8.4-fold increase in urinary CD59 levels ($p=2.51\times10\text{-}8$) in SCD patients with hemoglobinuria but without renal disease. CD59, a membrane attack complex (MAC)-inhibitory protein, protects human cells from damage during complement activation. We hypothesize that urinary CD59 levels correlate with the progression of CKD and that CD59 detection could improve early identification and staging of SCD CKD.We evaluated urine samples from the University of Illinois at Chicago cohort (UIC, n = 36) collected during clinic visits while patients were in a steady state. Urine samples were assayed for CD59, VCAM, and hemoglobin (Hgb) using ELISA (R&D Systems) and normalized to urinary creatinine (uCr).Stages of CKD were determined using the criteria of the NKF. Pearson correlation and receiver operating characteristic (ROC) analysis were performed using GraphPad Prism 10.In SCD patients without renal disease, uCD59/uCr levels were similar to the levels obtained in the control non-SCD participants (447.24±208.49 ng/mg in control vs. 395.04±183.53 ng/mg in SCD, p=0.6612).Thus, the uCD59 levels may be used for the detection of early-stage CKD and differentiation of early and late stages of CKD.

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**Development of a Novel Neratinib and Docetaxel Core-Loaded and Trastuzumab Surface-Conjugated Nanoparticle for Treatment of HER-2 Positive Breast Cancer**

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This study developed a targeted drug delivery nanoplatform for treating HER2-positive breast cancer. The nanoplatform encapsulated two hydrophobic anticancer agents, neratinib (NTB) and docetaxel (DTX), within nanoparticles (DTX-NTB-NP) functionalized by conjugation to trastuzumab (TRZ) to form trastuzumab-tagged nanoparticles (TRZ-NP). TRZ is a HER2-specific monoclonal antibody that binds to HER2 receptors, blocking signal transduction and inducing antibody-dependent cellular cytotoxicity (ADCC). Upon receptor-mediated endocytosis, neratinib inhibits cytosolic HER2 signaling, while docetaxel disrupts mitotic cell division, collectively leading to tumor cell death. The nanoparticles were fabricated by the nanoprecipitation technique, followed by surface modification with targeting moiety. The TRZ-tagged nanoparticles (TRZ-NP) were characterized and their effects evaluated in HER2-positive cancer cell line and xenograft model. In vitro antiproliferation assay in SKBR-3 cell line reveals a dose and time-dependent cytotoxicity. There was no significant difference in cytotoxicity observed between DTX-NTB-NP and its free form (DTX)/NTB) [$p = 0.9172$], and between TRZ-NP and its free form (TRZ/DTX/NTB) [$p = 0.6750$]. However, TRZ-NP, at half the concentration of the singly loaded nanoparticles, significantly reduced the viability of SKBR-3 cells compared to pure trastuzumab (TRZ) [$p < 0.001$], NTB-NP [$p = 0.0019$], and DTX-NP [$p = 0.0002$]. In vivo evaluation in female athymic nude mice showed significant relative tumor volume reduction in groups treated with TRZ-NP and DTX-NTB-NP compared to PBS controls ($p <= 0.001$ and $p <= 0.001$), respectively. This study is the first to synchronize the delivery of multiple agents-docetaxel, neratinib, and trastuzumab-within a nanoparticle system for treating HER2-positive cancer.

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**Early Compression Ultrasound for Suspected Cellulitis: A Practical Strategy to Reduce Delayed DVT Diagnosis (Case Series)**

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Lower extremity cellulitis and deep venous thrombosis (DVT) frequently present with overlapping clinical features including erythema, warmth, edema, and tenderness, creating risk for diagnostic anchoring on infection. Delayed recognition of DVT increases the risk of pulmonary embolism and post-thrombotic complications. We describe three medically complex adults initially managed for presumed cellulitis who were subsequently diagnosed with acute lower extremity DVT, highlighting the importance of early venous imaging in reducing diagnostic delay. All three patients presented with unilateral lower extremity erythema, warmth, and swelling. Two were started on empiric antibiotics prior to venous imaging. Each patient possessed significant thrombotic risk factors, including prior DVT, immobility, stroke, chronic kidney disease, or prolonged hospitalization. Two patients had a Wells score ≥3, indicating at least moderate pretest probability for DVT. Duplex ultrasonography ultimately revealed extensive femoral–popliteal thrombosis in all cases, and one patient was found to have incidentally identified pulmonary emboli. Anticoagulation was initiated promptly following diagnosis, and no patient demonstrated clear evidence of abscess or necrotizing infection. These cases illustrate how clinical overlap and anchoring bias may delay recognition of venous thromboembolism in patients with presumed cellulitis. Early compression ultrasonography, including point-of-care ultrasound (POCUS) when available, may improve diagnostic accuracy, particularly in patients with moderate Well's score or identifiable thrombotic risk factors. Incorporating structured DVT risk assessment and POCUS evaluation into the evaluation of suspected cellulitis represents a practical strategy to enhance patient safety and reduce preventable thromboembolic or post-thrombotic complications.

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**Racial and Ethnic Differences in Cesarean Delivery Across Insurance Types, United States, 2014–2024**

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Introduction: Cesarean delivery accounts for nearly one-third of U.S. births and is associated with increased maternal morbidity and health care costs. Although racial and ethnic disparities in cesarean delivery are well documented, the role of structural factors, particularly insurance coverage, in shaping these disparities remains incompletely understood. Study Design: Population-based retrospective cohort study. Methods: We analyzed singleton live births recorded in the United States Vital Statistics Natality files from 2014 to 2024. Multivariable logistic regression models were used to estimate the independent associations of race/ethnicity and insurance coverage with cesarean delivery, as well as their interaction. Models adjusted for maternal demographics, clinical characteristics, and temporal factors. Adjusted odds ratios (ORs), predicted probabilities, and absolute risk differences were derived using post-estimation marginal effects. Results: Among 41,543,568 deliveries during the study period, 13,312,221 (32.0%) were cesarean deliveries. After adjustment, both race/ethnicity and insurance status were independently associated with cesarean delivery. Compared with non-Hispanic White women, non-Hispanic Black women had higher odds of cesarean delivery (OR, 1.22; 95% CI, 1.22–1.23). Relative to uninsured women, those with private insurance had substantially higher odds of cesarean delivery (OR, 1.59; 95% CI, 1.58–1.60). Significant interaction effects were observed, indicating that insurance coverage modified

racial and ethnic differences in cesarean delivery rates. Non-Hispanic Black women consistently had the highest predicted probabilities across all insurance categories, with the largest absolute disparities observed among uninsured women. Conclusion: Racial and ethnic disparities in cesarean delivery persist in the United States and are modified by insurance coverage, suggesting that insurance-related structural factors may contribute to inequities in obstetric care.

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**Impact of Medicaid Expansion on Five-Year Mortality Among Patients with Melanoma in the United States**

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Background: Medicaid expansion under the Affordable Care Act (ACA) aimed to reduce disparities in cancer care, yet its effect on long-term melanoma outcomes remains underexplored. Methods: We used the National Cancer Database (2006–2021) to identify adults aged 40–64 years with a primary diagnosis of melanoma. A difference-in-differences framework compared 5-year overall mortality between states that adopted Medicaid expansion on or before January 2014 and non-expansion states which are yet to implement the policy. Models adjusted for demographic, clinical, and socioeconomic covariates. Subgroup analyses examined racial and ethnic differences. Results: Among 288,494 adults with melanoma (mean [SD] age, 54.5 [6.8] years), 171,805 (59.6%) lived in expansion states and 116,689 (40.5%) in non-expansion states. After the ACA, uninsurance fell by 55% in expansion states (2.9%→1.3%) vs 20% in non-expansion states (5.6%→4.5%); Medicaid coverage rose by 136% in expansion states (3.1%→7.3%) vs 22% in non-expansion states (2.7%→3.3%). Medicaid expansion was associated with a 1.1–percentage-point absolute reduction in 5-year mortality—≈1,900 fewer deaths among patients in expansion states (95% CI range, ~1,030–2,405). Effects differed by race/ethnicity (heterogeneity $\chi^2$=56.1; P<.001): Hispanic patients saw the largest gains (−7.0 percentage points; 95% CI, −9.1 to −4.8), followed by non-Hispanic other (−4.1; 95% CI, −8.0 to −0.3), with smaller reductions among non-Hispanic White (−0.8; 95% CI, −1.2 to −0.3) and no significant change among non-Hispanic Black patients (−0.5; 95% CI, −6.2 to 5.2). Conclusions: Medicaid expansion was associated with a significant reduction in melanoma mortality, though survival gains were uneven across racial groups, highlighting the need for equity-focused policy intervention.

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**Perceived Interpersonal Safety and Adverse Cardiovascular Health Indicators Among Reproductive-Aged Women: Findings from the SAFE HEART Study**

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Background: Chronic exposure to unsafe environments, including interpersonal violence and emotional abuse, may increase cardiovascular disease (CVD) risk. This study examined the association between perceived interpersonal safety and Life's Essential 8 (LE8) cardiovascular health indicators among reproductive-aged women. Methods: A cross-sectional analysis was conducted among 430 women aged 18–50. Perceived interpersonal safety was measured using a 4-item scale assessing physical harm, threats, insults, and verbal aggression; scores ≥11 indicated high safety concern. LE8 indicators were self-reported and defined by diet, physical activity, nicotine exposure, sleep, body mass index (BMI), blood lipids, blood glucose, and blood pressure. Multivariable logistic regression estimated odds of adverse LE8 outcomes. Model 1 was unadjusted, and Model 2 adjusted for CVH risk factors (BMI, low physical activity, poor sleep, and low fruit/vegetable intake) sociodemographic characteristics (age, race/ethnicity, education, income, insurance, marital status, and employment). Results: Among participants (mean age = 30.7 ± 6.8 years), 19% reported high interpersonal safety concern. These women were disproportionately Non-Hispanic Black or Hispanic, unmarried, uninsured, and low-income (all p<0.01). In Model 1, high safety concern was associated with greater odds of hypertension (OR=6.43), high cholesterol (OR=10.28), diabetes (OR=6.91), and smoking (OR=9.9) (all p<0.05). These associations remained significant in Model 2, with an additional association for high BMI (OR=2.29). Associations with poor diet and sleep were elevated but not statistically significant. Conclusion: High perceived interpersonal safety concern was independently associated with multiple adverse LE8 indicators, underscoring the cardiovascular consequences of chronic interpersonal stress and the need for trauma-informed, equity-centered prevention strategies.

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**Impact of the globalization of clinical trials on conditions commonly seen in skin of color**

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Clinical trials are essential to drug development and FDA approval in the United States. However, rising costs, extended timelines, and strict regulations has led to a rise in the globalization of clinical research. As sponsors conduct more studies internationally, ethical concerns emerge regarding whether findings are generalizable to populations with

skin of color (SOC) in the United States.We analyzed interventional trials conducted between January 2017 and December 2023 for five dermatologic conditions commonly seen in SOC populations: vitiligo (n=77), atopic dermatitis (n=598), seborrheic dermatitis (n=16), melasma (n=40), and keloids (n=34). Heat maps were created to visualize the global distribution of these studies. Approximately half of the trials were conducted in the United States, while the remainder occurred Europe and some Asian countries to a lesser extent. The United States leads in keloid research, whereas melasma trials are concentrated largely in East Asian countries. Notably, fewer than 35 trials across all five conditions took place in Africa, despite its high dermatologic disease burden and wide diversity of skin types. These findings highlight disparities in global research distribution and raise concerns about the applicability of international data to SOC populations in the U.S. As clinical research continues to globalize, intentional efforts to prioritize inclusive recruitment and geographically representative study design are necessary to ensure equitable advancements in dermatologic care.

