
# NCUR 2021 Proceedings

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## "Just to Chat, Truly Yours, Your Biggest Fan, This Is Stan": an Analysis on the Phenomenon Known as Stan Twitter

Rhetoric and Writing Studies - Time: Mon 1:30pm-2:30pm - Session Number: 146
*Allison Partin, Dr. Adrienne Jankens, English Department, Wayne State University, 42 W Warren Ave, Detroit, MI 48202*
Allison Partin

Twitter is one of the biggest social media platforms that has come to be within this generation, amassing a variety of sub-cultures and communities within users, including gamers, musicians, artists, and one specific group known as “stans”. The term “stan” is relatively new, evolving from Detroit rapper Eminem’s song given the same title, “Stan”, this sub-culture consists of teenagers, mostly girls aged between 13-19, who obsess over different musicians and bands, including the likes of One Direction, Ariana Grande, and BTS, just to name a few.

Any member of the “stan twitter”community learns that there is so much more to these groups than meets the eye. User @saturnsappho, who identifies as part of the Harry Styles fandom and has amassed over 500 followers, describes it specifically as “a place that feels like home; I am able to talk freely about my interests with people who won’t judge or make fun of me because they feel the same way”. However, almost every positive comes with a negative, and unfortunately these communities can turn sour, becoming full of narcissistic behavior and toxicity.

*Naming What We Know: Threshold Concepts of Writing Studies* (Adler-Kassner and Wardle) can help us understand the ways that stans write to bring to life their identities and communities on Twitter. Specifically, their own unique identity, ideologies, and morals become shaped and displayed through the various tweets that are written throughout their accounts. In my proposed presentation, I will analyze the emotional appeal of these “stans” and how their overall personal identity from these accounts is shaped, specifically through core concepts that are presented in “Threshold Concept 3: Writing Enacts and Creates Identities and Ideologies” (Adler-Kassner and Wardle).

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## A Game-theoretic Approach to Wildlife Management

Mathematics - Time: Tue 11:00am-12:00pm - Session Number: 446
*Humza Khan and Dr. Fernando Charro, Department of Mathematics, Wayne State University, 42 W Warren Ave, Detroit, MI 48202*
Humza Khan

The cost for the administration of up-keeping the environment in some semi-abandoned rural areas in Spain is unaffordable given the current state of decay and breadth of the task. Moreover, there is the added problem of maintaining improvements over time, which is expensive and requires a long-term compromise either from the administration, which is not always possible, or from the people that live in these areas, who have no incentive to carry out this maintenance. This leaves preserves to turn to measures that focus solely on monetizing their own resources by taking short-term measures that overall will not help the environment.

In our work, we have used game theory to study the design of an agreement among hunting preserves to conserve wildlife and support each other, both financially, and for the betterment of the environment. We show that it is possible for the administration to encourage the formation of coalitions of management units that carry out high-quality environmental interventions. We have created a mathematical model for this situation that incorporates regulated hunting as an active agent and funding mechanism. We show that, in this way, it is possible to achieve the same environmental goals with less cost for the administration, create an incentive to upkeep the improvements years after the implementation, and generate funding to support said maintenance, somehow breaking the cycle of scarcity.

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## Acetyl isogambogic acid activates unfolded protein response and apoptosis in head and neck cancer

Biology - Time: Tue 5:00pm-6:00pm - Session Number: 804

*Mehrnoosh Ghafouri AbbasAbadi, Chester Gauss, Thomas Jetmore, Jordyn Lucas, Jared Lin, Sarah Colbert, Gauthom Baddigam, Syed Akbari, Michael U. Callaghan, Yue Xi and Andrew M. Fribley*

*Carman and Ann Adams Department of Pediatrics, Wayne State University School of Medicine. 421 E. Canfield Detroit, MI 48201*

Mehrnoosh Ghafouri AbbasAbadi

Squamous cell carcinoma is a cancer that arises from squamous cells. Head and neck squamous cell carcinoma (HNSCC) develop in the mucous membranes of the mouth, nose, and throat. HNSCC is the sixth most common malignancy in the world with 650,000 new diagnosis and 350,000 death every year. Currently chemotherapy and radiation are the mainstay treatments however, the 5 year survival rate for patients with stage 3 or 4 disease is still less than 50%. There is an urgent unmet clinical need to investigate and discover novel treatments for these patients. HNSCC is characterized by dysregulated cell growth rate and aberrant protein synthesis which leads to increase protein folding demand and the need for chaperones. This high protein demand leads to accumulation of misfolded proteins in endoplasmic reticulum that causes ER stress and results in Unfolded Protein Response (UPR). To address the shortcoming of the current treatments for HNSCC, we attempted a high-throughput screen on a compound library of 2400 compounds in order to identify compounds that could induce ER stress and enforce a terminal (apoptotic) UPR in HNSCC. Acetyl-IsoGambogic Acid (AIGA) emerged as a hit; AIGA strongly showed activation of UPR and apoptotic pathways. Cell proliferation assays, gene expression, protein immunoblot profiles, DNA fragmentation assay, and fluorescence activated cell sorting (FACS) were consistent with activation of UPR and apoptosis in a panel of HNSCC cell lines. Considered together these data confirmed that our HTS approach could successfully identify novel inducers of a terminal unfolded protein response. Natural compounds such as AIGA might be able to provide a new therapeutic approach for treating patients with HNSCC.

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## Adverse Childhood Experiences and a Trusting Parent Teacher Relationship Among Early Head Start Parents

Psychology - Time: Wed 3:00pm-4:00pm - Session Number: 7007
*Sitara Ghuznavi, Rida Qureshi Dr. Ann Stacks - amstacks@wayne.edu Wayne State University 42 W Warren Ave, Detroit, MI 48202*
Rida Qureshi, Sitara Ghuznavi

The purpose of this project is to explore whether parents' adverse childhood experience (ACEs) impact their relationship with their child's Early Head Start teacher. The parent-teacher relationship is important for children because it is related to children's positive development and social-emotional skills. Research to-date suggests that parents with higher levels of education and lower levels of depression and stress collaborate more with their child's teacher. Yet, there are no data related to ACEs and the parent-teacher relationship. Interpersonal trauma is associated with a general reduction in the ability to trust helping professionals. This may hinder a parent's ability to trust his/her child's teacher, which can impact a child's classroom experience and learning potential. This study fills a gap in the work related to a parent's history of trauma and its impact on the parent-teacher relationship.

H1: Parents education will be positively correlated with the parent-teacher relationship

H2: Parental stress and depression will be negatively correlated with the parent-teacher relationship

H3: Parents ACEs will predict lower levels of confidence, collaboration, commitment and respect, after controlling for education, stress and depression.

Parents (n = 59, 54% female) were participants in a larger study, Hearts and Minds on Babies (HMB), which evaluates the effectiveness of an integrated, attachment-based intervention for Early Head Start parents and teachers. Self-report data from the pretest study wave will be used. Participants completed the ACEs questionnaire, the Family and Teacher/Provider Relationship Questionnaire and the Parent Caregiver Relationship Scale. First descriptive statistics for demographics and study variables will be examined. Then, correlation analyses will be used to examine relationships between all study variables. Finally, regression analyses will be used to assess the relationship between ACEs and the parent-teacher relationship, after controlling for education, stress and depression.

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## Analysis of Gene Duplication in Arabidopsis Thaliana on Growth Patterns, and It's Application in the Agricultural Industry

Plant Sciences - Time: Wed 12:00pm-1:00pm - Session Number: 6172
*Chuanzhu Fan, Feng Tao, William Nauam, Department of Biology, Wayne State University, 5047 Gullen Mall, Detroit MI 48202*
William Nauam

Arabidopsis Thaliana has been a long time genetic model organism used to study genomics and genetics. Like many model organisms today, the genome has been entirely sequenced, and further analysis of this organism is now being pursued. The purpose of this study, through a series of phenotypic analyses, is to better understand the attributes of the genes of interest. Unknown functions in growth patterns, and requirements for proper mature growth has the potential to be useful in the agricultural industry. With the use of phenotypic analysis, we can best determine the role of gene function. There are two stages employed in the analysis, the first being logging of growth patterns of the leaflets into well-defined stages, in order to keep track of growth. The second stage being counting of flowers as they appear, is to account for and analyze growth patterns in mature stages of the plants life cycle in accordance to the genes studied. The mutant strains being tested for and studied are denoted as SSN1, and SSN2, with a control wild-type, Columbia (Col-0). SSN1 and SSN2 are duplicated genes and are paralogs. SSN1 is a duplication for the gene AT5G12960 and SSN2 a duplication in the gene ATG12950 . Through the observation and cross colonization of the Col-0, SSN1, and SSN2, we can observe how the gene duplication can affect the overall fitness of the organism and similar species. However, in the case where there is no statistical difference, further testing may prove that the gene in question may have some importance in mitigating shock in extreme cold or heat. We hypothesize that the gene duplication observed in this experiment will show the role it has on adaptation in this species and those similar, as well as its role in changing the mechanisms of existing genes.

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## Assessing the Acceptability of an eHealth Intervention to Improve Diabetes Care Among Emerging Adults with Poorly Controlled Type 1 Diabetes

Nursing & Public Health - Time: Wed 12:00pm-1:00pm - Session Number: 6041

*Deepika Baskar Wayne State University Integrated Biosciences Building (IBio) #3128 & 3129 6135 Woodward, Detroit, MI 48202 April Idalski Carcone, PhD Associate Professor Division of Behavioral Sciences Family Medicine and Public Health Sciences Wayne State University Integrated Biosciences Building (IBio) #3128 & 3129 6135 Woodward, Detroit MI 48202 Deborah Ellis, PhD Associate Professor Division of Behavioral Sciences Family Medicine and Public Health Sciences Wayne State University Integrated Biosciences Building (IBio) #3128 & 3129 6135 Woodward, Detroit, MI 48202 Steven Ondersma, PhD Division of Public Health Department of Obstetrics, Gynecology and Reproductive Biology 965 Wilson Road, Room A626B East Lansing, MI 48824-1316*
Deepika Baskar

**Background**: The transitional period of emerging adulthood (18-25 years), with its focus on identity development and establishing independence, places some youth at risk for poor type 1 diabetes (T1D) outcomes. Yet, there are few effective interventions that specifically target emerging adults with T1D. Emerging adults have technology integrated into their natural ecology and are reliant on mobile devices, demonstrating the utility of technology-based interventions.

