

# MID-SURE 2022 ADDENDUM

## ADDITIONS

CATEGORY	POSTER	NAME	TIME/LOCATION
Arts & Humanities	225	Emarion Best	8:30 AM - 10:00 AM, Online
Biochemistry & Molecular Biology	345	Troy Sievertsen	8:30 AM - 10:00 AM, Online
Chemical Engineering & Materials Science	625	Samin Matin	8:30 AM - 10:00 AM, Online
Environmental Science & Natural Resources	1214	Christian Tibaudo	8:30 AM - 10:00 AM, Online
Environmental Science & Natural Resources	1212	Jahsun Hurley	8:30 AM - 10:00 AM, Online
Health Science	1336	Harsna Chahal	8:30 AM - 10:00 AM, Online
Mechanical Engineering	1608	Christina Berels	11:00 AM – 12:30 PM, 2202 STEM Facility
Microbiology, Immunology & Infectious Disease	1727	Syd Jacobi	3:00 PM – 4:30 PM, 2202 STEM Facility
Social Sciences	2227	Lucinda Gleespen	8:30 AM - 10:00 AM, Online
Social Sciences	2246	Jacklyn Staffeld	8:30 AM - 10:00 AM, Online

### PSYCHOLOGICAL STRESS IN PROFESSIONAL RACECAR DRIVING

**Presenter(s):** Emarion Best (North Carolina Central University)

**Arts & Humanities**

**Section:** 3

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 225

**Mentor(s):** David Ferguson (Michigan State University)

The sport of professional race car driving has always been a debatable topic over whether it is an actual sport and its athletes being as competitive. Race car driving is just as popular as American football and soccer with international leagues and loyal fans. The issue in professional race car driving is that there is minimal information on the psychological characteristics of the sport. With the lack of research, we do not know the full extent of how much stress professional race car drivers endure. How can we determine the psychological characteristics of elite race car drivers under stress? The goal is to document such stressors in hopes of advancement by implementing psychological resources for drivers. Existing information is an introduction to understanding how to identify psychological stress in auto racing. The use of interviews played a vital role in data collection and boosted the validity of previous research. Subjects include professional race car drivers in relation to psychological stressors prevalent in auto racing. Qualitative research is utilized and organized in word and excel. As more research is being conducted, there will be a better understanding as to how professional race car drivers are exposed to psychological stress. This will lead to driver's getting access to psychological resources.

## **SORGOLEONE PERMEABILITY THROUGH MOLECULAR DYNAMICS SIMULATIONS**

**Presenter(s):** Troy Sievertsen (Michigan State University)

**Biochemistry & Molecular Biology**

**Section:** 5

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 345

**Mentor(s):** Josh Vermaas (Michigan State University), Saad Raza (Michigan State University)

The roots for the common grain sorghum produce exudates that are released into the environment to compete with other plants. Sorgoleone is one such compound, suppressing weed growth near sorghum by binding to and inhibiting PSII during photosynthesis. Since sorghum also has PSII and would be susceptible if sorgoleone would make its way into tissues above ground, it is mechanistically essential for sorgoleone to be excreted efficiently. However, since the final enzyme in the synthesis pathway of sorgoleone is found both inside and outside of sorghum's cells, the location of sorgoleone biosynthesis and the release mechanism from sorghum roots into the surrounding soil have not yet been elucidated. By conducting unbiased molecular dynamics simulations for one microsecond to compare the permeability of sorgoleone with its precursor molecules, we gained fresh mechanistic insight into sorgoleone's synthesis and release. Through our simulations, we find that sorgoleone has a higher permeability coefficient (based on Fick's law of diffusion) than its precursors, crossing a model sorghum plasma membrane more frequently than its precursors. Our results suggest that sorgoleone can permeate out of cells relatively easily while its precursors cannot. This suggests that sorgoleone synthesis occurs within sorghum cells and that sorgoleone is exuded by permeating through the cell membrane without the need for a transport protein. To facilitate quantification for sorgoleone desorption kinetics, biased molecular dynamics simulations are ongoing.

## **EFFECT OF ELECTROSTATIC FORCES ON ENZYME COMPLEX CONFORMATION USING COMPUTATIONAL COARSE GRAIN METHODS**

**Presenter(s):** Samin Matin (Michigan State University)

**Chemical Engineering & Materials Science**

**Section:** 3

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 625

**Mentor(s):** Scott Calabrese Barton (Michigan State University)

Natural enzyme cascades has its application in processes like biosynthesis and bio catalysis that help to reduce greenhouse gas emissions. However, the limitations in understanding the mechanisms has less intensified its widespread usage in artificial catalytic cascades. Computational Molecular dynamics simulations act as a great tool in observing the transport, orientation and the overall mechanism phenomenon of the reaction. Factors such as running the molecular dynamics on different types of enzymes and on different electrostatic force fields has significant effects on the enzyme complex conformation. Understanding the effects of different electrostatic force on the enzyme complex conformation helps us analyse the enzyme mechanism/orientation at particular conditions and also helps us determine the most computationally optimum method of the molecular dynamics. In this work, several molecular dynamics simulation were run with different electrostatic force fields. Primarily, differences on the molecular structure and its computational run times were observed between coarse-grained and simple, non-coarse-grained molecular dynamics. The molecular dynamics were run on few different proteins enzymes and different tutorials were followed to complete the molecular dynamics process. Unique and specific steps were followed in order to effectively carryout the molecular dynamics runs.