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**Glycemic Control and Risk of End-Stage Renal Disease Among Adults With Type 2 Diabetes and Albuminuria**

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Background: Poor glycemic control contributes to chronic kidney disease progression in type 2 diabetes. This study evaluated associations between hemoglobin A1c levels and risks of end-stage renal disease, dialysis initiation, and mortality among adults with type 2 diabetes and albuminuria. Methods: This retrospective cohort study used the TriNetX Global Collaborative Network. Adults with type 2 diabetes and albuminuria without prior end-stage renal disease were identified. Hemoglobin A1c measured within six months of albuminuria diagnosis was categorized as ≤7% or ≥8%; patients with intermediate values were excluded. Propensity score matching balanced demographics, race/ethnicity, baseline CKD stage, comorbidities, tobacco use, and key medications, yielding 158,460 patients per cohort. Outcomes were assessed over two years. Results: End-stage renal disease occurred in 3.1% of patients with A1c ≤7% versus 2.9% with A1c ≥8% (risk ratio 1.09). Dialysis initiation was more frequent in the lower A1c cohort (1.7% vs. 1.5%), and renal survival was lower among patients with A1c ≤7%. Mortality occurred in 4.9% of patients with A1c ≥8% versus 4.6% with A1c ≤7%, with no significant difference in overall survival. Conclusions: Among adults with type 2 diabetes and albuminuria, lower hemoglobin A1c was associated with higher risks of end-stage renal disease and dialysis, while higher A1c was associated with increased mortality. These findings suggest hemoglobin A1c may reflect underlying disease severity rather than kidney protection in established albuminuria.
Keywords: albuminuria; glycemic control; hemoglobin A1c; end-stage renal disease; dialysis

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**Medicaid Expansion and Colorectal Cancer Survival: A Comparison Between California and Texas**

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Background: Colorectal cancer (CRC) remains a major public health concern in the United States, ranking as the third most diagnosed cancer and the second leading cause of cancer-related deaths. The Affordable Care Act's (ACA) Medicaid expansion sought to improve healthcare access by expanding insurance coverage for low-income adults, potentially improving early CRC detection and survival outcomes. However, states like Texas have not implemented Medicaid expansion, raising concerns about disparities in cancer care and outcomes. Objective: This study evaluates the impact of Medicaid expansion on cancer-specific survival (CSS) among individuals with colorectal cancer, comparing California (expansion state) and Texas (non-expansion state). Methods: A retrospective cohort study was conducted using SEER cancer registry data (2007–2021). Patients aged 18-64 years diagnosed with colorectal cancer were included. The study employed a Difference-in-Differences (DID) analysis to compare survival outcomes pre- and post-Medicaid expansion. Cox proportional hazards regression models were used to estimate the association between Medicaid expansion and survival outcomes, adjusting for demographic, socioeconomic, and clinical covariates. Results: The study included 122,543 individuals aged 18–64 diagnosed with colorectal cancer, stratified into pre-ACA (n=59,958, 48.9%) and post-ACA (n=62,585, 51.1%) periods. Following Medicaid expansion, CSS improved in California compared to Texas. In California, Medicaid expansion was associated with an 11.8% reduction in cancer-specific mortality (-0.118; 95% CI: -0.204 to –0.032) with the greatest reduction among Black individuals (-0.157; 95% CI: -0.271 to –0.043). Conclusion: Medicaid expansion in California was associated with improvements in colorectal cancer survival, particularly among racial minorities and patients with advanced-stage disease.

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**Comparing 5-Year Mortality Rates Among Patients Diagnosed with Lung Cancer With and Without Prior Low-Dose Computed Tomography Screening**

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Background: Low-dose computed tomography (LDCT) is recommended for early lung cancer detection in high-risk populations. Although randomized trials show mortality reduction with LDCT, real-world

survival outcomes among patients who ultimately develop lung cancer remain incompletely characterized. Objective: To compare 5-year all-cause mortality among patients diagnosed with lung cancer who underwent LDCT screening prior to diagnosis versus those without prior screening. Methods: We performed a retrospective cohort study using the TriNetX global federated electronic health record network. Adults aged 45–60 years with lung cancer were divided into two groups: those who received LDCT screening prior to diagnosis and those who did not. Propensity score matching balanced age, sex, smoking status, and comorbidities including chronic obstructive pulmonary disease, diabetes, hypertension, cardiovascular disease, alcohol-related disorders, chronic kidney disease, and prior chemotherapy or radiation therapy. The primary outcome was 5-year all-cause mortality following diagnosis. Kaplan–Meier survival analysis and Cox proportional hazards modeling were used to assess outcomes. Results: After matching, 49,827 LDCT-screened patients and 50,430 non-screened patients were included. Five-year mortality was lower in the screened group (5.7%) compared with the non-screened group (7.7%), yielding a risk difference of −2.1% (95% CI, −2.4% to −1.8%; $p < 0.001$). The hazard ratio for death was 0.623 (95% CI, 0.594–0.654), indicating a 38% relative reduction in mortality risk. Conclusion: Prior LDCT screening was associated with improved 5-year survival among patients diagnosed with lung cancer, supporting its effectiveness in real-world clinical populations.

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**Seasons of Risk: Investigating Temporal Trends in ICI-Associated Myocarditis**

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Introduction: Myocarditis is a recognized complication of immune checkpoint inhibitor (ICI) therapy. Viral myocarditis shows seasonal variation, raising whether ICI-associated myocarditis exhibits similar clustering. Identifying higher-risk periods could inform targeted monitoring strategies. Given the modest sample size, analyses were exploratory and hypothesis-generating. Methods: Fifty-four high-suspicion ICI-myocarditis cases were identified via consults, follow-up, or troponin monitoring. Six patients were excluded (two without confirmed ICI exposure, two without troponin elevation, one inaccessible record, one missing ICI start date), yielding 48 cases. Peak year was categorized as pre-COVID (<2020), during COVID (2020–2021), or post-COVID (2022–2025). Seasonality was assessed by comparing January-June versus July-December to ensure statistical stability. Fisher's exact and binomial tests were performed. Results: Among 48 cases, ICIs were most frequently initiated for gastrointestinal (17%), lung (15%), head and neck (13%), and melanoma (13%) cancers. Pembrolizumab was the most common regimen (54%), followed by ipilimumab + nivolumab (25%). Most patients (77%) developed symptoms within two months. A greater proportion of cases occurred July-December (64.6%) versus January-June (35.4%), approaching statistical significance (binomial p=0.059). This pattern persisted across troponin thresholds (>100 ng/L: 70%; >500 ng/L: 70%; >1000 ng/L: 63%). Elevated troponin cases were higher post-COVID, without statistical significance (Fisher's p=0.496). Conclusions: Most cases occurred within two months of ICI initiation, with a skew toward the latter half of the year suggesting seasonal clustering. This trend may reflect ICI utilization, surveillance practices, or immunologic priming related to COVID-19. These preliminary findings support investigation of temporal and immunologic risk factors to inform risk-adapted monitoring.

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**Distinct Recurrence Patterns and Survival Outcomes in Early-Onset Versus Later-Onset Stage I–III Colorectal Cancer: A Propensity-Matched Analysis**

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Background: Early-onset colorectal cancer (EOCRC) is rising globally, yet outcome differences compared with later-onset colorectal cancer (LOCRC) remain incompletely defined. We compared recurrence and survival outcomes between stage I–III EOCRC and LOCRC using a large federated database. Methods: We performed a retrospective cohort study using the TriNetX Global Collaborative Network (163 healthcare organizations). Patients with stage I–III colorectal cancer were stratified into EOCRC (age ≤49) and LOCRC (age ≥50). After propensity score matching for demographics, comorbidities, tumor site, treatment, and genomic factors, 1,099 patients remained in each cohort. Outcomes included lymph node recurrence, distant organ metastasis, and all-cause mortality. Risk analyses and Kaplan–Meier survival estimates were calculated, excluding prior outcomes. Results: Lymph node recurrence risk was similar between cohorts (3.9% vs 3.6%; RR 1.08, p=0.798); however, EOCRC demonstrated worse lymph node recurrence–free survival (HR 2.18, 95% CI 1.10–4.33; p=0.023). EOCRC had significantly lower risk of distant metastasis compared with LOCRC (17.8% vs 25.0%; RR 0.71, 95% CI 0.60–0.85; p<0.001), though survival curves were not significantly different (HR 1.02; p=0.866). All-cause mortality was significantly lower in EOCRC (10.2% vs 22.2%; RR 0.46, 95% CI 0.37–0.57; p<0.001), with improved overall survival (HR 0.72, 95% CI 0.57–0.90; p=0.005). Conclusions: In matched stage I–III colorectal cancer, EOCRC demonstrated lower distant metastasis and mortality compared with LOCRC, despite a higher hazard of lymph node recurrence. These findings highlight distinct recurrence patterns in EOCRC and underscore the need for tailored surveillance and management strategies.

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### Expanding the Understanding of Population Descriptors for Biomedical Research to Low- and Middle-Income Countries (LMIC) - Corpora Development

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Transformation of biomedical research through the meticulous development and expansion of resources for curation, extraction, and translation for clinical interpretation is fundamental to clinical genetic practices. In clinical contexts, curation of molecular and clinical entities provides real-time data collection, interpretation, and reporting. There is an increasing need to expand current practices to include population descriptor entities. However, populations can be described in social, biological, or geographical terms, and these constructs differ across place and time, resulting in multiple dynamic entity types. We aim to develop an event annotated corpus for extracting population descriptors. Our approach identifies population target types and provides guidelines for population entity annotation. We extend biomedical information extraction to include all population descriptor types. To develop this corpus, we manually annotated biomedical literature using structured and unstructured representations for entity extraction across multiple trained annotators. Our event extraction approach covered various descriptor categories, including clinical, demographic, geographic, and social. Focusing on Low- and Middle-Income Countries (LMICs), we selected 100 biomedical research papers from LMIC journals referencing population descriptor entities and domain-relevant processes. Trained annotators evaluated entity types and developed detailed annotation guidelines. Domain experts then created structured event annotations in both abstracts and manuscripts. The resulting corpus serves as a reference for FAIR training and evaluation of population entity mention detection in biomedical science from LMICs.

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### Preoperative GLP-1 Agonists in Orthopaedic Surgery: Impact on Fracture Healing and Revision Rates

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Background :Glucagon-like peptide-1 receptor agonists (GLP-1 RAs), including semaglutide and tirzepatide, are increasingly used for type 2 diabetes and obesity. Preclinical data suggest GLP-1 signaling may promote osteoblast activity and inhibit osteoclast-mediated resorption, but clinical evidence on fracture outcomes (including nonunion and delayed union) is limited. We evaluated the association between preoperative GLP-1 RA use and postoperative fracture-healing outcomes following major orthopaedic surgery. Methods: In this retrospective cohort study using TriNetX (US collaborative health care system network), we identified patients undergoing femoral or tibial fracture fixation or total hip/knee arthroplasty. GLP-1 exposure was defined as use within 3–6 months before surgery; controls had no GLP-1 exposure in the prior year. Propensity score matching (1:1) balanced baseline covariates (age, sex, diabetes, obesity, vitamin D deficiency, osteoporosis, glucocorticoid exposure), yielding 10,034 patients per cohort. Outcomes (nonunion, delayed healing, revision, infection, mechanical complications) were assessed from postoperative day 1 through last follow-up using risk and time-to-event analyses. Conclusion : Median follow-up was shorter in the GLP-1 cohort (490 vs 1,015 days). Nonunion rates were low (0.21% GLP-1 vs 0.34% controls) and not statistically different (RR 0.62; 95% CI 0.36–1.06; p=0.08; HR 0.87; 95% CI 0.50–1.51; p=0.42). Delayed healing occurred less often with GLP-1 exposure (0.17% vs 0.31%; RR 0.55; 95% CI 0.30–0.99; p=0.04), consistent with survival analyses. Overall, preoperative GLP-1 RA use was not associated with increased nonunion risk and was associated with reduced delayed healing. Future studies should stratify by procedure type to clarify heterogeneity.

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### Evaluation Standards for Large Language Model Interpretation of Pharmaceutical Markush Patent Claims

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Pharmaceutical patent claims frequently employ Markush language to define chemical scope through structured variable-based substituent definitions. Accurate interpretation of these claims requires more than surface extraction; it requires systematic implementation of the claim-defined structural logic. However, existing evaluation approaches emphasize surface recognition rather than testing whether the model accurately captures the complete variable-substituent framework and claim-defined structural relationships that determine chemical scope. This study formalizes two ground truth evaluation standards for assessing LLM performance in pharmaceutical Markush claim interpretation: Pair-Level Ground Truth (PL-GT) and Structure-Aware Pair-Level Ground Truth (SPL-GT). A manually curated ground truth dataset (GT v1.0) was constructed directly from strict claim language across 20 GLP-1 small-molecule patents. PL-GT evaluates explicit (variable, value) completeness using both unexploded and exploded implementations. SPL-GT extends this framework by incorporating substitution mode and claim-defined relational constraints to assess whether structural relationships are correctly implemented. Both standards are evaluated using identical extraction prompts, identical ground truth tables, and identical parsing logic, thereby isolating differences to evaluation behavior rather than model input or preprocessing variability. Results demonstrate that while PL-GT exposes systematic value-level under-extraction, SPL-GT reveals persistent failure to correctly implement structural dependencies defined within the claims. These findings demonstrate that evaluation standard selection materially alters

conclusions regarding LLM reliability in pharmaceutical Markush claim interpretation and underscore the necessity of structure-aware framework for chemically meaningful patent analysis.