**Objective**: The purpose of this study is to describe the development and initial evaluation of an eHealth intervention to improve T1D management in emerging adults with poor metabolic control.

**Methods**: *The 3Ms* is a two-session intervention to increase feelings of autonomy and motivate emerging adults to engage in their own diabetes care. Session 1 introduces 3 key diabetes care behaviors, *The 3 Ms* - Medication, Meter, and Meals – through psychoeducation and increases self-efficacy by providing strategies supporting T1D management. Session 2 reviews progress toward goal attainment, then reinforces participant success or bolsters motivation by reflecting on personal strengths. Ten emerging adults (16-25 years) diagnosed with T1D for at least six months with

hemoglobin A1c (HbA1c) ≤ 9.0% reviewed the intervention and provided feedback via semi-structured interviews. Interviews were audio-recorded and transcribed for analysis. Using Framework Matrix analysis, two coders developed a consensus matrix to derive themes from the interview data.

**Results**: Two primary themes emerged from the data. Youth described experiences characteristic of the developmental tasks of emerging adulthood: a preference for autonomy, the process of identity assimilation, and the struggle to integrate themselves into "normal" settings. Participants' impressions of the intervention characterized it as containing elements that were credible, relatable, and helpful reminders.

**Conclusions**: Emerging adults found *The 3Ms* to be acceptable and appropriate. Next steps will include testing intervention efficacy in a large-scale clinical trial.

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## Auto-Factory Practices Put Female Autoworkers at a Greater Risk of Developing Reproductive Cancers

Health & Human Development - Time: Tue 3:30pm-4:30pm - Session Number: 5117
*Nolan Babinski, Dr. Tim Moran, Irvin D. Reid Honors College, Wayne State University, 2100 Undergraduate Library 5155 Gullen Mall Detroit, MI 48202*
Nolan Babinski

Many women in the Metro Detroit area depend on the auto industry to make their livings, with many of these workers being exposed to possibly carcinogenic compounds. Along with the legal practices of large automotive firms (i.e. Ford, GM, and FCA), which have long been criticized by labor unions such as the UAW, supplier firms and others may historically have been suppressing female assembly line worker safeguards. Workers themselves may also not have been aware of some of the exposures that could affect their health and wellbeing.

The relationship between cancer in females and occupation has begun to gain popularity scholarly research, with the beginnings of a positive correlation between cervical cancer in females exposed to metal-working fluids. My research is an attempt to categorize and problematize the nature of cancer risk among female autoworkers through qualitative data collected from stakeholder interviews, medical professional observations, and interviews with organized representation for these workers. It is not a statistical modeling of this subject; that would be a work for a more advanced study. This project aims to narrate the relationship between reproductive cancers in females and the working conditions that female autoworkers are exposed to, extrapolated via chi-squared analysis, as well as providing changes that need to be made to the legal practices of automotive firms (i.e. revisions to liability release forms signed by employees) in order to prevent further ill-health in their female employees.

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## Behind the “Runner’s High”: a Systematic Review on the Effects of Exercise on the Endocannabinoid System

Exercise Science & Nutrition - Time: Mon 4:30pm-5:30pm - Session Number: 321
*Shreya Desai, Breanna Borg, and Hilary Marusak, Department of Psychiatry and Behavioral Neurosciences, Wayne State University, Tolan Park Medical Building 3901 Chrysler Service Drive, Suite 2B Detroit, MI 48201*

Shreya Desai

The endocannabinoid (eCB) system plays a key role in maintaining homeostasis and disruptions in eCB signaling have been linked to obesity, anxiety, and depression. Pharmacological interventions that boost or mimic the effects of eCBs have been shown to have anxiolytic and analgesic effects. Emerging data suggest that *behavioral* interventions, such as physical exercise, may also boost circulating eCB levels. Indeed, the classic "runner's high" - the sense of wellbeing and mood elevation felt after exercise - is thought to be due, in part, to increasing eCB levels. We conducted a PubMed search to identify original research articles published prior to 9/10/2020 that examined the impact of exercise on circulating eCB levels. Twenty-nine articles were included in the final review. Twenty of the 29 studies included humans (n=12 healthy; n=8 patients with pre-existing conditions) and 10 studies included animals (1 study included both humans and animals). Eighteen of the 29 studies examined acute effects (i.e., a single bout) of exercise and 11 examined chronic effects (i.e., exercise program). All 29 studies reported levels of the eCB anandamide (AEA), and 83% of studies (n=24) reported an increase in AEA following exercise. One study reported no change in AEA levels and four studies reported a decrease in AEA after exercise. In addition, 86% of studies (n=25) examined other eCBs, such as 2-AG; however, the results were inconsistent. The reviewed studies indicate a consistent increase in circulating AEA levels following acute exercise. Given that elevated eCB levels are linked to improved mood, reduced pain, and neuroprotection, increases in eCB levels may underlie some of the long-term beneficial effects of exercise on "brain health". Interestingly, four studies reported a decrease in baseline AEA levels following longer-term aerobic exercise programs (e.g., treadmill running), suggesting a modulation of baseline eCB system functioning that warrants further study.

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## Calibration of Photoacoustic Signal Temperature Dependence for Quantitative

# Thermometry During Endovenous Laser Ablation Procedures

Biological & Chemical Engineering - Time: Mon 3:00pm-4:00pm - Session Number: 2549
*Tanyeem Shaik, Mohammad Mehrmohammadi, College of Engineering, Wayne State University,818 W Hancock St, Detroit, MI 48201*
Tanyeem Shaik

Chronic venous insufficiency (CVI) is a prevalent condition and the main cause of varicose veins. Endovenous laser ablation (EVLA) is a minimally invasive, ultrasound (US)-guided procedure for treating varicose veins. Current EVLA procedures lack a temperature feedback system for monitoring the real-time temperature, which relates to the thermal dose deposition inside the vein during ablation procedures. Therefore, EVLA procedures performed without any temperature monitoring may lead to an insufficient thermal dose which causes the recurrence of varicose veins (20-40% of cases) or recanalization. We propose to use photoacoustic (PA) imaging for monitoring the real-time temperature inside the vein. The ultimate goal of this project is to design and develop a PA calibrated temperature feedback system for monitoring the changes in temperature during EVLA procedures. In order to achieve “quantitative PA thermometry”, understanding the dependence of PA signal change as a function of the surrounding temperature plays a key role. Especially, since the optical properties of blood changes at higher temperatures, it is important to study such changes and use them in calibrating PA thermometry measurements. In this study, a systematic evaluation of PA signal dependence on temperature in blood and in water-based tissues was performed. The project is divided into two major parts: (a) design an experimental temperature monitoring setup to validate the ability of PA imaging to monitor the real-time temperature changes in a blood medium and determine the baseline calibration curves in blood and water-based tissue. (b) design an optical absorption measurement device to evaluate the optical absorption properties of blood at higher temperatures to create a calibration curve between the changes in PA amplitude with temperature variations. Using the baseline calibration curves, we demonstrate the quantitative PA thermometry (qPAT) during EVLA in a set of excised tissue experiments.

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demonstrate the quantitative PA thermometry (qPAT) during EVLA in a set of excised tissue experiments.

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## Can Unsupervised Machine Learning Models Be Used to Better Allocate Public Safety Resources?

Sociology - Time: Tue 12:30pm-1:30pm - Session Number: 545

*Sergio Brilanti-Martinez and Dr. Brad Ray, School of Social Work, 42 W. Warren Ave. Detroit, MI 48202*
Sergio Brilanti-Martinez

The past summer has seen mass civil unrest in the United States as a response to dissatisfaction with existing public safety service models. Previous analysis of crime data using unsupervised machine learning methods is abundant. However, less research has been done to use these tools in the broader context of public safety and to guide areas of opportunity for public safety reform. This analysis will attempt to find patterns and discrepancies between public safety demand and supply in part by separating officer and citizen-initiated service calls for each type of crime or incident as well as incorporating complaint data. Of particular interest is examining any disparities among the percentage of calls of a type within a census track initiated by officer or citizen. Disparities in this variable among clusters can shed insights into behavioral patterns among both officers and citizens in how they respond to public safety concerns. Initial mapping of officer versus citizen-initiated service calls in ArcGIS Pro illustrates some types of service calls are initiated by officers at much higher rates in certain areas. Three datasets from the city of Detroit will be used with data from a 12-month period: 911 service calls, crime incidents, and police complaints. The data will be run through a k-means algorithm, the feature set will be filtered to get rid of noise, and the number of clusters will be determined using the elbow method. The modeling will be with the purpose of better understanding public safety demand and supply in the city of Detroit and of evaluating the usefulness of k-means modeling for determining public safety demand and supply and its potential role in generating actionable recommendations to key stakeholders.