## **ARE 1930'S ERA CONIFER PLANTATIONS A POTENTIALLY IMPORTANT RESOURCE FOR OAK RESTORATION EFFORTS IN SOUTHERN MICHIGAN?**

**Presenter(s):** Christian Tibaudo (Michigan State University)

**Environmental Science & Natural Resources**

**Section:** 2

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 1214

**Mentor(s):** David Rothstein (Michigan State University)

Oak regeneration in the eastern US continues to be inadequate and presents threats to many natural communities and overall forest biodiversity. Instead of focusing regeneration efforts on existing oak forests, studies suggest that pine plantations may provide more suitable locations for oak establishment. To determine whether these sites have potential to be prime locations for oak regeneration in southern Lower Michigan I quantified the extent of 1930s conifer plantations and assessed their suitability for oak regeneration and recruitment in three large, forested parks: Lake Lansing Park North, Waterloo State Recreation Area, and Island Lake State Recreation Area. I first analyzed aerial imagery to assess the proportion of upland areas occupied by conifer stands. Next, I visited a sample of putative conifer stands and adjacent upland forests to ground truth my cover type classification and to quantify the overstory, understory, and ground layer oak regeneration. Overall, I estimated that 1930s era conifer plantations made up 4.1% of the total upland forest area considered. In total, conifer plantations supported less oak regeneration than upland oak forests, though seedlings were taller. However, when I considered each conifer cover type individually, oak seedlings were tallest and most abundant underneath red pine, and least abundant underneath white pine. Additionally, red pine plantations contained the most advanced regeneration oak saplings. My data indicate that there are a small amount of mature conifer plantations in southern Michigan; however, only the portion of these dominated by red pine appear to have potential as oak regeneration focal sites.

#### **THE IMPORTANCE OF THE URBAN CANOPY IN NYC AND THE IMPACT OF RACE, WEALTH AND OTHER SOCIOECONOMIC FACTORS ON IT**

**Presenter(s):** Jahsun Hurley (City University of New York - Medgar Evers College)

**Environmental Science & Natural Resources**

**Section:** 2

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 1212

**Mentor(s):** David Rothstein (Michigan State University)

As a result of the history of the United States and the heavy presence of racism and classism found in the country, the experience of life in America is largely dependent on race, class, and income. Since the Civil rights movement, minorities in the country have been fighting for a place in which they feel that they have equal rights to white people in the country. Environmental inequality has been a hot button issue for many decades now, but more light has brought to the topic, and I plan to explore the issue and my findings is the project that I will create. My research project will focus on the urban forestry in New York City and its impact on the people who live in the city. I am to discover is there is a disparity in the Urban Canopy in neighborhoods with low income and that are heavily populated by minorities, from those neighborhoods with affluence and that are populated by white people. I will use many different studies done across the country to set a basis for my project, but I will focus on the street tree data found in New York City to draw my conclusions. I hope to see what the project will yield and how that reflects on the state of the city. I also would like to see if the findings of the study with respect to NYC are a part of a country wide trend or more of an anomaly.

#### **USAGE OF VIRTUAL REALITY HEADSETS DURING OFFICE-BASED PROCEDURES TO LOWER PATIENT ANXIETY**

**Presenter(s):** Harsna Chahal (Michigan State University)

**Health Sciences**

**Section:** 4

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 1336

**Mentor(s):** James Clarkson (Michigan State University), Judith Lin (Michigan State University)

One area of concern in the medical field is ensuring procedures are comfortable, safe, painless, and affordable for the patients. Many healthcare facilities have moved to office-based procedures with local anesthesia to combat the dangerous side effects and cost burden on the patient and healthcare system

from general anesthesia. However, there is still a concern about ensuring it is comfortable and painless for the patient in office-based procedures. With the rise of Virtual Reality (VR) headsets, many researchers are using headsets with local anesthesia to provide a relaxing experience for awake state office-based procedures. To better understand how VR headsets can reduce anxiety, divert patients' attention, and decrease pain, we conducted a study using VR headsets in office-based procedures for vein ablation and phlebectomy.