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**Disparities in COVID-19 Outcomes Among predominately African American Patients: A Focus on Metabolic Syndrome and Gastrointestinal Health in a tertiary care Hospital**

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Background: African Americans populations have experienced disproportionate morbidity and mortality from COVID-19, with metabolic syndrome (MetS). Aim: To evaluate the impact of metabolic syndrome on COVID-19 severity, gastrointestinal (GI) manifestations, and outcomes in a predominantly minority population hospitalized at a tertiary care center. Methods: We conducted a retrospective cohort study of 1,580 patients hospitalized with COVID-19 at Howard University Hospital. Patients were categorized as having MetS (n = 375) or not having MetS (n = 1,205) based on American Heart Association criteria. Demographics, comorbidities, clinical presentation, laboratory findings, treatments, and outcomes were compared. Subgroup analyses were performed among African American patients and further stratified by alcohol use.Results: Patients with MetS had higher ICU transfer rates (27.5% vs. 15.1%), greater prevalence of cardiometabolic comorbidities, more frequent GI symptoms, (43% vs. 33), and higher in-hospital mortality (18.9% vs. 10.9%, p = 0.001) as compared with non-MetS patients. Among African American patients, MetS remained associated with increased disease severity, GI involvement, and mortality (17.5% vs. 12.7%, p = 0.044). Subgroup analysis revealed that alcohol use among AA with MetS was associated with markedly higher obesity (91.9% vs. 27.5%) and BMI >30 kg/m², while non–alcohol users exhibited greater renal dysfunction (32% vs 20%) and inflammatory markers. Similar obesity-dominant patterns with alcohol use were observed in Hispanic and White MetS patients. Conclusion: Metabolic syndrome significantly worsens COVID-19 outcomes in minority patients, independent of race, with GI manifestations and alcohol use. Targeted metabolic and lifestyle-focused interventions may help mitigate COVID-19 disparities in vulnerable populations.

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**GLP-1 Receptor Agonist Use and Breast Cancer Risk Among Women With BRCA-Related Genetic Susceptibility: A Propensity-Matched Cohort Study**

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Background: Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) are widely prescribed for type 2 diabetes and obesity and have gained substantial popularity for weight management. Beyond metabolic effects, preclinical data suggest that GLP-1 signaling may influence cellular proliferation and tumor-related pathways. However, the long-term impact of GLP-1 RAs on cancer risk, particularly among genetically predisposed populations, remains unclear. Objective: To evaluate the association between GLP-1 receptor agonist use and breast cancer incidence in women with BRCA-related genetic susceptibility. Methods: This retrospective cohort study utilized the TriNetX Research Network, a federated database of real-world electronic health records. Adult women (≥18 years) with documented genetic susceptibility to malignant neoplasm of the breast (ICD-10 Z15.01) were included. Cohort 1 consisted of GLP-1 RA users (semaglutide, liraglutide, exenatide, dulaglutide, lixisenatide; n=4,101), and Cohort 2 included matched non-users (n=4,270). The primary outcome was incident breast cancer. Risk ratios, risk differences, and Cox proportional hazards models were calculated after matching for confounders. Results: Breast cancer incidence was 3.1% among GLP-1 users versus 2.3% among non-users (risk ratio 1.32; 95% CI 1.02–1.71; p=0.034). GLP-1 use was associated with a higher hazard of breast cancer (HR 1.82; 95% CI 1.39–2.38). Breast cancer–free survival was 73% in GLP-1 users compared with 92% in non-users (log-rank p<0.001). Conclusion: Among women with BRCA-related genetic susceptibility, GLP-1 receptor agonist use was associated with a statistically significant increase in breast cancer risk.

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**Maternal and Postpartum Outcomes in Pregnant Patients with Sickle Cell Disease**

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Sickle Cell Disease (SCD) is a genetic condition primarily affecting the vasculature via mutated beta hemoglobin chains. SCD poses risks during pregnancy due to the physiological changes the body undergoes, as well as the increased risk of vasooclusive crisis in a hypercoagulable state. This retrospective, cohort analysis used data from TriNetX to compare pregnant patients with SCD (n = 28,399) to pregnant patients without SCD (n = 2,476,468) to assess the risks of developing adverse outcomes. Propensity score matching was used to adjust for comorbidities and demographics in the cohorts. Pregnant patients with SCD had a 98% risk of developing sepsis when compared to pregnant patients without SCD (p < 0.001). Also, pregnant patients with SCD were found to have an earlier onset of sepsis during their pregnancy. The risk of developing an AKI was 94% in pregnant patients with SCD (p < 0.001), and there was an increase in recurrence during pregnancy (p = 0.032). Pregnant patients with SCD had an 85% risk of developing CKD postpartum (p

= 0.004). The risk for developing septic shock (p = 0.077) or mortality (p = 0.233) was not statistically significant when comparing pregnant patients with SCD to pregnant patients without SCD. These findings highlight the burden that SCD imposes on maternal outcomes, as well as the importance of surveillance and multidisciplinary care in preventing these outcomes.

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**IMPLEMENTING AN INTERDISCIPLINARY FORMULARY TO IMPROVE ACCESS AND OUTCOMES FOR UNINSURED PATIENTS AT A FEDERALLY QUALIFIED HEALTH CENTER**

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Purpose: A drug formulary is a list of medications supported by guidelines to promote clinically sound, cost-effective therapy and positive therapeutic outcomes.1,2 Section 340B of the Public Health Service Act allows eligible entities, such as Federally Qualified Health Centers (FQHCs), to purchase outpatient drugs at significantly reduced prices, enabling discounted medications for uninsured patients. There is limited data on formulary optimization for uninsured patients at an FQHC in house pharmacy. The project aims to develop and implement an interdisciplinary led formulary at an FQHC, to enhance medication access, improve outcomes,and ensure evidence-based, cost-effective care for patients without insurance. Methods: An interdisciplinary approach will be used to develop the clinic formulary. A Pharmacy and Therapeutics (P&T) Committee will be established to oversee formulary development and management. The type of formulary will be defined, and clinic data will be analyzed to identify the most frequently managed conditions and the top 150 medications prescribed. Each medication's 340B pricing, efficacy, safety, and costeffectiveness will be reviewed using current clinical guidelines and relevant literature. Medications will then be selected for inclusion, and a formal policy for ongoing formulary management will be developed to ensure evidence-based, cost-effective care for those without insurance.

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**Factors Guiding Practitioner Use Of Antibiotics For Implant Placement**

Presenter's Name: Naika Jecrois
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School/College: Dentistry
*Presentation Type: Poster Presentation*
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Antibiotics are frequently prescribed for dental implant placement despite strong evidence demonstrating no clinical benefit for straightforward cases and increasing concern regarding antimicrobial resistance. While prior studies have established the limited efficacy of routine prophylaxis, the factors driving continued antibiotic use among dental practitioners remain insufficiently understood. This study aims to identify practitioner, patient, and practice-related factors that guide antibiotic prescribing during simple dental implant placement. A cross-sectional survey was developed and distributed to dental practitioners involved in implant surgery across multiple specialties and practice settings. The survey evaluates prescribing patterns, awareness of current guidelines, clinical decision-making influences, and attitudes toward antibiotic resistance. Preliminary results from pilot survey responses indicate that many practitioners continue to prescribe antibiotics for healthy patients undergoing straightforward implant placement. Early findings suggest that fear of implant failure, personal clinical experience, and patient expectations are key drivers of antibiotic use, whereas consistent adherence to evidence-based guidelines is variable. Practitioners reporting uncertainty regarding guideline clarity were more likely to prescribe antibiotics routinely. These findings highlight the need for clearer, evidence-based guidance and targeted antimicrobial stewardship efforts to reduce unnecessary antibiotic use in implant dentistry.

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**Association between Religiousness and Caregiving Appraisal Among Families of Children with Rare Diseases**

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Co-authors: Dr. Heather Gordish, PhD, Dr. Lyon Maureen, PhD

Background: We do not know if religiousness/spirituality is an important source of support or coping for the primary family caregivers of children with rare diseases who may face future medical decisions. Scope: We present baseline data self-reported religiousness/spirituality and caregiving appraisals from a randomized clinical trial. Methods: Five items from the Brief-MMRS (identify as spiritual, identify as religious, feel God's presence, pray daily, attend religious services) were summarized. Lower scores mean more religious/spiritual. Four subscales from the Family Appraisal of Caregiving in Palliative Care were scored (positive appraisals of caregiving, family well-being, caregiver strain, caregiver distress). Higher scores mean greater positive appraisal of caregiving or family well-being. Linear regression model tested significance. Results: Twenty primary caregivers enrolled and consented with mean age of 40 years; 85% female. Children had 18 distinct rare diseases; mean age of 6 years; 70% male; 55% hospitalized last 3 months. Positive caregiving appraisals were significantly associated with religiousness/spirituality ($\beta = -2.83$, $p = 0.002$) and explained 41% of the variability in religiousness/spirituality ($R^2 = 0.41$). Family well-being was significantly associated with religiousness/spirituality ($\beta = -1.43$, $p = 0.020$) and explained 27% of the variance in religiousness/spirituality ($R^2 = 0.27$). There were no significant associations for caregiver strain or caregiver distress with religiousness/spirituality. Conclusions: Primary caregivers of children living with rare diseases who reported greater religiousness/spirituality were significantly more likely to also report positive appraisals of caregiving and family well-being, suggesting spiritual/religious factors may represent important dimensions of the caregiving experience and warrant further longitudinal investigation.

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**Does drinking of cow's milk cause anemia in cultures that are predominantly pastoralist? Evidence from Tanzania's Arusha**

Presenter's Name: Dyness Kejo
Classification:
School/College: Other
*Presentation Type: Poster Presentation*
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Anaemia is a global public health concern affecting both developing and developed countries with major consequences for human health and social and economic development. The impact of cow's milk on iron balance extends beyond its low iron content it also interferes with iron absorption. However, little research thoroughly explores whether cow's milk consumption contributes to anemia in predominant pastoralist communities in Tanzania. This study investigated the risk factors associated with the high prevalence of anemia among under-fives in pastoralist communities in Arusha, Tanzania. This study employed a population-based analytical cross-sectional design. Semi-structured interviews were conducted with mothers to collect information on child feeding practices and anemia-related indicators for 436 children aged 6–59 months. Results shows high (85%) prevalence of anemia among under-fives which could be attributed to dietary factors, including cow's milk consumption was significantly associated with increased odds of anaemia, with children who consumed cow's milk demonstrating more than threefold higher odds of anaemia compared with non-consumers (ARR = 3.1; 95% CI: 1.1–8.2; p = 0.02).As hypothesized, milk consumption was among the significant factors associated with increased anemia prevalence among children. While Cow milk remains an essential source of protein for under-fives in Tanzania, thereby improving the nutritional quality of complementary foods is necessary to exacerbate anemia in children. To conclude pastoral societies, cow's milk consumption is the primary food ingredients for complementary foods. Thus, feasible and effective action to address childhood anemia in pastoral communities must integrate messages to promote alternative sources of bio-available iron.

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**Development of a protocol to transform and detect CRO-resistant Neisseria gonorrhoeae harboring the mosaic penA60 allele**

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Antimicrobial resistance (AMR) in Neisseria gonorrhoeae (NG) is a growing public health concern, particularly as ceftriaxone remains the only recommended treatment option for gonorrhea. The emergence of resistance to ceftriaxone is primarily attributed to the mosaic penA60 allele, identified as the most prevalent resistance determinant. Recent studies have suggested that this allele is acquired from commensal Neisseria species (CNspp); however, the specific mechanisms behind this acquisition remain inadequately understood. The detection of the mosaic penA60 allele presents significant challenges, especially in polymicrobial environments like the pharynx, where resident CNspp share closely related DNA sequences with NG. This study aims to elucidate the horizontal gene transfer mechanisms that facilitate the acquisition of the mosaic penA60 allele from CNspp to NG, leading to ceftriaxone resistance. Additionally, we will develop a single-cell digital PCR (scdPCR) assay to accurately identify and differentiate NG strains harboring the mosaic penA60 allele from CNspp in complex samples. This research is crucial for understanding the dynamics of AMR in NG and enhancing diagnostic capabilities in clinical settings.

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**Characterizing Raciolinguistic Differences in Emotion Recognition for Post-Stroke Assessment**

Presenter's Name: M. ashura Langford
Classification: Undergraduate Student
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*Presentation Type: Poster Presentation*
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Stroke is the primary cause of long-term disability, and its impact, both in terms of severity and functional recovery, disproportionately affects African Americans. The disparity in stroke outcomes for African Americans may be due to assessment bias, which frequently prioritizes White American and European cultural norms. Specifically, Black right-hemisphere stroke survivors(RHSS) demonstrated a lower accuracy on the Geneva Emotion Recognition Test, which had only white actors. This study aims to develop raciolinguistically sensitive emotion recognition assessment materials. The objective of this study is to (i) identify the prosodic cues that distinguish emotion (angry, happy, and sad), (ii) explore differences related to raciolect, and (iii) evaluate participant perceptions of authentic speech (interviews) and pseudospeech, both black and white speakers. This study will have 50 Black and 50 White American healthy adults listen to PRAAT-manipulated recordings (varying in mean pitch and pitch range) of Black and White speakers, both uttering pseudowords and authentic speech. Participants will complete a race identification task and an emotion identification task. Preliminary results that used stimuli from White speakers suggest that participants across groups converge across groups for emotions(angry: low mean pitch, happy: high mean pitch, sad: narrow mean range), but not race. Characterizing prosodic differences in emotion recognition between races is significant for understanding post-stroke aprosodia disparities and developing linguistically-informed assessment strategies for dialect deficits implementable across diverse communities.