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## Changes in the Gut Microbiome Following Traumatic Stress Exposure in a Mouse Model of Post-Traumatic Stress Disorder (PTSD)

Microbiology - Time: Tue 5:00pm-6:00pm - Session Number: 5634

*Rebecca Schultz, Dr. Alana Conti Department of Neurosurgery, Wayne State University, 42 W Warren Ave, Detroit, MI 48202 Research and Development Service, John D. Dingell Veterans Affairs Medical Center, 4646 John R St, Detroit, MI 48201*
Rebecca Schultz

Posttraumatic stress disorder (PTSD) can occur in response to exposure to extreme adverse events. Its lifetime prevalence in adult Americans is estimated at 6.8% of the population, approximately 20 million adult Americans. There is a positive correlation between PTSD and gastrointestinal (GI) pain and upset, with the origin of these GI issues attributed to bacterial changes in the gut microbiome. Animal studies have shown a relationship between stress and intestinal wall dysfunction, leading to increased systemic lipopolysaccharide (LPS) levels, which has been linked to neuroinflammation and cognitive impairment. The communication between microbiota and the central nervous system is not fully understood, but it is thought to be bidirectional and complex. The goal of my project is to quantify the changes in the concentrations of microbiome bacteria after exposure to mouse Single Prolonged Stress (mSPS), a mouse model validated by our lab for the use of studying PTSD, in order to gain fuller understanding of the interactions between stress, the brain, and the gut microbiome. Single-housed C57Bl/6 mice were exposed to mSPS, with fecal and blood samples collected prior to and 7 days after mSPS. Using quantitative polymerase chain reaction (qPCR), the levels of bacterial DNA of several bacterial phyla found in the microbiome were quantified from the fecal samples. LPS levels present in blood from animals exposed to mSPS or control conditions were also measured and analyzed with enzyme-linked immunosorbent assays (ELISAs). It is expected bacterial levels from the Actinobacteria and Firmicute phyla will decrease, as these phyla are associated with stress. Likewise, elevated blood LPS levels are also expected after mSPS. Greater understanding of the gut-brain axis through these studies will be critical in the development of novel treatment and assessment methods in PTSD patients.

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## Characterizing Spatial Coefficient of Variation in Arterial Spin Labeling: Associations with Age, Cognition, and Vascular Health in Older Adults

Health & Human Development - Time: Tue 3:30pm-4:30pm - Session Number: 5119
*Shelby Darichuk, Patrick Pruitt, Dr. Jessica Damoiseaux, Department of Psychology, Wayne State University, 42 W Warren Ave, Detroit, MI 48202*
Shelby Darichuk

Perfusion of blood to brain tissue may play a role in cognitive aging, and can be measured using the neuroimaging method arterial spin labeling (ASL). A recently developed ASL parameter, spatial coefficient of variation (sCoV), provides complementary information to traditional perfusion measures. The sCoV has been suggested as an alternative hemodynamic measure to predict prolonged arterial transit time (ATT) which has been connected with neurodegenerative disorders such as Alzheimer's Disease. The objective was to explore associations of sCoV with aging, cognition, and vascular health. ASL data, neuropsychological testing data, and self-reported demographic and cardiovascular data were collected from older adults in the Netherlands (n = 33, 13 women, mean age 67.58 ± 8.32 years). Spatial CoV had a significant positive correlation with age (r = 0.427, p = 0.013) and a significant negative correlation with a measure of episodic memory performance (WMS Delayed Memory index score; r = -0.439, p = 0.015).The association between episodic memory performance and sCoV was no longer statistically significant after controlling for age and gender. Spatial CoV had small associations that were not significant with measures of vascular health, including pulse pressure (r = 0.285, p = 0.114), mean arterial pressure ( r = 0.268, p = 0.138), and modified vascular risk (r = 0.185, p = 0.318). We also did not find an association between sCoV and a measure of executive function performance (Stroop ratio; r = 0.075, p = 0.677). The associations of sCoV with age and episodic memory in older adults highlight its potential to characterize the association between vasculature and cognitive decline through aging. However, the small association between sCoV and episodic memory performance after controlling for age suggests this effect may be subtle and require more strongly powered studies to characterize the relationship between sCoV and cognition in older adults.

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controlling for age suggests this effect may be subtle and require more strongly powered studies to characterize the relationship between sCoV and cognition in older adults.

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## Communication, Planning, and Self Care: Examining the Gendered Aspect of Coping with Work Family Conflict Among Parents and Childfree Individuals

Sociology - Time: Wed 3:00pm-4:00pm - Session Number: 7136
*Ranya Krayem, Krista Brumley, and Shirin Montazer, Department of Sociology, Wayne State University, 656 W Kirby, Detroit MI, 48202 Katheryn Magruire, Department of Communication, Wayne State University, 906 W Warren Ave, Detroit MI, 48202 Boris Baltes, Department of Psychology, Wayne State University, 5075 Woodward Ave, 7th Floor, Detroit MI, 48202*
Ranya Krayem

Work family conflict (WFC) is an inter-role conflict in which the role pressures from work and family domains are mutually incompatible. The demands and stressors of one's work life interfere with that of their home life, potentially resulting in less time with family, lack of energy, and feelings of not doing a good enough job at home. When this stress arises, a strain is created within a household. Both the employee and their family must find ways to cope with the WFC. In this study, the goal is to analyze the use of different types of coping mechanisms and explore how gender may shape them. In depth interviews were conducted (n=44), transcribed, and coded using NVivo. Reports were created based off the codes and later analyzed for trends in relation to gender, parenthood status, and different types of coping mechanisms. Findings show that women are more proactive when it comes to preventative coping. Those without children tended to use emotion focused preventative care over problem focused prevention. Parents use social support, especially received care, more than couples with no children to cope with episodic stressors.

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## Conditioning Minimizes Cognitive Damage During Early-Stage Brain Development

Biology - Time: Mon 4:30pm-5:30pm - Session Number: 3108
*Nadiya Sharif, Zhongjie Shi, Kehuan Luo, Sidhartha Tan, Neonatal and Perinatal Medicine, Children's Hospital of Michigan, 3901 Beaubien Boulevard, Detroit, MI 48201.*
Nadiya Sharif

Hypoxic-Ischemic Encephalopathy (HIE), in which the thalamus of the fetal brain is targeted resulting

in cell death, results in Hypoxic-Ischemic related intellectual disorders. In this study, a rabbit model was used to reflect acute placental insufficiency (i.e., H-I) in humans, with the objective of determining the possibility of using conditioning to minimize cognitive damage in early-stage brain development. H-I in fetuses was induced via uterine ischemia. Postpartum, fetuses were conditioned to recognize a human face via consistent exposure to a human feeder for 9 days, after which cognitive tests took place. In test 1, the goal being to determine if the kits were able to recognize the original feeder as they were presented during the conditioning process, the H-I ($p = 0.0142$) and naïve ($p = 0.0001$) conditioned kits differentiated between positive stimuli from the negative stimuli but the unconditioned kits displayed no preference for either stimulus ($p > 0.05$). In test 2, in which the kits were tested for whether the lab coat was the discriminative stimulus they recognized, the H-I ($P= 0.0001$) and Naïve ($P= 0.0215$) conditioned kits continued to identify the positive stimuli, despite changing contexts. Test 3, which aims to determine if the kits are using olfactory or visual pathways, demonstrated that the naïve ($P = 0.0037$) and H-I ($P= 0.035$) conditioned kits may have relied on their olfactory system to identify the original feeder rather than their visual perception. However, both olfactory and visual pathways in the brain cross the thalamus, suggesting that an improvement in cognitive recognition is identifiable. Furthermore, the lack of statistical significance, in tests 1-3, between the conditioned Naive and H-I kits, alludes that the cognitive damage due to H-I was mild or the time between the surgery and the cognitive testing allowed for sufficient brain recovery.

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## Crude Oil Price Fluctuations: a Forty-Year Examination

Economics - Time: Tue 12:30pm-1:30pm - Session Number: 511

*Stephanie Price-Cummings, and Dr. Liang Hu, Department of Economics, Wayne State University, 42 W Warren Ave, Detroit, MI 48207*
Stephanie Price-Cummings

Crude oil is one of the most important commodities in the global economy and fluctuations in its' prices have been observed over the past forty years. Various factors such as geopolitical events, surging global demand, overproduction, and new technology-driven by artificial intelligence play a role in determining

crude oil prices. This paper conducts three sequential analyses. First, it examines the booms and busts in crude oil prices and analyzes the events that caused these cycles. Topics covered include the history of energy trade agreements, political disputes and wars, OPEC decisions, industrialization, and global supply and demand. Second, we apply economic theories to investigate how oil price shocks affect the economy through various channels. From consumers' perspective, unexpectedly high oil prices, and hence higher gasoline prices would cause the loss of discretionary income in households. Moreover, oil price shocks affect expectations about the future path of the price of oil. From firms' perspective, oil price fluctuations affect the cash flow of earlier investment decisions by manufacturing firms. The transmission mechanism is also linked to macroeconomic outcomes including inflation, output, employment, and wages. Expected results from the nominal price of oil will likely showcase that financial markets are more correlative than causational and are more linked during expansionary periods in the global business cycle. Third, a time series econometric approach is employed to quantify the effect of economic factors on predicting future oil prices in an attempt to explain the cause, measure the impact that the global economy has on price fluctuations, and explain why it is difficult to predict the price of oil. Preliminary analysis shows that global demand for oil, proxied by the world production index published by the OECD, is a major driving factor, whilst U.S. gross domestic product has a less significant impact on future real oil prices.

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## Description of a New Species of Hyalella (Amphipoda: Hyalellidae) from Belle Isle

Ecology - Time: Tue 2:00pm-3:00pm - Session Number: 613

*Molly McKeon, Taylor Hardy and Dr. Donna Kashian, Department of Biological Sciences, Wayne State University, 5047 Gullen Mall, Detroit MI 48202*
Molly McKeon

Benthic macroinvertebrates make up a significant portion of the biomass of freshwater aquatic ecosystems. The macroinvertebrate species Hyalella azteca occurs in regions from the equator to the

Arctic. They are found mainly in shallow freshwater environments, but also dwell in brackish water. They thrive in lentic or lotic water. They are characterized by spines on their dorsal side, which can vary amongst individuals; moreover, there has been variation in their second antennae length. This variation may be an indicator there is more than one taxa present. The differences being studied show a potential speciation event taking place in real-time. The primary objective of this research is to compare the gene sequence of Hyalella from freshwater lagoons on Belle Isle, Detroit MI and compare them to the GenBank® official H. azteca genome. Hyalella were collected from lagoons on Belle Isle with 500 µm D-Nets and stored separately in ethanol. The DNA will be amplified using PCR to obtain larger fragments. The primers are designed to be specific for Hyalella to avoid DNA contaminants. Samples will be sent for Sanger sequencing in forward and reverse directions to the University of Arizona. Our sequences from Hyalella will be compared to already published genomes found in GenBank® using Chromas, MegaX, BLAST and ClustalOmega. Preliminary data indicates that the species found on Belle Isle is a different species than the more-known H. Azteca. From assessment of past data, along with the proceedings from current evaluation of research this is a new species of amphipoda that has speciated from the original H. azteca specimen. If this is the case, publishable research will be formed and sent out by April of 2020 and the specimen in mind will be named. The speciation event creates an open field for further study and description of the specimen.