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**Gender Differences in Clinical Presentation and Surgical Outcomes of High Intensity Focused Ultrasound for Essential Tremor**

Presenter's Name: Charisma Leach
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School/College: Medicine
*Presentation Type: Poster Presentation*
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Introduction: Essential tremor (ET), is a common disorder affecting men and women at similar rates. Despite this, women remain underrepresented

among those receiving surgical treatment for management of tremors. High-Intensity Focused Ultrasound (HIFU) is a non-invasive, ablative technique approved for management of medication-refractory tremor. HIFU offers a safer alternative to traditional surgeries such as deep brain stimulation. This study examines gender differences in the clinical presentation and surgical outcomes of HIFU for ET as a potential explanation for the significantly lower surgical intervention rates observed among women compared to men at a single center. Methods: A retrospective cohort study was conducted on all ET patients treated with HIFU at NYU Langone Health between April 2018 and January 2025. A total of 103 patients (65 men, 38 women) were included. Statistical analysis was performed to analyze gender differences in disease duration, age at procedure, tremor severity, SDR, intraoperative tremor control, perioperative side effects, and post-operative tremor recurrence. Results: We found that women underwent HIFU at a statistically significantly older age and had significantly lower SDR compared to men. However, no statistically significant gender differences were observed in baseline tremor severity, intraoperative tremor control, perioperative side effects, or post-operative tremor recurrence. Conclusions: Despite receiving HIFU at an older age, and with lower average SDR, women's surgical outcomes were comparable to those of men. These findings suggest that disparities' obvious clinical characteristics do not account for the gender gap found in ET patients undergoing HIFU and highlight a broader issue of healthcare inequity.

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**Exploring GLP-1 Agonists as a Therapeutic Option for Hidradenitis Suppurativa**

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Background: Hidradenitis Suppurativa (HS) is a chronic inflammatory skin disorder marked by painful nodules, abscesses, and scarring. Treatment remains challenging, with suboptimal outcomes despite available therapies. Glucagon-like peptide-1 (GLP-1) receptor agonists, widely used for type II diabetes and obesity, exhibit anti-inflammatory properties and may offer therapeutic benefits in HS. We aim to perform a retrospective study exploring the potential of GLP-1 analogs in treating HS. Methods:A retrospective cohort study was conducted using the TriNetX database. HS patients prescribed GLP-1 agonists (Cohort 1) were compared to those without such prescriptions (Cohort 2). Cohorts were matched 1:1 by age, gender, race, overweight, obesity, and diabetes. Primary outcomes included emergency visits and incision and drainage (I&D) procedures within one year. Statistical analysis employed propensity score matching, risk ratios, and Kaplan-Meier survival estimates. Results: Matched cohorts included 19,030 patients each. The GLP-1 group had fewer emergency visits (30.5%) compared to controls (36.9%), with a risk difference of 6.4% (95% CI: -7.4% to -5.5%, p<0.001). The risk of I&D procedures was lower in the GLP-1 group (6.6% vs. 9.6%), with a risk difference of 2.9% (95% CI: 3.5% to 2.4%, p<0.001). Hazard ratios and odds ratios confirmed significant reductions in both outcomes. Conclusion:GLP-1 agonists demonstrate a protective effect against HS-related emergency visits and I&D procedures, likely due to their anti-inflammatory and weight-reduction properties. These findings suggest potential for GLP-1 agonists as adjunctive HS therapies, warranting further investigation.

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**A Propensity-Matched TriNetX Cohort Study Comparing Dexmedetomidine Versus Benzodiazepine Derivatives and Early Postoperative Outcomes in Older Adults**

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Background: Perioperative sedative selection in older surgical patients varies widely, yet comparative data on postoperative outcomes remain limited. We compared early postoperative outcomes among surgical patients aged ≥65 years receiving perioperative dexmedetomidine versus benzodiazepine derivatives. Methods: We performed a retrospective 1:1 propensity score–matched cohort study using the TriNetX Global Collaborative Network. Patients aged ≥65 years undergoing surgery who received benzodiazepine derivatives or dexmedetomidine on the day of surgery or within 1 day after were included. Outcomes were assessed from postoperative day 1 through day 7. The primary outcome was postoperative delirium; secondary outcomes included hypotension, falls, and mortality. Results: Following propensity matching, 421,528 patients were in each cohort. Delirium/encephalopathy occurred in 0.9% of benzodiazepine-exposed patients and 0.7% of dexmedetomidine-exposed patients (RR 1.38, 95% CI 1.31–1.45; p<0.001). Hypotension occurred in 0.7% and 0.8%, respectively (RR 0.89, 95% CI 0.84–0.94; p<0.001). Mortality was higher in the benzodiazepine cohort (0.2% vs 0.1%; RR 1.61, 95% CI 1.45–1.78; p<0.001), as were falls (0.2% vs 0.1%; RR 1.94, 95% CI 1.73–2.18; p<0.001). Conclusion: In a large propensity score–matched cohort of surgical patients aged ≥65 years, perioperative benzodiazepine exposure was associated with higher risks of postoperative delirium, falls, and short-term mortality compared with dexmedetomidine, while dexmedetomidine was associated with a slightly higher risk of hypotension. These findings suggest sedative selection may influence early postoperative outcomes in older adults.

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**Severe Hypoalbuminemia Predicts Increased 5-Year Mortality After Isolated CABG**

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Objective: To evaluate the association between graded preoperative serum albumin levels and early and long-term mortality following isolated coronary artery bypass grafting (CABG), and whether perioperative major adverse cardiovascular events (MACE) explain observed mortality differences. Methods: Adults undergoing isolated CABG with a preoperative albumin measurement within 30 days were identified using the TriNetX Global Collaborative Network. Patients were stratified into hypoalbuminemia (<3.5 g/dL, n=4041), mild hypoalbuminemia (3.0–3.4 g/dL, n=2846), severe hypoalbuminemia (<3.0 g/dL, n=2534), and supranormal albumin (≥4.0 g/dL, n=5524) cohorts and matched 1:1 to a reference group (3.5–3.9 g/dL). All-cause mortality at 30 days, 90 days, 1 year, and 5 years was analyzed using Kaplan-Meier estimates and Cox proportional hazards models. Thirty-day MACE (myocardial infarction, stroke/TIA, or cardiac arrest) was analyzed using risk ratios.Results: Severe hypoalbuminemia showed the highest early mortality (30-day HR 2.26, p<0.001) with persistent elevation at 5 years (HR 1.28, p=0.017). Mild hypoalbuminemia showed increased early mortality with attenuation over time (30-day HR 1.59, p=0.044; 5-year HR 1.21, p=0.053). Supranormal albumin was associated with improved survival at all timepoints (5-year HR 0.61, p<0.001). Thirty-day MACE did not parallel mortality risk and was reduced in hypoalbuminemia (RR 0.78, p=0.003), severe hypoalbuminemia (RR 0.78, p=0.014), and supranormal albumin (RR 0.73, p<0.001). Conclusions: Lower preoperative albumin predicts increased early and long-term mortality after CABG without corresponding increases in perioperative cardiovascular events, suggesting death relates to reduced physiologic reserve rather than acute ischemic complications. Albumin may aid perioperative risk stratification and counseling.

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**Racial Disparities in Ischemic Complications and Anti-VEGF Utilization Following Retinal Vein Occlusion**

Presenter's Name: Zarina Meer
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Purpose: To evaluate racial differences in sequelae and treatment utilization among patients with retinal vein occlusion (RVO). Design: Retrospective cohort study. Participants: Adults with central or branch RVO identified within the TriNetX Collaborative Network. Methods: White and Black patient cohorts of adults with incident RVO were defined using standardized diagnostic criteria. A two-year lookback excluded prior outcomes; one-to-one propensity score matching balanced baseline characteristics. Primary outcomes were ischemic complications and macular edema. Secondary outcomes included individual ischemic events, tube shunt surgery, and anti-VEGF utilization. Time-to-event outcomes were assessed using Kaplan-Meier and Cox models. Main Outcome Measures: Two-year incidence of ischemic complications and macular edema following RVO. Results: After matching, 11,160 patients were included in each cohort. Within two years, ischemic complications occurred in 8.5% of White versus 13.0% of Black patients (RR, 0.65; 95% CI, 0.60-0.70; P<0.001). Black race was associated with higher hazard on time-to-event analysis (hazard ratio [HR], 0.64; 95% CI, 0.59-0.69; P<0.001). Macular edema rates were similar between cohorts (37.0% vs 37.4%; RR, 1.01; 95% CI, 0.98-1.05; P=0.571). Retinal neovascularization, vitreous hemorrhage, neovascular glaucoma, and tube shunt surgery were more frequent among Black patients (P<0.001). In secondary analysis, White patients were more likely to receive anti-VEGF therapy (35.2% vs 31.6%; RR, 1.11; 95% CI, 1.04-1.19; P=0.001) and received more administrations (mean 6.96 vs 4.82; P<0.001). Conclusion: Black patients experienced more ischemic complication despite similar macular edema incidence and lower anti-VEGF utilization. Differences in longitudinal treatment patterns may be associated with disparities in ischemic outcomes following RVO.

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**A Propensity-Matched TriNetX Cohort of Preoperative Opioid Exposure Compared to No Opioid Exposure Following Partial Colectomy or Proctectomy**

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Background: Preoperative opioid exposure has been associated with adverse postoperative outcomes, yet evidence for early complications after colorectal surgery remains sparse. We evaluated whether opioid exposure increases 30-day complications following partial colectomy or proctectomy. Methods: Retrospective cohort study using electronic health records from the TriNetX network. Adults ≥ 18 years who underwent partial colectomy or proctectomy were included. Two cohorts were defined: patients with ≥1 opioid prescription within 90 days preoperatively and those without preoperative opioid use. Patients with prior opioid abuse or treatment, chronic pain, palliative care, or significant abdominal pathology were excluded. Outcomes assessed 1-30 days postoperatively included infection, wound complications, paralytic ileus, and sepsis. Cohorts were matched on baseline characteristics, metabolic factors, and underlying disease pathology. P values < 0.05 were considered statistically significant. / Results: After matching, 9,291 patients were included per cohort. Opioid exposure was associated with higher 30-day risk of procedural infection (1.6% vs 1.1%; RR 1.46, 95% CI 1.13–1.89; p=0.003), wound disruption (3.6% vs 2.5%; RR 1.44, 95% CI 1.21–1.71; p<0.001), paralytic ileus (0.8% vs 0.5%; RR 1.62, 95% CI 1.12–2.35; p=0.010), and sepsis (0.9% vs 0.5%; RR 1.62, 95% CI 1.13–2.32; p=0.008). Conclusions: Recent preoperative opioid exposure was associated with modest but significant increases in multiple 30-day complications following colorectal resection. These findings support perioperative risk stratification and targeted optimization for opioid-exposed patients.

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**Differential Cataract Risk With Fibrates and Statins Across Type 2 Diabetes and Hyperlipidemia: A Global Multicenter Cohort Analysis**

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Background: Cataracts are the leading cause of blindness globally, and their progression is accelerated by metabolic disorders such as T2DM and, to a lesser extent, HLD. While lipid-lowering drugs (LLDs), particularly statins and fibrates, are widely prescribed to manage these conditions, their effects on cataract development remain unclear and inconsistent in the literature. This study aimed to investigate the relationship between statin or fibrate use and cataract risk in distinct T2DM and HLD populations. Methods: Using de-identified global data, patients with T2DM or HLD treated with statins or fibrates (n = 4,295–770,721) were propensity-matched to untreated controls (n = 621,699 and 895,887). Cataract diagnosis and surgery were analyzed using risk ratios (RR), Kaplan–Meier survival, and hazard ratios (HR). Results:In patients with T2DM, fibrate therapy was associated with a significantly lower risk of cataract surgery (RR = 0.365; $p < 0.001$) and diagnosis (RR = 0.580; $p < 0.002$), with delayed time-to-event for both outcomes. Statins also conferred a modest risk reduction, and only cataract diagnosis showed a significantly reduced hazard (HR = 0.897; $p < 0.018$). Among patients with HLD, fibrates lowered cataract diagnosis risk (RR = 0.854; $p < 0.001$) but not surgery. In contrast, statins were associated with increased risk and earlier onset for both cataract outcomes (all $p < 0.001$), with significantly elevated hazards for surgery (HR = 1.229) and diagnosis (HR = 1.244). Conclusion: Fibrate therapy was associated with reduced risk of cataract diagnosis and surgery in T2DM patients, and exhibited modest benefit in HLD. Conversely, statin use significantly increased the risk of both cataract diagnosis and surgery in patients with HLD.

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**Optimizing Pediatric Patient Comfort: A Study of Moisture Isolation Techniques During Dental Treatments**

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Background: Effective dental isolation is essential for pediatric restorative procedures, yet its effect on physiologic stress is not well established. This study included two independent pilot sub-studies evaluating salivary cortisol responses to isolation techniques during sealant placement: (1) cotton roll isolation (CRI) versus the Isolite system (IS), and (2) CRI versus the DryShield isolation system (DSI). Both were reported together due to shared clinical context and outcome measures. Methods: Pediatric patients received sealants using CRI, IS, or DSI according to sub-study assignment. Salivary cortisol samples were collected pre- and post-procedure. In the CRI–IS cohort, pulse rate was measured at three time points and participants completed preference surveys. Cortisol analyses were conducted separately within each sub-study; pulse rate and subjective outcomes were assessed only for CRI–IS. Results: In the CRI–DSI comparison, DSI produced a significantly greater increase in salivary cortisol compared with CRI ($p = 0.0001$), indicating a higher acute stress response. No significant cortisol differences were observed between CRI and IS; however, heart rate increased significantly with CRI ($p = 0.035$). Most participants who provided feedback preferred IS. Gender was not associated with stress differences. Conclusions: CRI and IS demonstrated comparable physiologic stress responses, though IS was subjectively preferred. DSI was associated with increased cortisol reactivity, suggesting clinicians should consider potential stress effects when selecting isolation techniques for pediatric patients.

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**Follow-Up Patterns After Elevated Liver Enzymes in Young Adults: A Retrospective Cohort Study Using Real-World Data**

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Classification: Professional Student
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*Presentation Type: Oral Presentation*
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Background: Elevated liver enzymes are common incidental findings in young adults, yet their clinical follow-up remains poorly understood. Inadequate evaluation may delay diagnosis of treatable liver disease. Objective: To evaluate six month follow-up patterns and downstream diagnoses among adults aged 18-40 with newly elevated liver enzymes. Methods: Using the TriNetX global electronic health record network, we identified 5,168 adults aged 18-40 with a first ALT or AST $\geq$ 40 U/L between 2019-2025. We excluded patients with prior liver disease, pregnancy, or hepatotoxic medication use. Follow-up was defined as receipt of repeat liver function testing, liver imaging, or hepatitis panels within 180 days. Time to follow-up was evaluated using Kaplan-Meier survival analysis. We also compared one-year liver related diagnosis rates by follow-up status. Results: Only 41.9% of patients received any follow-up within 180 days. 35.5% had repeat ALT/AST testing. 11.8% underwent imaging. 3.6% received hepatitis panel testing. Kaplan-Meier curves showed follow-up primarily occurred in the first 60 days. Patients who received follow-up had a 5.7% rate of new liver-related diagnoses within one year, compared to 1.2% among those without follow-up. Conclusion: Nearly 60% of young adults with elevated liver enzymes did not receive follow-up. Structured clinical pathways, automated alerts, or lab-based reminders could improve timely evaluation and reduce missed opportunities for early diagnosis. Keywords: Elevated liver enzymes, Young adults, Real-world data, Electronic Health records, Liver function testing. Conflicts of interest: All authors declare no conflicts of interest

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### Social Determinants of Food Insecurity in Cancer Survivorship: The Role of Marital Status and Employment Disruption

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Using nationally representative data from the 2016–2017 Medical Expenditure Panel Survey (MEPS) and the Experiences with Cancer Survivorship Supplement, we conducted a cross-sectional study to examine the association between marital status, employment disruption, and food insecurity among U.S. adult cancer survivors. MEPS is administered by the Agency for Healthcare Research and Quality and provides detailed information on healthcare utilization, sociodemographic characteristics, insurance coverage, and economic outcomes among the noninstitutionalized U.S. population. Adults aged ≥18 years with a self-reported history of cancer who completed both the survivorship supplement and the USDA 10-item Adult Food Security Survey were included. Employment status at diagnosis was categorized as full work, disrupted work, or no work, and marital status was classified as currently married, formerly married, or never married. Food insecurity was defined as a survey score ≥3. Survey weights were applied to generate nationally representative estimates, and Rao–Scott chi-square tests and weighted multivariable logistic regression models were used to assess associations while adjusting for age, sex, race, education, insurance, income, and caregiving variables. The unweighted sample included 1,851 respondents, representing approximately 18.6 million U.S. cancer survivors. Preliminary results demonstrate that employment disruption (adjusted odds ratio [AOR] 2.46; 95% CI, 1.33–4.52) and being formerly married (AOR 2.14; 95% CI, 1.29–3.57) or never married (AOR 2.53; 95% CI, 1.21–5.28) were independently associated with higher odds of food insecurity compared with married survivors maintaining full employment. These findings highlight vulnerable subgroups within the survivorship population who may benefit from targeted social and economic support interventions.

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### Genotyping and Genomic Mapping of Portulaca and Talinum Species Using High Throughput DNA Extraction

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Genomic and Genotyping mapping have a crucial part in conducting research about plants; it helps scientists have a better understanding of inherited traits, connections among species, and genetic discrepancies. All of these methods are very important and beneficial for different types of species of plants that have yet to be heavily researched. As this project was conducted, from the assigned three plant groups from the ordered Caryophyllales the genomic DNA was extracted. Which includes Talinum fruticosum also referred to as water leaf strain two, Talinum paniculatum also referred to as water leaf strain one, and Portulaca species belonging to the Portulacaceae family. Using the Quick DNA Plant Seed 96 Kit samples of fresh plant tissue were processed, this allowed effective isolation of clean genomic DNA adequate enough for molecular analysis. The DNA that's extracted is being produced for genomic and genotyping mapping to establish the genetic differences and similarities of the three among plant strains and species provided. The observations initially showed that there is great quality in the DNA acquired for the downstream analysis, as the process of the detailed genotyping results is still being done. Overall this study aims to establish the plant DNA that is a well founded workflow for genetic analysis and plant DNA extraction while refining apprehension of variations of genetics among closely linked groups of plants. The discoveries may support research in the future among plant comparative genomics, breeding, agricultural research, and nutrition.

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### Consequence of Excluding CYP3A4∗1B from Pharmacogenomic Testing Panels: Implications for Precision Dosing

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Background: Pharmacogenomics (PGx) presents an opportunity to improve treatment outcomes via individualized medication selection and dosing. However, current PGx testing algorithms predominantly feature European populations, threatening the generalizability of testing results across populations and unintentionally exacerbating disparities. CYP3A4*1B is a common polymorphism in individuals of African ancestry but is rare in European and Asian populations. Its potential contribution to variability in drug response and dosing remains under-recognized, and its exclusion from current PGx testing panels disproportionately impacts people of African descent. The purpose of this research is to generate evidence evaluating the clinical relevance of CYP3A4*1B and to assess whether its exclusion in PGx panels may contribute to precision-dosing disparities. Methods: A structured narrative synthesis was performed using guideline documents, clinical cohort studies, pharmacokinetic investigations, and population genetics reports examining CYP3A4*1B or related CYP3A4/5 variants. Key outcomes included drug dosing requirements, pharmacokinetics, allele frequencies across populations, and clinical utility. Results: In an African American cohort of predominantly CYP3A4*1B carriers, PGx-guided buprenorphine dosing was associated with improved withdrawal symptomatology. Independent transplant pharmacokinetic studies demonstrated that Black recipients classified as rapid metabolizers carrying the CYP3A4*1B allele required increased dosing. Population studies revealed marked ethnic variability in CYP3A4*1B frequency, with substantially higher representation in African ancestry groups. Conclusions: Converging evidence indicates that CYP3A4*1B contributes to clinically meaningful variability in drug metabolism and dosing, particularly in populations of African descent. Its exclusion

in PGx panels may risk perpetuating precision-medicine disparities. Prospective studies and ancestry-inclusive panel design are warranted to optimize equitable pharmacogenomic implementation.

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**Engineering Smart Nanoparticles to Combat Triple-Negative Breast Cancer**

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*Presentation Type: Poster Presentation*
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Triple-negative breast cancer (TNBC) is one of the most aggressive and difficult-to-treat breast cancer subtypes, with disproportionately high rates among Black women and limited treatment options because it lacks receptors targeted by most breast cancer therapies. My research develops "smart" nanoparticles that deliver chemotherapy directly to TNBC tumors while simultaneously awakening the body's immune defenses. These nanoparticles feature three innovative components: (1) a biodegradable polymer core that safely carries chemotherapy drugs, (2) a pH-sensitive crosslinker we synthesized from 2,4-dimethoxybenzaldehyde that acts like a molecular lock, staying closed in healthy tissue but opening in the acidic tumor environment to release drugs precisely where needed, and (3) Anti-PD-1 antibodies on the surface that target immune cells in tumors and remove the "brakes" preventing them from attacking cancer. This triple-threat approach combines nanotechnology, synthetic chemistry, and immunotherapy into a single platform. By concentrating treatment at tumor sites and reducing exposure to healthy organs, this system can make TNBC therapy more effective with fewer side effects, potentially transforming outcomes for patients with this aggressive cancer subtype that disproportionately affects young women and women of color.

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**Hypermagnesemia and Risk of Major Fractures in Younger Adults: A Propensity Score–Matched Cohort Study**

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Background: The relationship between hypermagnesemia and fracture risk remains poorly defined, particularly in younger adults. We evaluated the association between elevated serum magnesium and incident major fractures using a large, federated electronic health record network. Methods: We performed a retrospective propensity score–matched cohort study using the TriNetX Global Collaborative Network (170 healthcare organizations). Adults aged 18–60 years with hypermagnesemia (ICD-10 E83.41 or serum magnesium ≥2.60 mg/dL) were compared to adults with normal magnesium levels (1.70–2.20 mg/dL) and no hypermagnesemia diagnosis. Patients with prior fractures, neoplastic bone disease, or multiple myeloma were excluded. The primary outcome was incident major fracture (femur, forearm, shoulder/upper arm, thoracic spine/ribs, lumbar spine/pelvis, or lower leg) occurring ≥1 day after index. Propensity score matching balanced demographics, chronic kidney disease, dialysis, diabetes, vitamin D deficiency, hyperparathyroidism, glucocorticoid use, bisphosphonate use, and vitamin D therapy. Matched cohorts included 543,858 patients each. Median follow-up was 714 days (hypermagnesemia) and 729 days (normal magnesium). Results: Major fractures occurred in 17,857/543,858 (3.3%) patients with hypermagnesemia versus 9,231/543,858 (1.7%) controls (risk difference 1.6%, 95% CI 1.5–1.6; risk ratio 1.93; odds ratio 1.97; $p<0.001$). Kaplan–Meier analysis demonstrated significantly lower fracture-free survival in the hypermagnesemia cohort (82.68% vs 88.86%; log-rank $\chi^2=2270.84$, $p<0.001$). Hypermagnesemia was associated with an increased hazard of fracture (HR 1.83, 95% CI 1.78–1.87). Patients with hypermagnesemia also experienced more fracture events per patient (mean 4.31 vs 3.45; $p<0.001$).

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**Perioperative Outcomes in Children With Recent Stimulant Prescriptions: A Propensity-Matched Cohort Study**

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Background. Prescription stimulants are frequently used in children with attention-deficit hyperactivity disorder (ADHD), yet outcome-based perioperative safety data remain sparse. We evaluated immediate perioperative outcomes in children with a recent recorded stimulant prescription undergoing surgery compared to propensity-matched controls without a recorded stimulant prescription. Methods. A retrospective cohort analysis was made using the TriNetX Global Collaborative Network (162 healthcare organizations). Children aged 2–18 years undergoing surgery with anesthesia were included. The stimulant cohort had a recorded prescription for amphetamine or similar stimulants within 1 month before surgery, while controls had no recorded stimulant prescription within 90 days. Propensity score matching (1:1) yielded 14,708 patients per cohort. Outcomes from index through postoperative day 1 included coded vasoactive-medication administration (epinephrine, norepinephrine, phenylephrine, or vasopressin), shock, arrhythmias, nausea/vomiting, and delirium/agitation. Results. Coded vasoactive-medication administration was lower in stimulant-exposed children (11.3%) than controls (23.4%) (RR 0.49, 95% CI 0.46–0.52; $p<0.001$). Shock occurred in 0.15% vs 0.30% (RR 0.50, 95% CI 0.30–0.83; $p=0.007$). Arrhythmias (0.21% vs 0.17%), nausea/vomiting (0.83% vs 0.94%), and delirium/agitation (0.19% vs 0.12%) did not differ significantly (all $p>0.05$). Conclusions. In this large propensity-matched cohort, recent recorded stimulant prescription was not associated with higher rates of selected immediate (0–1 day) perioperative adverse

outcomes and was associated with lower coded vasoactive-medication administration. These findings suggest that perioperative continuation strategies for prescription stimulants warrant reevaluation.