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## Do Sedentary Conditions Affect the Number of C1 Neurons in Rat Rostral Ventrolateral Medulla?

Exercise Science & Nutrition - Time: Mon 3:00pm-4:00pm - Session Number: 223
*Benjamin Huber, Patrick J. Mueller, Department of Physiology, Wayne State University School of Medicine, 540 E. Canfield, Detroit, MI 48201 Ida J. Llewellyn-Smith, Department of Cardiovascular Medicine, Human Physiology and Centre for Neuroscience, College of Medicine and Public Health, Flinders University, Bedford Park, South Australia, Australia*
Benjamin Huber

The rostral ventrolateral medulla (RVLM) is an important region in the brainstem for blood pressure control because it contains a critical subset of adrenergic (C1) neurons that project to sympathetic preganglionic neurons in the spinal cord. C1 neurons from sedentary rats show more dendritic branching than in physically active rats, suggesting a novel mechanism by which inactivity could increase sympathetic activity and contribute to hypertension. However, it is also possible that the absolute number of C1 neurons changes along with the number of dendritic branches in sedentary rats. Therefore, the purpose of this study was to test the hypothesis that there are more C1 neurons in the RVLM of rats living under sedentary conditions compared to freely exercising rats. Aiming to understand the mechanisms by which inactivity leads to hypertension, we maintained four-week old, male Sprague-Dawley rats for 10–12 weeks under either physically active conditions (running wheels; 410±5.6 km total per rat) or sedentary conditions (no running wheels). Following perfusion and post-fixation, sections of brainstem were first immunoperoxidase-stained black for phenylethanolamine N-methyltransferase (PNMT), a synthetic enzyme and marker of C1 neurons, and then brown for tyrosine hydroxylase (TH), the enzyme that all catecholamine neurons contain. PNMT+TH and TH only neurons in each rat were counted for the 6 sections containing the 600 μm caudal to the caudal pole of the facial nucleus (FN). Sedentary conditions did not produce a difference in the number, or rostrocaudal pattern, of TH+PNMT-immunoreactive C1 neurons compared to the active group, nor an interaction between the two (two way RM ANOVA, $p>0.05$ ea). Because the number of RVLM C1 neurons is the same in active and sedentary rats, an increase in the number of C1 neurons is not a cause of increased activation of vasomotor spinal neurons in sedentary rats.

(HL096787-09)

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## Drone Imagery and Archaeology: Protocols for producing isometric illustrations from drone imagery in Alpuente, Spain

Anthropology & Archeology - Time: Mon 1:30pm-2:30pm - Session Number: 2028
*Kristen Doby, and Dr. Thomas Killion Department of Anthropology, Wayne State University, 42 W. Warren Avenue, Detroit, Mi 48202*
Kristen Doby

Drone Imagery and Archaeology: Protocols for producing isometric illustrations from drone imagery in Alpuente, Spain

By Kristen Doby and Mikayla Swasey

This mapping intensive project aims to abstract structure dimensions, configuration, and form of farming villages and agricultural terraces abandoned in the western highlands of Valencia, Spain during the 2nd half of the 20th century. Using photogrammetric data collected by aerial drone (Mavic Pro 2.0 by DJI) in the summer of 2019, we seek to illustrate settlement agriculture patterns and develop a mapping and illustration protocol using Photoshop. While drone imagery has revolutionized the field of archaeology, particularly as it relates to landscape analysis, further work is needed in the development of methodological practices for integrating this data with archaeological work and streamlining image illustration. Our contribution to this project is to produce isometric imagery that compliments 3-D models to form clearer pictures of settlement behavior that is unobstructed by foliage and shadows in drone imagery. With this data and Photoshop protocol, we provide a preliminary step in construction of a relational database to store and interpret data from archaeology, ethnography, drone images, and archives. Data from this project will be used for the creation of a methodology to generate simplified line drawings from drone imagery and will assist in the larger analysis of the Alpuente Landscape Ethnoarchaeology Survey Project (A.L.E.S). The ALES research in Alpuente critically examines the archaeological concept of “settlement abandonment” and the degree to which sustainable agricultural practices can exist under conditions of agricultural intensification. In such a large landscape analysis, these protocols are critical and will prove beneficial for landscape archaeology as the discipline continues to incorporate drone technology.

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## Effective Connectivity Analyses of the Plasticity of Brain Networks in Schizophrenia During Learning

Biology - Time: Mon 3:00pm-4:00pm - Session Number: 2573

*Kalyyanee G. Nanaaware, Asadur Chowdury, Shahira Baajour, Dr. Jeffrey A. Stanley, Dr. Vaibhav A. Diwadkar, Department of Psychiatry and Behavioral Neurosciences, Wayne State University School of Medicine, Tolan Park Medical Building, 3901 Chrysler Service Drive, Detroit MI 48201*
Kalyyanee Nanaaware

Learning is a process characterized by neural circuit plasticity and schizophrenia is suggested to be a disorder of network plasticity. Understanding impaired learning and network plasticity in schizophrenia patients has rarely been attempted at the macroscopic scale. We implemented a learning paradigm which induced negatively accelerated associative learning and utilized Dynamic Causal Modeling (DCM) to analyze the fMRI data. DCM estimates effective connectivity of pathways and changes in degree of modulation (indicates network plasticity) induced by the condition. We investigated the plasticity of ascending/descending pathways in the brain networks in schizophrenia. Control (HC) group was free of neurological/psychological evaluation (n=38; nine females). Patient (SCZ) group was stable (n=52; ten females). Subject ages: 18-50. The object-location association paradigm induced negatively accelerated learning through encoding, rest, and retrieval conditions. During encoding, subjects associated objects displayed on a 9x9 grid with the object's grid location. Locations were randomly cued during retrieval; subjects recalled associated objects. We repeated eight cycles of the paradigm; observed a roughly linear rate of learning during cycles 1-4 which plateaued during cycles 5-8. Cycles 1-4 were denoted as "early" stages of each condition, cycles 5-8 as "late" stages. Two model structures were hypothesized, four conditions of early/late encoding and retrieval modulated relevant pathways. Structures included ventral/dorsal visual pathways, hippocampus, frontal regions; differing in whether descending pathways were modulated. Winning model didn't have descending pathways modulated by the task. Results suggest network plasticity in SCZ/HC groups since encoding induced similar increases in degree of modulation of network pathways. Retrieval induced differing results, specifically in frontal-hippocampal

pathways. A time by group interaction (significance 0.009) was induced by retrieval in the ascending pathway from the inferior temporal gyrus to the hippocampus, suggesting altered plasticity in patients. Retrieval induced a main effect of group in frontal pathways, indicating lower modulation of patient networks.

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## Elucidating Mechanisms Involved in Hydroxyurea-Mediated Reduction in Red-Cell Endothelial Interactions in Sickle Cell Disease

Biochemistry - Time: Mon 1:30pm-2:30pm - Session Number: 2173

*Kimera Harris, Urvashi Thongam, Eric VanBuren, Jennell White Department of Pharmacology, Wayne State University School of Medicine 540 E Canfield St., Detroit, MI 48202*
Kimera Harris

Vaso-occlusion is the hallmark of sickle cell disease (SCD) resulting in frequent pain, organ damage, and early death. Red blood cells (RBCs) contribute to vaso-occlusive episodes (VOEs) by abnormally adhering to the vascular endothelium. Hydroxyurea (HU), the standard of care for SCD management, reduces the frequency of VOEs, in part, by reducing adhesion receptor expression and red cell adhesion, however, regulatory mechanisms are unknown. Very late antigen-4(VLA-4), the most characterized adhesion receptor in SCD, is highly expressed on immature RBCs (reticulocytes) present in SCD patients in increased numbers. Reticulocytes and VLA-4 cell surface expression are increased during VOEs and decreased in HU-treated patients. We previously demonstrated that VLA-4-mediated adhesion is reduced in HU-treated patients. Others have shown that VLA-4 activity, and subsequent adhesion, is regulated with cell signaling pathways although these mechanisms have not been defined in RBCs or SCD. Our more recent data demonstrates that HU modulates VLA-4-mediated adhesion in

whole blood samples collected from SCD patients within minutes suggesting rapid erythroid signaling pathways may be involved. Ongoing studies are aimed at understanding the effect of HU on VLA-4 activity and this relationship with sickle reticulocyte adhesion. Flow cytometric and functional adhesion approaches will be utilized to assess VLA-4 activity and VLA-4 binding affinity, respectively. This study aims to reveal novel pathways that target VLA-4 to reduce VOEs in SCD.

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## Examining the Relationship Between Neighborhood Adversity and Glycemic Control Among African American Adolescents with Type 1 Diabetes

Nursing & Public Health - Time: Wed 12:00pm-1:00pm - Session Number: 6039

*Yasir Mehmood, Jamil Gharib, Jessica Worley, Dr. April Carcone, Dr. Malcolm Cutchin, and Dr. Deborah Ellis, Department of Family Medicine and Public Health Sciences, Wayne State University, 3939 Woodward Avenue, Detroit, MI 48201*
Yasir Mehmood

African American adolescents with Type 1 Diabetes in the U.S. demonstrate poorer glycemic control. This study examined the relationship between neighborhood adversity and glycemic control among African American adolescents. Neighborhood adversity includes stressors like reduced economic and social opportunities. We hypothesized that higher levels of neighborhood adversity were associated with poorer glycemic control in African American adolescents (10-16 years) with Type 1 Diabetes. Baseline data from a longitudinal intervention study were examined. Glycemic control was measured by HbA1c (%), a measure of average blood glucose. A percentage greater than 7.5% indicates poor glycemic control in adolescents. Neighborhood adversity was measured using the Neighborhood Adversity Index (NAI), which includes 9 indicators of adversity derived from U.S. Census block group data. Pearson's correlation demonstrated a positive relationship ($r = 0.310$, $p < 0.001$) between HbA1c and NAI scores. These results suggest that adolescents facing higher rates of neighborhood adversity are likely to also have poor glycemic control. A possible mechanism for this relationship is youths' internalization or externalization of neighborhood stress resulting in poorer diabetes care behavior. Future studies should implement a causal design to confirm that living in a more adverse neighborhood contributes to elevated HbA1c levels.

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## Functional Network Architectures are Distorted During Memory Formation and Consolidation in Schizophrenia

Psychology - Time: Wed 1:30pm-2:30pm - Session Number: 6656
*Emmanuel Meram, Shahira Baajour, Asadur Chowdury, Jeffrey Stanley, Vaibhav Diwadkar, Department of Psychiatry and Behavioral Neuroscience, Wayne State University School of Medicine, 540 E Canfield St, Detroit, MI 48201*
Emmanuel Meram

Schizophrenia (SCZ) is a highly debilitating neuropsychiatric disorder characterized by cognitive impairments particularly related to associative learning and memory (Diwadkar et al., 2008). Recent studies have characterized dysfunctional modulation of brain regions during associative learning, presenting evidence for the primacy of dysfunctional frontal-hippocampal lobe interactions (Woodcock et al., 2016). However, the complex, integrative network of functional brain connections offers multiplex interactions that can be summarized using graph theoretic analyses. Our primary focus was to use graph theoretic approaches, such as betweenness centrality (BC), to characterize network disorganization in schizophrenia induced during associative learning. BC is a metric that estimates the number of shortest functional paths that traverse through a node (brain region), making it a useful tool to investigate the connectivity of bridges between nodes (Heuvel et al., 2010). We modeled and applied BC to fMRI time series data collected while 59 subjects (32 SCZ) participated in an established associative learning and memory task (Wadehra et al., 2013). The task oscillates between periods of memory formation, wherein objects were presented in associated locations for naming, and retrieval, wherein recall cues were presented for association. A period of consolidation (rehearsal) follows formation. In SCZ, conditions of memory formation and consolidation induced significantly disorganized network structure. This was characterized by differential patterns of "hubness" (differences in BC) between groups. However, nodes with differences ($p<0.05$) did not always evince the highest

levels of BC within each group. We hypothesize that differences in BC can be induced on nodes that support task-implementation without being hubs in the overall network. Task-induced effects on the fMRI signal are not entirely predictable, and we suggest that overt- and covert task induced effects are essential for understanding the limits of network dysfunction in conditions like schizophrenia.

Schizophrenia (SCZ) is a highly debilitating neuropsychiatric disorder characterized by cognitive impairments particularly related to associative learning and memory (Diwadkar et al., 2008). Recent studies have characterized dysfunctional modulation of brain regions during associative learning, presenting evidence for the primacy of dysfunctional frontal-hippocampal lobe interactions (Woodcock et al., 2016). However, the complex, integrative network of functional brain connections offers multiplex interactions that can be summarized using graph theoretic analyses. Our primary focus was to use graph theoretic approaches, such as betweenness centrality (BC), to characterize network disorganization in schizophrenia induced during associative learning. BC is a metric that estimates the number of shortest functional paths that traverse through a node (brain region), making it a useful tool to investigate the connectivity of bridges between nodes (Heuvel et al., 2010). We modeled and applied BC to fMRI time series data collected while 59 subjects (32 SCZ) participated in an established associative learning and memory task (Wadehra et al., 2013). The task oscillates between periods of memory formation, wherein objects were presented in associated locations for naming, and retrieval, wherein recall cues were presented for association. A period of consolidation (rehearsal) follows formation. In SCZ, conditions of memory formation and consolidation induced significantly disorganized network structure. This was characterized by differential patterns of “hubness” (differences in BC) between groups. However, nodes with differences ($p<0.05$) did not always evince the highest levels of BC within each group. We hypothesize that differences in BC can be induced on nodes that support task-implementation without being hubs in the overall network. Task-induced effects on the fMRI signal are not entirely predictable, and we suggest that overt- and covert task induced effects are essential for understanding the limits of network dysfunction in conditions like schizophrenia.

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## Genomic Characterization of Genes Encoding Protein Methyltransferases Identifies Therapeutic Targets for Cancer Treatment

Biology - Time: Mon 4:30pm-5:30pm - Session Number: 3071

*Era Cobani and Dr. Zeng-Quan Yang, Department of Oncology, Wayne State School of Medicine, HWCRC 815 4100 John R. Detroit, MI 48201*
Era Cobani

Protein methyltransferases (PMTs) are a class of enzymes involved in epigenetic regulation that catalyze the transfer of one or more methyl group to lysine (K) and arginine (R) residues on histone and non-histone proteins. PMTs are classified into two subfamilies: protein lysine methyltransferases (PKMT) and protein arginine methyltransferases (PRMT). Recent genomic studies have shown that the genes involved in epigenetic regulation are altered in cancers at unexpectedly high frequencies, suggesting that certain PMTs may be driver genes in cancer development and progression. In this study, we performed a genomic meta-analysis that identified the association of copy number alterations (amplification, homozygous deletion) and mutations of 68 PMT genes (51 PKMTs and 17 PRMTs) with clinical features such as tumor grade, survival and prognosis in 32 cancer types.Utilizing the data from more than 10,000 tumor sample in TCGA data set via cBioPortal and other oncogenomic databases, we identified 24 PMTs with the highest frequency of genetic alterations, including 8 with high-level amplification, 3 with homozygous deletion, and 13 with somatic mutation. Loss-of-function analysis was conducted to examine PMT candidates with important roles in growth and survival of more than 10

cancer cells. As a result, we identified two genes: SETDB1 and PRDM10 as candidate therapeutic targets. PRDM10 is lost in a significant number of cancers such as sarcoma, melanoma, bladder urothelial carcinoma, cervical squamous cell carcinoma etc., while SETDB1 is significantly amplified in cancers such as breast invasive carcinoma, uterine cancer, bladder urothelial carcinoma, liver hepatocellular carcinoma etc. RT-qPCR and Western blots were conducted to measure the mRNA expression and protein levels of these two oncogenes in a panel of more than 10 cancer cell lines. In brief, this study provides a comprehensive analysis and gives insight into novel potential therapeutic targets for certain cancers.

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## Genomics in Pleistocene Park: On the Internal Causes Driving Extinction

Biology - Time: Mon 3:00pm-4:00pm - Session Number: 2572
*Jacob Kostecke & Dr. Weilong Hao, Department of Biological Sciences, Wayne State University, 5047 Gullen Mall, Detroit, MI 48202*
Jacob Kostecke

Many large mammals from woolly mammoths to saber-tooth tigers went extinct around 12,000 years ago during the last great Ice Age. Though external factors such as ancient human hunting, climate change, and even asteroid impacts have been speculated, the determining forces driving massive extinction remains elusive. Recent analyses on abundant genomic data suggest that elevated genetic mutations can cause extinction. In this study, we took advantage of the recently available and well preserved mitochondrial DNAs from extinct mammals to identify genetic mechanisms driving the extinction of megafauna. We compared substitution patterns between 24 extinct animals and their living relatives. This was accomplished through the use of the bioinformatic software Geneious Prime and phylogenetic trees. Overall, extinct mammals show more C → T and A → G substitutions on the light strand, but fewer G → A and T → C substitutions than their living relatives in the Cytochrome C Oxidase and ATP Synthase complexes. This suggests subtle differences in DNA replication and/or

repair between the extinct lineages and living relatives. Our study sheds light on the understanding of mechanistic factors in massive extinction and will help generate knowledge to prevent future extinctions.

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## Identification of Therapeutic Targets That Reduce VLA-4 Adhesion-mediated Vaso-occlusive Episodes in Sickle Cell Disease

Biochemistry - Time: Mon 1:30pm-2:30pm - Session Number: 2174

*Urvashi Thongam 1, David Kakhniashvili 2, Steven Goodman 2, Jennell White 1,3 Department of Pharmacology 1, Wayne State University School of Medicine, 540 E Canfield St, Detroit, MI 48201; Proteomics & Metabolomics Core 2, University of Tennessee Health Science Center, 800 Madison Ave, Memphis, TN 38103; Carman and Ann Adams Department of Pediatrics 3, Wayne State University School of Medicine, Children's Hospital of Michigan, 3901 Beaubien Street, Detroit, MI 48201*
Urvashi Thongam

Red blood cell (RBC) adhesion contributes to morbidity and mortality in sickle cell disease (SCD) by causing frequent and unpredictable vaso-occlusive episodes (VOEs). Hydroxyurea (HU), the mainstay therapy for SCD, reduces the frequency of VOEs, in part, by decreasing adhesion receptor expression and red cell-endothelial interactions. Very late antigen-4 (VLA-4), the most characterized adhesion receptor in SCD, is highly expressed on reticulocytes (immature RBCs) from SCD patients with frequent VOEs and decreased in HU-treated patients. VLA-4-dependent adhesive interactions are rapidly and reversibly modulated by cell signaling pathways in white blood cells and other inflammatory diseases however these mechanisms are not well defined in RBCs or SCD. Preliminary data from our lab indicate that VLA-4-mediated adhesion is decreased within minutes of HU treatment, suggesting rapid, erythroid cell signaling pathways may be involved. Using mass spectrometry (MS), we identified a novel approach to elucidate HU- and erythroid-signaling pathways that modulate VLA-4 function in sickle reticulocytes to aid in the development of alternative therapies to reduce VOEs in SCD. Post-acquisition analysis of raw MS data will identify VLA-4 protein interactions in SCD patients on/off HU therapy.