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**Loneliness and Lifestyle Behaviors among College Students: Findings from a Historically Black College and University**

Presenter's Name: Elizabeth Ordor
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*Presentation Type: Poster Presentation*
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Background: College loneliness is a critical health concern impacting physical, mental, and academic wellbeing. Black students and students attending historically HBCUs are underrepresented in the literature. Understanding how loneliness impacts key health behaviors among this population may be useful for preventive care. Objective: The objective of this study is to examine the relationship between loneliness and health behaviors often targeted for therapeutic intervention in lifestyle medicine. Methods: HBCU students (N = 276) completed the National College Health Assessment during campus-based primary care visits. Independent t-tests and chi-square analyses were conducted to compare students reporting loneliness to students not reporting loneliness on 5 key variables: (1) servings of fruits/vegetables per day, (2) days engaged in physical activity, (3) past 30-day alcohol use, (4) days of restful sleep, and (5) stress. Results: Overall, 58% of students reported feeling very lonely. Students endorsing loneliness reported significantly lower number of servings of fruits and vegetables ($t = 2.39$, $p = .022$), were more likely to report alcohol use in the past-30 days ($X2 = 7.49$, $p = .006$), reported less days of restful sleep ($t = 2.46$, $p = .015$), and report more stress ($t = 8.87$, $p<.001$). There were no differences in physical activity between the two groups. Discussion: Findings highlight college loneliness association with behaviors for targeted invention and potential need for lifestyle medicine integration in student health centers. Evidence-based therapeutics provided through lifestyle medicine supports student wellbeing and promotes preventive care practices to foster mental and physical health.

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**Assessing the Feasibility of Values and Preference Elicitation During Inpatient Psychiatric Hospitalization**

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Background: Psychiatric Advance Directives (PADs) are an evidence-based strategy to promote patient autonomy and reduce coercive crisis interventions among individuals with serious mental illness. Despite demonstrated effectiveness, PAD uptake remains low, particularly in high-acuity inpatient settings where crises often occur. A key implementation question is whether patients can meaningfully engage in structured values- and preference-elicitation conversations during acute psychiatric hospitalization. Objective: To assess the feasibility and acceptability of conducting a brief, structured values-elicitation conversation with adult psychiatric inpatients. Methods: This ongoing observational pilot study aims to enroll 30 adults admitted to an academic inpatient psychiatry unit. Clinically appropriate patients are invited to complete a one-time, 10–15-minute structured conversation guided by a worksheet eliciting core values, hospitalization preferences, calming strategies, treatment experiences, trusted supports, and interest in future PAD completion. Primary outcomes include feasibility (ability to complete the conversation during admission) and acceptability (patient-reported experience and PAD interest). Analyses are descriptive. Results: To date, seven patients have participated (mean age 42.3 years; 83% male). Conversations averaged 11.3 minutes. All participants identified at least one core value and calming strategy; 71% named a trusted support person. All reported they would recommend the experience, and 86% expressed interest in future PAD completion. Conclusions: Early findings suggest structured values elicitation is feasible and acceptable during acute psychiatric hospitalization and may inform future PAD implementation efforts.

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**Graded Preoperative Serum Albumin Predicts Early Sepsis After Isolated Coronary Artery Bypass Grafting**

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Objective: Hypoalbuminemia is associated with adverse outcomes after CABG, but its graded relationship with postoperative sepsis and acute kidney injury (AKI) remains incompletely characterized. We evaluated the association between preoperative serum albumin and early postoperative sepsis and AKI after isolated CABG. Methods: Adults undergoing isolated CABG with a serum albumin measurement within 30 days preoperatively were identified in the TriNetX Global Collaborative Network. Patients were stratified into severe hypoalbuminemia (<3.0 g/dL), mild hypoalbuminemia (3.0–3.4 g/dL), and supranormal albumin (≥4.0 g/dL) groups. Each group was independently propensity score matched 1:1 to a reference cohort (3.5-3.9 g/dL). Thirty-day and 90-day sepsis and AKI outcomes were analyzed using Cox proportional hazards models. ResultsL Severe hypoalbuminemia was associated with higher sepsis risk at 30 days (HR 2.32, p=0.001) and 90 days (HR 1.96, p<0.001). Mild hypoalbuminemia was associated with higher sepsis risk at 30 days (HR 1.96, p=0.004) and 90 days (HR 1.53, p=0.014). Supranormal albumin showed lower sepsis risk at 90 days (HR 0.48, p<0.001). No significant differences in AKI/dialysis were observed for hypoalbuminemia groups. Supranormal albumin showed lower AKI/

dialysis risk at 30 days (HR 0.84, p=0.040) and 90 days (HR 0.68, p<0.001) Conclusions: Preoperative albumin level was associated with graded increases in postoperative sepsis after isolated CABG. Hypoalbuminemia identified patients at higher risk of sepsis while supranormal albumin levels were associated with lower sepsis and AKI risk.

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**Evaluating the Association of Food Insecurity with Breastfeeding Practices and Introduction of Solid Food**

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"Breast is best." The American Academy of Pediatrics and the World Health Organization recommend exclusive breastfeeding for the first six months of life (Meek et al., 2020). Despite these guidelines, many families discontinue breastfeeding early or introduce solid foods before six months. Formula-fed infants may miss key immunologic and metabolic benefits of breast milk, and early solid introduction can increase the risk of choking and impaired gastrointestinal development (Richard et al., 2021). Although prior research links socioeconomic status to breastfeeding duration (Francis et al., 2024), the independent impact of food insecurity is less clear. Using nationally representative National Survey of Children's Health data, we evaluated whether household food insecurity influences early feeding practices. The sample included 11,323 children aged 0 to 2 years with complete feeding and household data. Analyses were conducted in StataNow 19.5 and included weighted prevalences with 95 percent confidence intervals and survey-weighted logistic regression examining two outcomes: breastfeeding cessation before six months and introduction of solids before four months. Food-insecure households demonstrated poorer feeding behaviors. Unadjusted prevalence of breastfeeding cessation before six months increased from approximately 30 percent among food-secure families to 45 percent among food-insecure families. Early solid introduction rose from 9 percent to 15 percent. After adjustment for socioeconomic and demographic factors, food insecurity remained associated with twice the odds of early breastfeeding cessation and nearly three times the odds of very early solid introduction, highlighting food insecurity as a key driver of early nutritional inequities.

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**Long-Term siRNA Treatment Targeting Hepatic Androgen Receptor (AR) Provides Durable Rescue of Hepatic Insulin Resistance and Excessive Gluconeogenesis in a Chronic PCOS Mouse Model**

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Polycystic ovary syndrome (PCOS) is a common endocrine disorder characterized by hyperandrogenemia and closely associated with reproductive abnormalities and metabolic dysfunction, including insulin resistance, hyperglycemia, dyslipidemia, obesity, and type 2 diabetes. We previously demonstrated in a short-term (90-day) letrozole (LET)-induced PCOS mouse model that siRNA targeting hepatic androgen receptor (AR) restores insulin signaling and normalizes gluconeogenesis. However, whether hepatic AR silencing can durably rescue metabolic dysfunction during prolonged hyperandrogenemia remains unknown. Given the chronic nature of PCOS, this study investigated whether sustained hepatic AR silencing restores long-term metabolic dysfunction induced by persistent hyperandrogenemia. Female C57BL/6J mice (4 weeks old) were assigned to three groups: LET (n=9), placebo control (CON, n=8), and LET+siRNA (n=9). LET and LET+siRNA mice received continuous-release LET pellets at baseline and again at 3 months. LET+siRNA mice were treated biweekly with hepatocyte-targeted AR-siRNA (10 mg/kg, subcutaneous). Metabolic tests (GTT, ITT, PTT, GSIS) were performed monthly for six months. RT-PCR confirmed sustained 60–70% hepatic AR knockdown across 180 days. LET-treated mice showed progressive metabolic decline, including impaired glucose tolerance, reduced insulin sensitivity, and increased gluconeogenesis. In contrast, LET+siRNA mice exhibited progressive metabolic rescue, with complete normalization by month 6. AR-siRNA restored insulin-stimulated phosphorylation of IR, AKT, and FoxO1 without altering total protein levels.Our findings demonstrate that chronic hyperandrogenism induces severe systemic metabolic disturbances driven largely by hepatic AR. The durable rescue achieved by AR-siRNA identifies hepatic AR as a central mediator of long-term PCOS pathogenesis and highlights AR-siRNA as a promising targeted therapeutic strategy for managing chronic PCOS-associated metabolic dysfunction.

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**Age-Based Comparative Analysis of Clinical and Genetic Features in New-Onset Type 1 Diabetes**

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Type 1 diabetes is an autoimmune disease resulting from immune-mediated destruction of pancreatic beta cells. Although commonly diagnosed in childhood, adult-onset T1D is increasingly recognized and may present differently. We hypothesized that adults with new-onset T1D exhibit distinct immunologic and genetic features compared to young children. We analyzed a Barbara Davis Center database of newly diagnosed T1D patients (1996–2024) containing islet autoantibody and HLA genetic data. Diabetes was defined using ADA criteria, confirmed by autoantibody positivity and insulin requirement at onset. Clinical data including HbA1c and diabetic ketoacidosis were obtained from electronic health records. Patients were stratified as <5 years or ≥20 years and analyzed using GraphPad Prism. New-onset T1D children <5 years old (n=347, mean age 3.1 +/- 1.2 years) and adults ≥20 years old (n=295, mean age 31.5 +/- 12 years) were compared. Adults had

higher HbA1c at diagnosis (median 11.5% vs. 10.5%, p<0.0001) but were less likely to present with DKA (32% vs. 55%, p<0.0001). Adults more frequently had glutamic acid decarboxylase 65 autoantibodies (76% vs. 69%, p=0.04), while IA-2, and ZnT8 autoantibodies were less prevalent compared to children. Adults were more likely to have zero or one positive autoantibody (41% vs. 17%, p<0.0001), whereas children more often had ≥2 autoantibodies (83% vs. ~60%). The HLA-DQ8 allele was more common in children (71% vs. 49%, p=0.014); other HLA class II alleles were similar. Adults with new-onset T1D demonstrate distinct autoantibody patterns and lower DQ8 prevalence than children, underscoring the importance of comprehensive autoantibody testing in adults.

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**Timing of Surgical Decompression in Cauda Equina Syndrome: A Retrospective Propensity-Matched Cohort Study Using TriNetX**

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Cauda equina syndrome (CES) is a rare neurologic emergency traditionally managed with urgent surgical decompression to prevent permanent neurologic deficits; however, the evidence supporting a strict 24-hour operative threshold remains inconsistent. This study aimed to compare short-, intermediate-, and long-term outcomes in patients with CES undergoing early (≤24 hours) versus delayed (>24 hours to ≤7 days) surgical decompression. A retrospective, propensity score–matched cohort study was conducted using the TriNetX Global Collaborative Network. Adult patients diagnosed with CES who underwent lumbar decompression within seven days were identified and stratified by timing of surgery. Propensity score matching balanced demographics, comorbidities, and medication use, resulting in 2,076 patients per cohort. Primary outcomes included urinary retention, bowel dysfunction, sensory deficits, mortality, and repeat decompression at 30 days, 90 days, and 1 year. Across all follow-up intervals, no statistically significant differences were observed between early and delayed decompression groups. At 30 days, urinary retention occurred in 5.4% of early versus 5.8% of delayed patients (p=0.48), bowel dysfunction in 2.5% of both groups (p=1.00), and sensory deficits in 4.9% versus 5.0% (p=0.80). Similar nonsignificant findings persisted at 90 days and 1 year, with Kaplan–Meier analyses demonstrating comparable event-free survival between cohorts. These findings suggest that decompression within 24 hours may not independently improve neurologic or functional outcomes compared with decompression performed within one week of diagnosis. Surgical timing alone may not determine recovery in CES, and patient-specific clinical factors should guide operative urgency and management strategies.

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**The Impact of Liquid Plasma on Plasma Wastage**

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Introduction: Early administration of plasma has been shown to improve outcomes in trauma patients. The plasma products with the shortest preparation times have differing shelf lives: thawed plasma (5 days) and liquid plasma (26 days). Due to the short shelf life of thawed plasma, significant wastage occurs. In October 2025, the blood bank transitioned to storing liquid plasma in the trauma refrigerator instead of thawed plasma. Plasma wastage rates were subsequently compared to determine whether this change resulted in a reduction in wastage. Methods: Plasma wastage data were reviewed for the period from February 1, 2025, to January 31, 2026. Thawed plasma was utilized from February 1, 2025, to September 30, 2025, while liquid plasma was utilized from October 1, 2025, to January 31, 2026. The mean monthly plasma wastage was compared between these two groups. Results: During the review period, 412 units of plasma were discarded; 335 thawed plasma and 77 liquid plasma. Prior to liquid plasma being stored in the trauma refrigerator, 339 units of plasma were discarded (297 thawed/42 liquid). After liquid plasma was introduced, 85 units of plasma were discarded when liquid plasma was made available (50 thawed/35 liquid). The average wastage before liquid plasma was 42.38/month and after was 21.25/month, representing a 49.86% reduction in wastage. Conclusion: The institution of liquid plasma allowed the hospital to decrease wastage while still providing plasma in an expeditious manener.