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causing frequent and unpredictable vaso-occlusive episodes (VOEs). Hydroxyurea (HU), the mainstay therapy for SCD, reduces the frequency of VOEs, in part, by decreasing adhesion receptor expression and red cell-endothelial interactions. Very late antigen-4 (VLA-4), the most characterized adhesion receptor in SCD, is highly expressed on reticulocytes (immature RBCs) from SCD patients with frequent VOEs and decreased in HU-treated patients. VLA-4-dependent adhesive interactions are rapidly and reversibly modulated by cell signaling pathways in white blood cells and other inflammatory diseases however these mechanisms are not well defined in RBCs or SCD. Preliminary data from our lab indicate that VLA-4-mediated adhesion is decreased within minutes of HU treatment, suggesting rapid, erythroid cell signaling pathways may be involved. Using mass spectrometry (MS), we identified a novel approach to elucidate HU- and erythroid-signaling pathways that modulate VLA-4 function in sickle reticulocytes to aid in the development of alternative therapies to reduce VOEs in SCD. Post-acquisition analysis of raw MS data will identify VLA-4 protein interactions in SCD patients on/off HU therapy.

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## Impact of Nutrition on 30-day Readmissions Among Patients Presenting to the Emergency Department with Acute Heart Failure

Biology - Time: Tue 5:00pm-6:00pm - Session Number: 804
*Tejeshwar Singh Bawa, Dilnoor Kaur Bawa, Phillip Levy, Wayne State School of Medicine, Wayne State University Integrative Bioscience Center 6135 Woodward Ave, Detroit, MI 48202*
Dilnoor Kaur Bawa

In America, heart disease is responsible for one in every four deaths. Heart failure (HF), in particular, is associated with a national health and economic burden that is expected to continually grow. Persons who consume a nutritious diet rich in micronutrients (e.g. vitamins) have lower cardiovascular disease risk and there is considerable interest in how the micronutrient environment might influence cardiovascular disease recovery. While there are many clinical and non-clinical factors that influence patient outcomes, our project will focus on nutrition's role in cardiovascular disease progression. My study investigates the relationship between patient nutritional profiles and post-discharge acute heart failure (AHF) cardiac recovery.

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## Impact of Stress on Food Based Routines in Families from Low Socioeconomic Backgrounds

Nursing & Public Health - Time: Wed 12:00pm-1:00pm - Session Number: 6033
*Hira Ali, Riya Chhabra, Shraddha Jadhav, Kristine Durkin, Kobra Eghtedary, Mark Greenwald, Elizabeth Towner Hira Ali, Department of Public Health, Wayne State University, 656 W. Kirby St.,*

*Detroit, MI 48202 Riya Chhabra, Department of Public Health, Wayne State University, 656 W. Kirby St., Detroit, MI 48202 Shraddha Jadhav, Department of Psychology, Wayne State University, 5057 Woodward Ave., Detroit, MI 48202 Kristine Durkin, Department of Psychology, West Virginia University, Morgantown, WV 26506-6040 Kobra Eghtedary, South Carolina Department of Health & Environmental Control, Bureau of Health Improvement & Equity Mark Greenwald, Tolan Park Medical Building, Suite 2A, Room 225, 3901 Chrysler Service Drive, Detroit, 48201 Elizabeth Towner, Department of Family Medicine & Public Health Sciences, Wayne State University, 6135 Woodward Ave., H206 Detroit, MI 48201*
Hira Ali, Riya Chhabra, Shraddha Jadhav

Food access and education are barriers to healthy eating for families from low-SES backgrounds. In our formative work with this population, caregivers described needing to learn strategies for budgeting, purchasing, and cooking to improve dietary quality. This secondary data analysis examines what time and cost-saving food-based routines and strategies caregivers from low-SES backgrounds are using and how stress may impact their use. Caregivers(N=34) were recruited from WIC clinics as part of a larger study on risk factors of preschooler obesity within low-SES populations. Caregivers were all female with a mean age of 34.48+7.53 years. Most(88%) identified as African-American. Caregivers completed the Perceived Stress Scale and were categorized as high/low stress based upon median split of the Total Score(range 0-56). Caregivers also noted use of 23 time and cost-saving food-based routines and strategies. Descriptive analyses were applied to examine strategy use for the sample overall and to explore differences by caregiver stress level. Caregivers endorsed using an average of 3.06+0.40 routines and strategies. The most frequently used routines and strategies were purchasing sale items(76%), serving the same meal to all family members(71%), freezing food(56%), and serving leftovers(56%). Overall, caregivers reported similar patterns of routine and strategy utilization irrespective of stress level. However, rates were higher by 4> caregivers in the low vs. high stress group for five routines and strategies: makes healthy meals with a few ingredients, serves leftovers, serving the same meal to all family members, buying food in bulk, and making groceries stretch across the month. Our findings suggest caregivers from low-SES backgrounds use few time and cost-savings routines and strategies, and that stress does not impact use patterns. Future research should examine strategies for engaging families from lower-SES backgrounds in utilizing time and cost-saving strategies to promote healthier eating.

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engaging families from lower-SES backgrounds in utilizing time and cost-saving strategies to promote healthier eating.

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## Improving Reproducibility of Prenatal Diffusion-Weighted Magnetic Resonance Imaging Biomarker to Detect Hypoxic-Ischemic Brain Injury in Rabbit Fetus

Nursing & Public Health - Time: Wed 12:00pm-1:00pm - Session Number: 6032
*Carolann Walkuski, Justin Jeong-Won Jeong, Wayne State University, 42 W Warren Ave 48202*
Carolann Walkuski

Cerebral palsy remains the leading motor disability among young children. Hypoxia-ischemia (H-I) in the prenatal period is a cause of cerebral palsy, suggesting an urgent need of non-invasive biomarker for early brain injury in the prenatal period. Our NIH-funded study using diffusion-weighted imaging (DWI) of rabbit dam suggests that average apparent diffusion coefficient (ADC) of 2-D cross-sectional region of interest (ROI) in fetal brain can be an excellent biomarker to predict motor deficits after birth. We have not been satisfied with the subjective evaluation of the mean value of ADC, which varies depending on the location and size of the selected 2-D ROI. This study investigates if the second order statistics: kurtosis and skewness of ADC value obtained from a 3-D ROI covering whole-brain can improve the reproducibility for detection of brain injury in the rabbit fetus affected by uterine ischemia. A rabbit dam (25 days gestation with 8 fetuses) underwent a series of 2 minutes DWI scans for 60 minutes while receiving a 40-minute-uterine H-I insult in the middle of DWI acquisition. Both 2-D contour ROI and 3-D sphere ROI (0.5 mm radius) were manually demarcated by two raters on each ADC map to assess the H-I related fetal brain injury. Finally, intra-class correlation coefficient (ICC) of two raters was evaluated from three measures of ADC time series, 1) Mean of 2-D ROI, 2) Kurtosis of 3-D ROI and 3) skewness of 3-D ROI. We found that both kurtosis and skewness provide better reproducibility than mean (ICC of kurtosis/skewness/mean = 0.92/0.91/0.74), suggesting that the high order statistics provide more consistent detection of the spatially uneven ADC abnormality-evaluation across raters. Further investigation with a large cohort should warrant that the proposed 3-D ROI analysis can accurately predict behavioral outcomes after birth.

Cerebral palsy remains the leading motor disability among young children. Hypoxia-ischemia (H-I) in the prenatal period is a cause of cerebral palsy, suggesting an urgent need of non-invasive biomarker for early brain injury in the prenatal period. Our NIH-funded study using diffusion-weighted imaging (DWI) of rabbit dam suggests that average apparent diffusion coefficient (ADC) of 2-D cross-sectional region of interest (ROI) in fetal brain can be an excellent biomarker to predict motor deficits after birth. We have not been satisfied with the subjective evaluation of the mean value of ADC, which varies depending on the location and size of the selected 2-D ROI. This study investigates if the second order statistics: kurtosis and skewness of ADC value obtained from a 3-D ROI covering whole-brain can improve the reproducibility for detection of brain injury in the rabbit fetus affected by uterine ischemia. A rabbit dam (25 days gestation with 8 fetuses) underwent a series of 2 minutes DWI scans for 60 minutes while receiving a 40-minute-uterine H-I insult in the middle of DWI acquisition. Both 2-D contour ROI and 3-D sphere ROI (0.5 mm radius) were manually demarcated by two raters on each ADC map to assess the H-I related fetal brain injury. Finally, intra-class correlation coefficient (ICC) of two raters was evaluated from three measures of ADC time series, 1) Mean of 2-D ROI, 2) Kurtosis of 3-D ROI and 3) skewness of 3-D ROI. We found that both kurtosis and skewness provide better reproducibility than mean (ICC of kurtosis/skewness/mean = 0.92/0.91/0.74), suggesting that the high order statistics provide more consistent detection of the spatially uneven ADC abnormality-evaluation across raters. Further investigation with a large cohort should warrant that the proposed 3-D ROI

analysis can accurately predict behavioral outcomes after birth.

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## Investigation of the Synergistic Nature of Traumatic Brain Injury and Opioid Exposure on Generation of Reactive Oxygen Species

Biology - Time: Mon 3:00pm-4:00pm - Session Number: 2571

*Alexander R. Woznicki, Rachel E. Godfrey, Scott C. Lloyd, Dr. Kelly E. Bosse, and Dr. Alana C. Conti*
*John D. Dingell VA Medical Center and Dept. of Psychiatry and Behavioral Neurosciences, Wayne State University, Detroit, MI*
Alexander Woznicki

Although opioids are commonly used for post-injury pain management, their effects on traumatic brain injury (TBI)-induced pathology remain unclear. TBI or morphine alone can generate reactive oxygen species (ROS), which can result in oxidative stress and inflammation. Therefore, we hypothesize that morphine exposure post-TBI may exacerbate ROS induction. This work aimed to localize and compare the extent of ROS generation across brain regions after exposure to TBI and/or morphine by quantifying dichlorofluorescein (DCF), which fluoresces upon contact with ROS.

Male mice (10-12 weeks old, n = 3-4/group) were exposed to moderate, closed-skull TBI or sham (control) surgery. Starting 24 hours after injury, mice received repeated morphine or saline (control) injections in an escalating dose pattern. Frozen coronal brain slices (12 um) were slide-mounted, incubated in 20 uM DCF, washed in PBS, and coverslipped with fluorescent mounting medium. After 96 hours, tissue sections were imaged using fluorescence microscopy and analyzed using ImageJ software.