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**A Propensity-Matched TriNetX Network Analysis of Dual vs Mono Antiplatelet Therapy Following Lower Extremity Revascularization**

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Background: Anti-platelet management following lower-extremity revascularization for peripheral artery disease (PAD) remains heterogeneous in routine practice. We evaluated whether dual antiplatelet therapy (DAPT) was associated with lower subsequent major amputation compared with aspirin monotherapy using a real-world database. Methods: A retrospective cohort study was performed using the TriNetX US Collaborative Network. Adults (≥18 years) undergoing lower-extremity revascularization (open or endovascular) were identified. The study cohort received aspirin plus a P2Y12 inhibitor (i.e., ticlopidine, clopidogrel, prasugrel, ticagrelor, or cangrelor)

following the initial revascularization procedure, i.e., DAPT. These were compared to a "control" group who were treated post-procedure with aspirin alone. Patients whose treatment included anticoagulation were excluded from this study. The primary outcome assessed was a major amputation (above or below knee amputation) within the first year following revascularization. Results: 11,171 patients were identified for the "study" cohort as well as for the "control" group in matched cohorts. DAPT was associated with lower 1-year risk of above-knee amputation (1.9% [210/11,147] vs 2.8% [309/11,125]; 95% CI −1.3% to −0.5%; risk ratio 0.68) and lower 1-year risk of below-knee amputation (3.0% [328/11,117] vs 4.4% [489/11,086]; 95% CI −2.0% to −1.0%; risk ratio 0.67). Kaplan–Meier analysis was concordant for both outcomes (log-rank p<0.001). Conclusions: In this propensity-matched real-world analysis of PAD patients who underwent lower-extremity arterial revascularization, DAPT was associated with lower 1-year amputation risk compared to aspirin alone.

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**The valve behind the bleed: Unmasking Heyde's syndrome in a transfusion dependent patient with ESRD**

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Background: Heyde's syndrome describes the association between severe aortic stenosis, acquired type IIA von Willebrand syndrome, and recurrent gastrointestinal bleeding from angiodysplasia. High shear stress across a stenotic valve promotes loss of high-molecular-weight von Willebrand factor multimers, impairing hemostasis. Valve replacement restores multimer distribution and reduces bleeding in most patients, supporting a causal relationship. In patients with end-stage renal disease (ESRD), baseline anemia and uremic platelet dysfunction may delay recognition. Case Presentation: A 71-year-old male with ESRD on hemodialysis and atrial fibrillation presented with recurrent symptomatic anemia requiring frequent transfusions, often with hemoglobin ≤6.0 g/dL. Prior evaluations identified colonic angiodysplasia and a treated duodenal arteriovenous malformation; however, anemia persisted. Echocardiography revealed severe aortic stenosis, raising suspicion for Heyde's syndrome as the underlying etiology of his recurrent anemia. Transcatheter aortic valve replacement was recommended but declined, resulting in ongoing transfusion dependence and recurrent hospitalizations. Discussion: Symptomatic severe aortic stenosis is associated with poor prognosis and warrants valve replacement. In the context of Heyde's syndrome, valve intervention has been associated with recovery of high-molecular-weight von Willebrand factor multimers and reduction in clinically significant gastrointestinal bleeding.In ESRD, the high baseline prevalence of anemia may lead clinicians to overlook Heyde's syndrome unless anemia proves refractory or suspicion remains high. Conclusion:Clinicians should maintain suspicion for Heyde's syndrome in ESRD patients with recurrent transfusion-dependent anemia and severe aortic stenosis when standard anemia management fails. Early recognition is critical, as definitive treatment of aortic stenosis may reduce recurrent bleeding, transfusion burden, and associated morbidity and mortality in appropriately selected patients.

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**Sedation Strategy and Post-Colonoscopy Hemorrhage: A Comparative Analysis of Propofol and Dexmedetomidine**

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Background: Sedation choice during colonoscopy may influence post-procedural bleeding risk, but comparative data between propofol and dexmedetomidine remain limited.Objective: To compare 30-day post-procedural bleeding after colonoscopy between patients receiving propofol versus dexmedetomidine.Methods: A retrospective analysis using the TriNetX Global Collaborative Network evaluated adults with exclusive same-day exposure to propofol or dexmedetomidine. Cohorts were propensity-score matched (1:1) for demographics and comorbidities. Results: In matched cohorts (propofol n=1,612; dexmedetomidine n=1,527), the 30-day bleeding outcome occurred in 0.8% of propofol patients versus 1.6% of dexmedetomidine patients (HR 0.489; p=0.032. While propofol offers significantly faster sedation onset and recovery, dexmedetomidine provides superior hemodynamic stability, respiratory preservation, and enhanced post-procedural analgesia. Notably, other research indicates that anesthesia services using propofol may increase hemorrhage risk by 28% compared to standard sedation. Conversely, dexmedetomidine can attenuate postoperative hypercoagulability by reducing the surgical stress response and cytokine release. Conclusions: Propofol was associated with a lower 30-day bleeding signal in this real-world cohort. However, clinicians must weigh this against dexmedetomidine's superior respiratory safety and analgesic benefits, which may be advantageous in specific high-risk populations. Given conflicting data regarding sedation-linked hemorrhage, prospective trials are necessary to clarify these risks and optimize sedation selection.

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**Skin Cancer Risk Among Patients with Celiac Disease: A TriNetX Analysis**

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Objective: To evaluate whether patients with celiac disease have an increased risk of developing skin cancers. Design, Setting, and

Participants: A retrospective cohort study was done utilizing the TriNetX Global Collaborative Network database. Cohort 1 (n=276,699) – adults (≥18 years) with Celiac disease (ICD-10-CM: K90.0), and cohort 2 (n=2,299,684) – adults (≥18 years) without Celiac disease were propensity score matched on demographics and lifestyle/comorbidity factors, including nicotine dependence, alcohol-related disorders, BMI, psoriasis, and chronic skin ulcers yielding two balanced cohorts of 248,960. Main Outcomes and Measures: Outcome measures included melanoma (ICD-10-CM:C43; ICD-10-CM:D03) and nonmelanoma skin cancers (ICD-10-CM:C44; ICD-10-CM:D04). Risk analysis, Kaplan-Meier survival, and number of instances analysis were performed. Results: The Celiac disease cohort had an overall higher risk of developing both melanoma and nonmelanoma skin cancer compared to matched controls. The risk of developing nonmelanoma skin cancer was significantly higher in the celiac group (2.3%) than the control group (1.2%)(Risk Ratio: 2.07; CI:1.969–2.177; $p < 0.001$). Kaplan-Meier analysis showed lower survivability in the nonmelanoma skin cancer Celiac group (89.90% vs 94.25%; $p < 0.001$). There was also an elevated risk of melanoma in the Celiac group (0.5%) vs the controls (0.3%)(Risk Ratio:1.547; CI:1.398–1.712; $p < 0.001$). Kaplan-Meier analysis for melanoma survivability was also slightly lower (97.94% vs 98.34%; $p < 0.001$).

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**Ketamine Exposure on the Day of Burn Debridement and Risk of Incident PTSD and Depressive Disorders: A Propensity-Matched EHR Cohort Study (TriNetX)**

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Background. Psychiatric sequelae after burn injury, including post-traumatic stress disorder (PTSD) and depression, contribute to long-term morbidity. Ketamine is often used during burn debridement for analgesia and sedation, but its association with longer-term mental health outcomes in this population remains unclear. Methods. Using the TriNetX Global Collaborative Network, we identified patients with burns (ICD-10 T20–T25) who underwent skin debridement (CPT 1003164). The ketamine cohort received ketamine (RxNorm 6130) on the same day as debridement; controls did not. Outcomes were assessed from 1 to 730 days after the index event. Incident PTSD (ICD-10 F43.1) and depressive disorders (ICD-10 F33 and F32.* including F32.A; ICD-9 296.2) were evaluated, excluding patients with pre-existing diagnoses. Propensity score matching (1:1) was performed to balance baseline characteristics, yielding 1,251 patients per cohort. Results. PTSD occurred in 47/1,142 (4.1%) ketamine-exposed patients versus 22/1,184 (1.9%) controls (risk ratio [RR] 2.215, 95% CI 1.344–3.651; p=0.001); hazard ratio (HR) 2.401 (95% CI 1.447–3.985). Depressive disorders occurred in 90/900 (10.0%) versus 71/992 (7.2%) patients (RR 1.397, 95% CI 1.037–1.882; p=0.027); HR 1.534 (95% CI 1.124–2.095). Conclusion. Perioperative ketamine exposure was associated with a higher 2-year risk of incident PTSD and depressive disorders after burn debridement. These findings highlight the need for careful interpretation in the context of treatment-selection factors.

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**Representation of Culturally and Linguistically Diverse Participants in AAC Research on Autism: A Rapid Review**

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Culturally and linguistically diverse (CLD) individuals on the autism spectrum are historically underrepresented in augmentative and alternative communication (AAC) research. This underrepresentation limits the generalizability of current AAC assessment and intervention strategies, which impacts clinicians' abilities to provide culturally responsive therapy. This rapid review aimed to examine the extent to which CLD participants on the spectrum are included in recent AAC studies and how cultural and linguistic variables are reported or considered within these studies. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) was used as a guiding systematic methodology tool. Articles were included if they met the following criteria: (a) U.S.-based and published in English, (b) peer reviewed, (c) participants included individuals with ASD who used AAC, and (d) studies were quantitative, qualitative, or mixed-methods. Thirty studies met the criteria for full inclusion, and data were extracted to identify the number and demographics of participants; reporting practices of race, ethnicity, and language background; and mentions of cultural or linguistic considerations. Results indicate that CLD representation for AAC users on the spectrum continues to be limited. Only 16 of the 30 included studies reported any race or ethnicity, indicating patterns of inconsistency and underreporting within this body of literature. Few articles mentioned home languages of participants, and cultural and linguistic variables were rarely discussed, as only 10 of the 30 studies acknowledged the lack of cultural reporting as a limitation within the study.

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**Blood Pressure and Hypertension Prevalence by Race in U.S. Adults Aged ≥85 Years**

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Background. In the United States, non-Hispanic Black (NHB) adults have higher total and cardiovascular mortality than non-Hispanic White (NHW) adults. However, this pattern reverses around age 85, a phenomenon known as the mortality crossover. From 2018–2023,

cardiovascular mortality per 100,000 among NHB men aged ≥85 years was 5,188 compared with 6,132 in NHW men. Similar patterns are observed in women. One hypothesis is that Black adults who survive to advanced age are healthier than White adults. We tested whether NHB adults aged ≥85 years have lower hypertension prevalence and lower blood pressure (BP) than NHW adults. Methods. All of Us data accessed on 09/17/2025 included 7,758 participants aged ≥85 years from a cohort of 633,540. Individuals with missing race or ethnicity were excluded. Essential hypertension was identified using SNOMED code 320128. Participants without recorded BP measurements were excluded, leaving 6,365 individuals for BP analyses. Demographics and systolic BP were examined. No persons were aged ≥91 years. Results. Among participants aged ≥85 years, 49% were female; 58% were aged 85–86, 38% were 87–88, and 4.3% were 89–90. The cohort included 496 (6.6%) Black and 6,096 (81%) White participants. Overall, 54.2% had diagnosed hypertension, with a higher prevalence among Blacks (61.5%) than Whites (53.5%). Mean systolic BP was 137 mmHg (SD 18) overall, 136 mmHg (SD 18) in Whites, and 142 mmHg (SD 19) in Blacks. Conclusion. Hypertension prevalence and systolic BP remain higher among NHB than NHW adults aged ≥85 years, suggesting hypertension is unlikely to explain the mortality crossover.

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**Using a Culturally Responsive, Racialized, and Equity Perspective in Public Health Program Evaluations**

Presenter's Name: Veronica Thomas
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Despite decades of progress in evaluation, many public health program evaluations prioritize neutrality and technical objectivity. These evaluations overlook or minimize the effects of structural inequities, historical trauma, and systemic racism, which shape health program design, implementation, and the health outcomes of the populations served. Graduate training in health program evaluation often emphasizes methodological rigor without equal attention to culture, community engagement, power dynamics, and equity. Health program evaluators, in addition to their technical and statistical expertise, must demonstrate respect and understanding of the cultural context in which they operate. Furthermore, they should incorporate these insights into their evaluations, foster collaborations with priority communities, highlight inequities when they emerge rather than hide or ignore them, and challenge biased understandings of long-standing issues, such as victim-blaming, stigma, and misconceptions about health outcomes for certain populations. Campbell and Thomas (2026), in their recently published textbook, after years of research on the topic, advocate for a culturally responsive, equity-centered, and racialized framework for health program evaluation. They seek to expand the ways health program evaluation is taught and practiced by integrating cultural, racialized, and socially just perspectives throughout every stage of the process. The textbook urges evaluators to: (a) recognize positionality and power dynamics, (b) engage populations of focus collaboratively and ethically, (c) avoid deficit-oriented interpretations of health disparities, and (d) produce and disseminate high-quality, robust findings that are valid, culturally grounded, and equity-oriented to guide decision-making for improving public health.

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**Socioeconomic and Mental Health Determinants of Intimate Partner Violence–Related Emergency Department Visits Among Women in California**

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Background: Intimate partner violence (IPV) is a major public health concern affecting one in three U.S. women. Many survivors rely on emergency departments (EDs), particularly when socioeconomic disadvantage and mental-health vulnerabilities heighten risk. Objective: To identify demographic, socioeconomic, and clinical factors associated with IPV-related ED visits among women aged 15–64 years in California. Methods: We performed a cross-sectional analysis of the California State Emergency Department Database (SEDD-HCUP) records from 2018 - 2020. IPV was defined using validated ICD-10-CM codes capturing confirmed and suspected abuse. Covariates included age, race/ethnicity, insurance type, neighborhood socioeconomic status (Distressed Communities Index), and mental-health and chronic conditions. Multivariable logistic regression was used to evaluate predictors of IPV-related ED visits. Results: Among 1,387,772 ED visits, 5,729 (0.41%) involved IPV. Women living in the most distressed communities had significantly greater odds of an IPV-related visit than those in prosperous areas (aOR 1.47, 95% CI 1.32–1.64). Young women demonstrated the highest risk, with those aged 15–24 years having fourfold greater odds compared with women aged 55–64 years (aOR 4.07, 95% CI 3.56–4.65). Uninsured/self-pay women also had more than twice the odds of IPV-related visits relative to privately insured women (aOR 2.04, 95% CI 1.81–2.30). Several mental-health conditions—including bipolar disorder, PTSD, alcohol abuse, and dementia—were independently associated with elevated IPV risk. Conclusion: IPV-related ED visits disproportionately affect young, uninsured women living in poor communities and those with mental-health comorbidities. Enhancing ED-based screening, strengthening mental-health integration, and expanding community-level prevention efforts are critical to reducing IPV burden.

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**Medicaid Expansion and Glioblastoma Survival: Reducing Disparities Among Vulnerable Populations**

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Background: Glioblastoma (GBM), the most aggressive adult primary brain cancer, has poor survival rates despite advances in treatment. Socioeconomically disadvantaged and racial/ethnic minority groups often face barriers to timely care, worsening outcomes. The Affordable Care Act's Medicaid expansion aimed to improve healthcare access, potentially enhancing GBM outcomes through earlier diagnosis and better treatment access. Objective: This study evaluates how Medicaid expansion affects overall and cancer-specific survival among patients with glioblastoma, comparing outcomes in California (expanded Medicaid) and Texas (non-expanded). Methods: We conducted a retrospective cohort analysis using data from the Surveillance, Epidemiology, and End Results (SEER) registry from 2007 to 2021. The study included 15,614 GBM patients aged 18–64 from selected California and Texas. Survival outcomes were analyzed using a Difference-in-Differences (DID) approach combined with Cox proportional hazards models, adjusted for demographic, clinical, and socioeconomic variables. Results: Among the cohort, 7,525 patients (48.2%) were diagnosed pre-ACA and 8,089 (51.8%) post-ACA implementation. Medicaid expansion was associated with improved GBM survival outcomes. Patients in California post-ACA experienced an 8.6% reduction in the hazard of cancer-specific mortality (CSM: DID –8.6%; 95% CI: -16.8% to –0.4%; p=0.04) and a 7.6% decrease in overall mortality (OM: DID -7.6%; 95% CI: -15.0% to –0.02%; p=0.04) compared to Texas. Conclusion: Medicaid expansion improved survival among GBM patients in California compared to non-expansion Texas, highlighting the critical role of health policy interventions in addressing disparities and underscoring the need for broader Medicaid adoption nationwide.

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**Dysregulated Peroxiredoxins in Bladder Urothelial Carcinoma Are Associated with Altered Tumor Immune Microenvironment and Genomic Instability**

Presenter's Name: Jarett Wallerson
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Bladder urothelial carcinoma (BLCA) is one of the most common types of urologic malignancies that disproportionately affects older males. Peroxiredoxin (PRDX1-6) are antioxidant enzymes that have been linked to cancer progression and immune modulation, but their prognostic roles in BLCA remain unclear. This study investigates the association between PRDX expression levels and their impact on genomic instability, tumor immune microenvironment, and tumor characteristics in BLCA. Clinical and RNA sequencing data of the PRDX genes were acquired from The Cancer Genome Atlas (TCGA). Samples (n = 411) were grouped by expression levels using their z-score. A comparative analysis was done to evaluate their impact on genomic instability metrics, tumor immune microenvironment, and expression of innate immune and checkpoint genes. Overall survival was assessed to determine their prognostic relevance. PRDX1, PRDX4, and PRDX5 overexpression was significantly associated with genomic instability. While the overexpression of PRDX2, PRDX4, and PRDX6 was significantly associated with tumor immune microenvironment. PRDX4 and PRDX6 exhibited a hot immune phenotype, whereas PRDX2 and PRDX3 exhibited colder immune profiles. PRDX6 overexpression was associated with poor prognosis and advanced tumor characteristics. PRDX1 overexpression was also linked to reduced overall survival, but a colder immune phenotype. PRDX4 was strongly associated with genomic instability and tumor immune microenvironment. PRDX2 overexpression was associated with advanced tumor stage and size, without significant impact on overall survival. Future studies should validate findings and explore the role of PRDXs as useful biomarkers when combined with other biomarkers to improve BLCA prognosis.

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**Direct vs. Indirect Childhood Victimization among African American Young Adults in Washington D.C.**

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Background- ACEs are Adverse Childhood Experiences that occur during childhood from the ages of 0-18 years of age. As children's brains develop they are especially vulnerable to these experiences. This prolonged activation of stress response systems can disrupt the development of brain architecture and other organ systems, and increase the risk for stress-related disease and cognitive impairment, well into the adult years. Methods- Participants were between the ages of 18-25, Black or African American, HIV negative (excluding those with compromised immune systems), and living in a lower-income wards (5, 7 and 8) of Washington, D.C. The questionnaire used in this study was modeled after the Juvenile Victimization Questionnaire (JVQ). The questionnaire contained 34 items that asked participants whether they experienced or witnessed several forms of violence before age 18. We grouped different types of violence into five types: conventional crime, child maltreatment, peer/sibling victimizations, sexual victimization, and witnessing/indirect victimization. Results- The study included 638 members of the community who answered the exposure to violence questionnaire. 142 individuals of those who responded to the questionnaire reported no exposure to violent incidents and 495 reported exposure to one or more violent incidents. The highest correlation to depressive symptoms was witnessing/indirect victimizations. Conclusions- Our findigs highlight both direct and indirect victimization play independent roles in mental health disorders and drug use. Although there appears to be higher positive correlations between experiencing direct victimization and

current drug use and higher positive correlations between experiencing indirect victimization and depressive symptoms/moods, both have independent effects.

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**Adolescent Dysmenorrhea and Risk of Subsequent Irritable Bowel Syndrome: A Multicenter Retrospective Cohort Study**

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*Presentation Type: Poster Presentation*
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Co-authors: McKenzi Thompson

Background: Dysmenorrhea and irritable bowel syndrome (IBS) share overlapping mechanisms, including prostaglandin-mediated smooth muscle activity and visceral hypersensitivity. However, it remains unclear whether adolescent dysmenorrhea predicts future IBS diagnosis. Objective: To evaluate whether adolescent dysmenorrhea is associated with increased subsequent IBS risk in a large propensity score-matched multicenter cohort. Methods: We conducted a retrospective cohort study using electronic health record data from a multi-institutional database (TriNetX). Females aged 10-19 with at least one clinical encounter were included. The exposed cohort had a documented diagnosis of dysmenorrhea. The comparison cohort excluded patients with dysmenorrhea, inflammatory bowel disease, malabsorption disorders, GI malignancy, intestinal endometriosis, or prior bowel resection. Cohorts were propensity score matched (PSM) 1:1 on age, race, mental and behavioral disorders, endometriosis, polycystic ovarian syndrome, and obesity. Patients with prior IBS were excluded. The primary outcome was incident IBS occurring ≥1 day after index date during available follow up. Risk ratios with 95% confidence intervals were calculated. Results: After 1:1 PSM, 58, 212 patients remained in each cohort. Incident IBS occurred in 427/57,718 adolescents with dysmenorrhea (0.7%) compared to 300/57,923 controls (0.5%). Dysmenorrhea was associated with increased risk of subsequent IBS (RR 1.43, 95% CI 1.23–1.66; risk difference 0.2%; $p<0.001$). Conclusion: Adolescent dysmenorrhea may represent an early clinical marker of visceral pain sensitization and future IBS risk. Identification of disparities in diagnostic progression may inform earlier intervention strategies and improve equity in gastrointestinal and reproductive care.

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**New-Onset Musculoskeletal Manifestations in Hidradenitis Suppurativa: A Large-Scale Incidence Analysis**

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Background: Hidradenitis suppurativa (HS) is a chronic inflammatory skin disease traditionally considered cutaneous in nature. Emerging data suggest HS may also have systemic inflammatory effects, including musculoskeletal involvement, yet large-scale studies evaluating incident joint disease following HS diagnosis are limited. Objective: To quantify the 12-month incidence of new-onset musculoskeletal manifestations, including synovitis, enthesopathy, and small joint pain, among patients with newly diagnosed HS. Methods: We conducted a retrospective cohort study using the TriNetX US Collaborative Network, analyzing electronic health records from 71 healthcare organizations. Patients aged 18–40 years with newly diagnosed HS and no prior history of joint disease were included. Outcomes assessed within 12 months of HS diagnosis included synovitis, tenosynovitis, enthesopathy, and small joint pain. Kaplan–Meier survival and frequency analyses were performed. Results: Among 125,181 patients with HS, 1.2% developed synovitis or enthesopathy and 2.3% developed small joint pain within one year of diagnosis. Kaplan–Meier survival probabilities at 12 months were 98.5% for synovitis/enthesopathy-free survival and 97.2% for small joint pain-free survival. The median number of outcome instances per patient was 1, with mean instances of 2.14 and 2.24, respectively. Conclusion: This large-scale cohort study demonstrates that HS is associated with an early risk of musculoskeletal involvement, reinforcing its classification as a systemic inflammatory condition. Clinicians should monitor for joint-related symptoms in HS patients, particularly within the first year of diagnosis, to enable timely intervention and prevent progression.

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**Epigenetic Activation of Innate Immunity Restrains Tumor Growth in Head and Neck Cancer**

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*Presentation Type: Poster Presentation*
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Objective: Immune checkpoint blockade (ICB) has improved outcomes in head and neck squamous cell carcinoma (HNSCC), yet most patients remain intrinsically resistant. The cGAS–STING pathway drives type I interferon (IFN-I) signaling and antitumor immunity but is frequently epigenetically repressed in tumors, limiting immunogenicity and responsiveness to STING agonists. This study investigated whether decitabine-mediated epigenetic reprogramming restores tumor-intrinsic cGAS–STING activity and promotes immune priming in HNSCC.
Methods: Using the DNA methyltransferase inhibitor decitabine, we evaluated cGAS–STING signaling in MOC1 and MOC2 murine oral cavity cancer models representing immune-hot and immune-cold microenvironments. Molecular and cellular analyses included flow cytometry, Western blotting, qPCR, ELISA, and immunohistochemistry, with complementary in vivo studies. Results: Decitabine inhibited proliferation and colony formation in both MOC1 and MOC2 cells, induced G1 cell-cycle arrest, activated DNA damage responses, and promoted apoptosis. Treatment upregulated key components of the cGAS–STING–IFN-I pathway, indicating restoration of innate immune signaling. Decitabine also increased MHC-I and MHC-II expression, enhancing antigen presentation. In vivo, decitabine activated cGAS–STING–IFN-I signaling, increased immune cell infiltration, and elevated

PD-1 expression in both tumor models, consistent with enhanced tumor immunogenicity and adaptive immune engagement. Conclusion: Decitabine exerts direct antitumor effects while restoring tumor-intrinsic cGAS–STING–IFN-I signaling in HNSCC, independent of baseline immune status, supporting its potential to convert immune-cold tumors into immunotherapy-responsive disease.

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