Preliminary results show an effect of combined morphine and TBI on ROS levels compared to those in control tissues throughout the cortex, hippocampus, and nucleus accumbens. A similar profile of regional changes have been observed in tissue processed with in vitro ROS/Reactive Nitrogen Species (RNS) biochemical assays that are the present gold standard. The data collected by the ROS/RNS assay further validate this novel technique of DCF staining in whole brain slices for enhanced spatial resolution.

Our data suggest that post-TBI opioid exposure may exacerbate TBI pathology, supporting a role for development of non-opioid based therapies useful for post-injury pain management.

Funding Source: This work was supported with resources and the use of facilities at the John D. Dingell VA Medical Center, Detroit, MI, SPIRE Award RX003198 (KEB), VA Merit Award RX003267 (ACC), and the Richard Barber Interdisciplinary Research Program (ACC, ARW, REG).

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## Loss of Heterozygosity in the Diploid Fungal Pathogen Candida Albicans is Associated with Changes in Resistance and Virulence Traits

Microbiology - Time: Mon 3:00pm-4:00pm - Session Number: 235

*Doha Abdullah and Dr. Robert Akins, Department of Biochemistry, Immunology and Microbiology, Wayne State University School of Medicine, 550 E Canfield, Detroit MI 48201.*
Doha Abdullah

C. albicans is the most successful human fungal pathogen causing vaginal candidiasis in 40% of American women, oral lesions, and 25,000 cases of candidemia in the USA with an estimated mortality rate of 20%. The central question of my proposal is whether antifungal stress, which induces loss of heterozygosity (LOH) mutations in this diploid yeast, concurrently induces phenotypic changes associated with virulence. I found among a set of 41 flucytosine-stressed and 40 control isolates that the percent of stressed isolates with LOH is 17 fold greater, resistance to terbinafine, rotenone, and cyanide-salicylhydroxamic acid was 26-, 23- and 51-fold greater, invasiveness was 20 fold greater, and biofilm formation was 2 times more than seen in controls. Additionally, Invasiveness prevalence did not diminish after subculturing the isolates collection. Epigenetic changes should disappear after subculturing, whereas LOH induced changes are mutational and should be stable.These data indicate that LOH is associated with phenotypic changes seen in a high percent of stressed cells. Additional molecular characterization of LOH by whole genome sequencing could map the subset of alterations that confer these phenotypic changes. LOH may be an important pathway in the adaptive responses of C. albicans to antifungals and to the host. Verifying that is a first step in understanding the pathway and in identifying new targets for antifungal intervention.

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## Microcystin: The Best Contraceptive There Is

Ecology - Time: Tue 12:30pm-1:30pm - Session Number: 4085
*Moussa Chehab, Rida Farook, and Dr. Donna Kashian, Department of Biological Sciences, Wayne State University, 42 W Warren Ave, Detroit Michigan 48202*
Rida Farook, Moussa Chehab

Recently there has been an emphasis on studying algal blooms in global water systems. Microcystin released by cyanobacteria during summer algal blooms can affect Quagga Mussels' spawning rates. Quagga Mussels are an invasive species that have been brought over from the Dnieper River in Ukraine and were found in the Great Lakes in 1989. We will be studying mussels from Lake Mohave, Nevada and the Detroit River, Michigan. Our goal is to compare oxidative stress response to microcystin in these two groups of mussels to determine if location is a confounding variable that could affect their response. Testing quagga mussels' oxidative stress shows us how these species respond to environmental stress. We will be testing oxidative stress every 24 hours for 72 hours using lipid peroxidation and catalase activity as biomarkers for oxidative stress. We will also be testing spawning rates. We anticipate that the quagga mussels will increase in lipid peroxidation and catalase activity as exposure to microcystin increases. We also anticipate that spawning levels will decrease with increasing microcystin levels. Studying how microcystin affects the mussels' spawning and oxidative stress response will provide an understanding about how to decrease this invasive species' reproduction rates.

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## New Nano-mechanical Approaches in Cancer Biology

Physics/Astronomy - Time: Wed 12:00pm-1:00pm - Session Number: 6137
*Sara Ellias, Dr. Hoffmann, Dr. Fridman, Dr. Sundararaghavan, Department of Physics and Astronomy, Pathology, and Biomedical Engineering, Wayne State University, 42 W Warren Ave, Detroit, MI 48202*
Sara Ellias

Understanding the responses of cancer cells to changes in their microenvironment is an important step towards personalizing treatment therapies. This requires an understanding of the relationship between cancer cell morphology, the surrounding environment, protein expression, and the effects that these factors have on the development of the disease. In this study, we are focusing on the relationship of cancer environment and the expression of an important receptor, Discoidin Domain Receptors (DDRs). DDR senses collagen, helping cancer cells to modify their environment. We will focus on Pancreatic Cancer (PC) cells, which overexpress DDR. PC cells promote the development of a collagen-dense scaffold and fibrosis - the hardening of tissue - which is associated with malignancy and drug resistance. The overall goal is to verify if disrupting DDRs in PC cells will impair the cancer cells' ability to survive and proliferate. In particular, we seek to understand the relationship between DDR expression and cell behavior. Using a novel, recently-developed nano-mechanical technique, based on atomic force microscopy (AFM), the ligand binding and abundance of DDRs can be measured on live PC cells. PC cells, with and without DDR receptors, were seeded onto matrices made of collagen and hyaluronic acid. We developed hydrogel-based materials with varying mechanical and cell adhesion properties to mimic real tumor environments. Cell behavior on the materials were evaluated by measuring adhesion, cell morphology, proliferation, and cell phenotype. We investigated the relationship between DDR expression, cell behavior, type of environment, and receptor-ligand binding through an AFM technique that allows the measurement of cell receptor concentration and adhesion strength on each individual living cell. This project provides real-time insight into the molecular forces that govern DDR-collagen complexes in live cells, a key component in the development of rational therapeutic approaches that target DDR receptors.

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## Non-inflammatory Cerebrospinal Fluids Biomarkers in Neonates with Perinatal Hypoxic Brain Injury - a Systematic Review

Biology - Time: Tue 5:00pm-6:00pm - Session Number: 804

*Saihaj Deol and Dr. Sidhartha Tan, Department of Pediatrics, Wayne State University, Detroit, MI 48202*
Saihaj Deol, Sidhartha Tan - sidharthatan@gmail.com

Neonatal encephalopathy that purportedly arises from a hypoxic-ischemic brain injury is labeled hypoxic-ischemic encephalopathy (HIE). Perinatal asphyxia is a clinical syndrome involving acidosis, a low Apgar score, and the need for resuscitation in the delivery room; asphyxia alerts one to the possibility of neonatal encephalopathy. The study of these diseases is important as they can have lifelong effects on the patient as well as their family. Identifying the biomarkers that may be associated with brain injury as a result of HIE or asphyxia is imperative in providing early interventions to infants. Further, due to the variation in the units of reported biomarkers and methods of measurement as well as the unfocused targets in previous studies, analysis of the current literature through a systematic review will offer more comprehensive coverage from different settings in which brain injury resulted from HIE or asphyxia. In the present systematic review, we focused on the cerebrospinal fluid (CSF) and non-inflammatory biomarkers that are involved in the development of possible brain injury in asphyxia or HIE. A literature search in PubMed and EMBASE for case-control studies was conducted and 17 studies were found suitable by a priori criteria, which is case–control studies about the correlation between hypoxic neonatal brain injury during the perinatal period. Statistical analysis used the Mantel-Haenszel model for dichotomous data. The pooled mean difference and 95% confidence intervals (CIs) were determined based on the standard deviation and sample size. We identified the best biomarkers out of hundreds in three categories: cell adhesion and proliferation, oxidants and antioxidants, and cell damage. The best biomarkers were identified as those with a difference magnitude (expressed as a percentage of the control mean) greater than 100%. The following sub-population comparisons were made: perinatal asphyxia vs. no asphyxia, asphyxia with HIE vs. asphyxia without HIE, asphyxia with HIE vs. no asphyxia, term vs. preterm HIE with asphyxia. The biological significance of the biomarkers was determined by using a modification of the estimation approach, by ranking the biomarkers according to the mean-difference confidence intervals between the comparisons. This allowed us to recommend the most promising CSF biomarkers that could be incorporated into a combined test. We found that the most promising CSF biomarkers are creatine kinase, xanthine oxidase, vascular endothelial growth factor, neuron-specific enolase, superoxide dismutase, and malondialdehyde (in order of strength with creatine kinase being the strongest). Future studies are recommended using such a combined test to prognosticate the most severely affected patients.

Neonatal encephalopathy that purportedly arises from a hypoxic-ischemic brain injury is labeled hypoxic-ischemic encephalopathy (HIE). Perinatal asphyxia is a clinical syndrome involving acidosis, a low Apgar score, and the need for resuscitation in the delivery room; asphyxia alerts one to the possibility of neonatal encephalopathy. The study of these diseases is important as they can have lifelong effects on the patient as well as their family. Identifying the biomarkers that may be associated with brain injury as a result of HIE or asphyxia is imperative in providing early interventions to infants.

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## Representation Through Racial Socialization in Early Childhood

Psychology - Time: Wed 3:00pm-4:00pm - Session Number: 1133
*Tasnim Begum, Joseph Calhoun, and Dr. Erika Bocknek, Division of Theoretical and Behavioral Foundations, College of Education, Wayne State University, 5425 Gullen Mall, Detroit MI 48202*
Tasnim Begum, Joseph Calhoun

Racial socialization (RS) includes the processes by which children learn values and see themselves as a member of an ethnoracial group. Literature on RS primarily focuses on parents' messages and modeling while engaging in "the Talk" to affirm children's racial identity, teach cultural values, and prepare children for potential discriminatory encounters. In these conversations, typically occurring during adolescence, parents highlight the tenets of preparation for racial bias, egalitarianism, promotion of mistrust, and cultural pride. The advantages of RS are well understood; however, less is known about the precursors to these practices in early childhood. As early as three months old, infants look for faces that match their primary caregiver's race, and by age two they feel more connected to those of the same ethnoracial background. Therefore, children’s ethnoracial identity development begins early. The current study sought to provide a more in-depth investigation of the foundations of RS in early childhood. Following a phenomenological approach, semi-structured interviews were conducted with Black mothers of preschool-aged children (N=14) to amplify their experiences with RS and parenting. All interviews were theoretically coded followed by thematic analysis. A prominent theme that emerged was mothers' use of representation in explicit and implicit ways to promote racial identity. Mothers reported that selecting dolls, books, and television shows with main characters of the same racial background was a tool to discuss loving one's skin tone, hair texture, and physical features. Furthermore, mothers reported that representation is also a salient factor for school selection and readiness. These findings illustrate how parents use representation as a protective factor in parenting during early childhood. The special focus on representation in early childhood adds to the scholarly literature on RS

as a pathway to positive racial identity development.

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## Schizophrenia Network Dysfunction During Associative Learning Revealed Using Dynamic Graphical Models

Psychology - Time: Wed 3:00pm-4:00pm - Session Number: 7002

*Tristan Attisha, Shahira Baajour, Asadur Chowdury, Vaibhav Diwadkar, Department of Psychiatry and Behavioral Neurosciences, Wayne State University School of Medicine, 540 E Canfield St, Detroit, MI 48201*

Tristan Attisha

Schizophrenia is a mental disorder characterized by dysfunctional brain networking, expressed during learning and memory. Interest on its biological correspondence has focused on network profiles of the frontal, unimodal and hippocampal regions due to their hypothesized roles during associative learning. Previous studies have described dysfunctional modulation of brain networks during associative learning, and have presented the importance of frontal-hippocampal and frontal-unimodal network associations during memory encoding and retrieval. We expand on current knowledge by testing network functionality of patients during an object-location associative learning paradigm in order to detect associative memory proficiency. fMRI data were collected for 79 subjects (46 SCZ). The paradigm is comprised of eight memory blocks divided into encoding and retrieval epochs. During encoding, nine objects were presented to the subjects in a 3 columns by 3 rows spatial grid. Following a 9 second rest period, the subsequent retrieval epochs consist of a location being cued and subjects stating the associated object. Following data collection, the fMRI data were preprocessed using standard methods in SPM 12. Coactivated peaks were then used to extract a time series ($p<0.05$). Dynamic Graphical Models, portraying dynamic, directed functional connectivity between parent and children nodes, were created in MATLAB, and the results were categorized among the right and left hemispheres of 6 nodes for encoding and retrieval: HPC, DLPFC, dACC, SPC, ITG, and FG. Following, in-degree and

out-degree centrality models were created to portray the number of parent nodes (in-degree) and children nodes (out-degree) connected to Node X. The SCZ group were observed to have a lower in-degree and out-degree value in the dACC-R, DLPFC-L, ITG-L, SPC-R and HPC-R. Our findings support the primacy of frontal-hippocampal regions, and the lack of interaction between parent-child relationships may evince an inefficient attempt to build associations and maintain information during encoding and recollection in SCZ.

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## The Detroit Young Adult Asthma Project: Anxiety, Perception, and Adherence

Nursing & Public Health
*Ali Fakih, Dr. Veronica Dinaj Kochi, and Dr. Karen MacDonell, Department of Family Medicine and Public Health Sciences, Wayne State University School of Medicine, 3939 Woodward Avenue, Detroit MI 48201*
Ali Fakih

Youth of color have poorer asthma control than Caucasian youth, even after controlling for socioeconomic variables. Research on interventions to improve medication adherence in racial minority populations is limited. The study aims to develop and test a technology-based intervention to improve adherence to controller medications in African American emerging adults (AAEA) (18-29). Identifying factors that may affect adherence is imperative to improving medication adherence in AAEA. The current study utilized baseline data from the intervention to explore asthma-related anxiety and perceptions of asthma impact self-reported adherence. We hypothesized that asthma-related anxiety would be associated with lower adherence and perceived self-efficacy. Study included N=122 AAEA (males = 26), with a mean age of 23.0 years with persistent asthma and suboptimal medication adherence. Youth were recruited from the Detroit Medical Center and Wayne State University. Half of the sample was randomized to receive a multi-component technology-based intervention targeting

adherence. This consisted of 2 computer-delivered motivational interviewing sessions and individualized text message medication reminders between sessions. Control participants completed a series of computer-delivered asthma education modules and received text messages between sessions with facts about asthma. Multiple linear regression was conducted. Results found that our model was significant F (4, 113) =7.75, p<.001, accounting for 21% of the variance. Higher asthma related anxiety was associated with poorer medication adherence (β = .252, p<.01). Lower perceived importance of taking controller medication was associated with poorer adherence (β = -.269, p<.01). Self-efficacy and number of ED visits was not found to be significant. Results affirm that higher asthma-related anxiety and lower perceived asthma importance are associated with lower medication adherence. It is critical to understand factors associated with lower medication adherence in this population. Results suggest that psychological functioning and perceived importance of taking medications for asthma should be targeted during interventions.

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## The Role of NFκB Innate Immune Factors in Maintaining Drosophila Retinal Integrity

Biology - Time: Mon 4:30pm-5:30pm - Session Number: 3107

*Mohamed Dabaja, Dr. Tiffany Cook, Center for Molecular Medicine and Genetics, Wayne State University School of Medicine, 540 E Canfield St, Detroit, MI 48201*
Mohamed Dabaja

Retinal degenerative diseases such as macular degeneration, glaucoma, and retinal pigmentosa affect the vision of millions of people each year, yet few diagnostic or therapeutic options are currently available. Glia, the non-neuronal cells in the nervous system, are important for protecting and maintaining neuronal structure and function, but their roles in retinal function and maintenance are only starting to be understood. The fruit fly *Drosophila melanogaster* is a valuable genetic system for studying retinal

degeneration during both aging and light-induced stress. Recent work from our laboratory has shown that an accessory cell in the Drosophila eye, called Semper cells, are enriched in glial regulators and effectors. One such factor, called Prospero, is a transcription factor associated with glial development and is critical in Semper cells to maintain photoreceptor function and prevent premature light-dependent degeneration. Preliminary molecular studies from our laboratory suggest that genes associated with the innate immune system are disrupted in Semper cells knocked down for Prospero, suggesting a neuroinflammatory regulatory network may contribute to Semper cell-dependent photoreceptor support. To test this hypothesis, we assessed whether NFκB factors, mediators of the innate immune system, are essential in Semper cell-dependent photoreceptor protection. Using a GAL4-UAS-RNAi approach, we knocked down all three Drosophila NFκB factors in Semper cells and measured neighboring photoreceptor neuronal activity using electroretinogram recordings. Our preliminary studies suggest that Drosophila retinal glia require different NFκB factors in Semper cells to sustain visual function under homeostatic vs degenerative light conditions. These studies suggest a complex interplay of innate immune factors in the fly retina, and provide a new system to understand the role of neuroinflammation in sustaining retinal integrity and function.

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## Waste to Resource: Coal Fly Ash Beneficiation

Civil Engineering - Time: Tue 11:00am-12:00pm - Session Number: 3629
*Dimitrios Kakaris Porter, and Dr. Timothy Dittrich, Department of Civil and Environmental Engineering, Wayne State University, 42 W. Warren Ave., Detroit MI 48202*
Dimitrios Kakaris Porter

In 2018, the United States was the third largest consumer of coal, incinerating 624 mega tons of coal in power plants. When coal is combusted, about 10% of the mass is left behind as metals and minerals in a waste product called coal combustion residuals (CCR). This waste is generally hauled to landfills, which impacts our economy and environment by taking space and resources in order to dispose of it. A large

portion of the ash consists of minerals such as silica dioxide and various clays, which under the right conditions can be a valuable resource. Each ton of CCR also has ~$300 of value in critical metals known as rare earth elements (REEs). The goal of my project is to economically utilize the CCR for beneficial reuse, including recovering metals and using the mineral content for things such as concrete aggregate. The issue with directly reusing CCR in concrete is that it also contains potentially harmful metals (e.g., Hg, As) that can lead to unpredictable outcomes such as metal leaching into the environment. The purpose of this research is to process CCR sequentially so that benefits are maximized, and economic and environmental costs are minimized. The ash is first subjected to a magnetic separation to separate about 10%wt of the material, presumed to contain mostly iron. Next, the ash will be hydrothermally treated and then acidified for REE extraction. The remaining ash will undergo a purification phase and be tested for use in concrete. The concrete samples will then be subject to leaching experiments using established ASTM standards. The expectation is that useful metals can be extracted, and harmful concrete leachate can be reduced. This research will provide insight to the processes that can turn this costly waste into a productive resource.

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## Yeast Magic: a Science Outreach Activity to Teach Elementary School Children About Cells

Biology - Time: Wed 12:00pm-1:00pm - Session Number: 904

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Komal Zahrah

Inciting excitement and a passion for science begins when children are exposed to interesting science experiments. ‘Silly Science’ is a hands-on science outreach program that has been targeted towards elementary school students in Metro Detroit since 2017. It develops short (30 minutes) hands-on activities that are safe, engaging, and informative. Because of its format, the program in the past mainly focused on chemistry, engineering, or modeling activities. The objective of this project was to develop a new activity that used live organisms to teach students about eukaryotic cells. To this end, I first

considered unicellular organisms commonly used in research laboratories to identify those that were attention-grabbing for the children, easy to obtain, and safe to culture in a school environment, in the absence of a biosafety cabinet. I considered several strains of yeast and concluded that baker's yeast fits all these criteria. When designing an experiment for children, I learned that they like to draw art, so I decided that drawing on an agar plate would be appealing to them. I then tested multiple dilution stocks and optimized the yeast concentration that ensured optimal growth over 1 week at room temperature on the Yeast Extract Peptone Dextrose agar plate. When doing the experiments in the school, the children used the liquid yeast culture to draw on the agar plate. After a week of allowing the yeast to grow, the drawing became visible, as expected, based on the optimization experiments. In conclusion, my research established a safe and engaging protocol to introduce elementary school children to eukaryotic cells. My results demonstrated that yeast is a versatile and safe organism for science outreach activities that also allows for direct connections to life experiences, demonstrating to children the importance of science in their everyday life.

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