### **MAXIMUM TORQUE FOR APPLICATION IN CHILD RESISTANT AND SENIOR FRIENDLY PACKAGING**

**Presenter(s):** Christina Berels (Michigan State University)

**Mechanical Engineering**

**Section: 1**

**Time and Location:** 11:00 AM – 12:30 PM, 2202 STEM Facility

**Presentation Number:** 1608

**Mentor(s):** Tamara Bush (Michigan State University)

The number of deaths from accidental poisonings in the U.S. occurred in staggering numbers until a year after the enactment of the 1970 Poison Prevention Packaging Act (PPPA) which resulted in a 50% reduction in deaths. Child-resistant packaging (CRP) required by the PPPA must be designed to be significantly difficult for children under 5 years of age to open within a reasonable time. Studies have shown that CRP is not only difficult for children to open, but also poses a challenge for older adults. This has led to the packaging being poorly closed or the contents transferred to non-CRP containers. The aim of this study is to quantify the relationship between the maximum opening torque of adults over the age of 65 and children under 6 can apply to a novel medicine bottle cap. A torque sensor was selected and first tested for its accuracy. Two models for testing the torque were designed. The first was mounted to a tabletop and could not be held in the hands. The second was a 3-D printed pill bottle design that could be picked up. Both designs were evaluated for their accuracy in reading the maximum torque a participant could apply and both performed similarly. The second design was chosen to move forward with because of its similarity to an actual pill bottle. This research is important for the design of a new CRP that is accessible to older adults and still prevents the accidental poisonings of young children.

### **CONCENTRATION METHODS OF COVID-19 WASTEWATER SURVEILLANCE**

**Presenter(s):** Syd Jacobi (Michigan State University)

**Microbiology, Immunology & Infectious Disease**

**Section: 3**

**Time and Location:** 3:00 PM – 4:30 PM, 2202 STEM Facility

**Presentation Number:** 1727

**Mentor(s):** Irene Xagorarakis (Michigan State University)

Sampling took place in Detroit and the Wayne, Oakland, and Macomb counties of Michigan from 8/16/2021 to 5/23/2022 to screen wastewater for the presence of SARS-CoV-2. Two virus collection and concentration methods were used and compared. For the VIRADEL method, 10 gallons of wastewater was passed through a NanoCeram filter canister to collect the virus. VIRADEL elution involves running beef broth in the opposite direction through the filter canister to draw the virus out and into the beef solution. The sample then undergoes a series of pH adjustments and centrifuging. Finally, the sample is aliquoted into 2 mL cryogenic vials for RNA Extraction. For the PEG method, 500 mL of wastewater was collected. PEG elution involves collecting 500 mL of wastewater. NaCl and PEG is added to 101 mL of the sample before mixing on a stir plate and centrifuging. The supernatant is discarded, and the pellet resuspended. The resuspended pellet is aliquoted into 2 mL cryogenic vials for RNA Extraction. After both virus collection and concentration methods, viral RNA was extracted using the QIAGEN kit. RT-ddPCR was used to quantify the presence of SARS-CoV-2 RNA using the N1 and N2 genes, as recommended by the CDC. Sampling dates were matched with clinical case records to determine the relationship between SARS-CoV-2 RNA in the wastewater and the infection rates in the area. The VIRADEL demonstrated a correlation between genomic copies per 100 mL of SARS-CoV-2 RNA and the clinical cases in the areas of interest.

## **EFFECTS OF TYPES OF CARE AND PARENTING PRACTICE ON SOCIAL-EMOTIONAL DEVELOPMENT AMONG ASIAN-AMERICAN YOUNG CHILDREN**

**Presenter(s):** Lucinda Gleespen (Michigan State University)

**Social Sciences**

**Section:** 3

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 2227

**Mentor(s):** Kyunghee Choi (Michigan State University)

This study examined the effects of types of pre-school childcare and parenting practices on social-emotional outcomes among Asian-American Kindergarten children. Based on the Early Childhood Longitudinal Study-K: 2011 (n=1,530), five types of care (Head Start, school-based childcare, private center-based, informal care and exclusive parental care) and parenting practices (parental expectation, parental investment, and parenting teaching behaviors) were examined its impact on children's social-emotional skills (approach to learning, social skills, child-teacher relationship scores). Compared to Head Start children, children cared for by informal care had lower social-emotional scores and children who attended formal center-based care (private funded care or school based care) had positive social-emotional scores (lower externalizing problems and lower student-teacher conflict scores). Children whose parents read books, told stories, and played games with their children frequently showed positive social-emotional development (higher child-teacher closeness scores/lower conflict scores, positive approach to learning skills). Child (age, gender, disability status) and family (income, father's education, language) characteristics affected social-emotional skills. Although enrolling in formal center-based care at preschool age had positive impacts on Asian American children's social-emotional skills, Asian American children were less likely to enroll in formal center-based care including Head Start. Asian American parents should be informed eligibility and availability for formal center-based care and importance of parental child interaction to promote their children's positive social-emotional skills.

## **PROBING THE ROLE OF THE VENTRAL HIPPOCAMPUS TO NUCLEUS ACCUMBENS PATHWAY IN INDIVIDUAL DIFFERENCES IN APPETITIVE LEARNING**

**Presenter(s):** Jacklyn Staffeld (Eastern Michigan University)

**Social Sciences**

**Section:** 5

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 2246

**Mentor(s):** Jonathan Morrow (University of Michigan), Karen Saules (Eastern Michigan University)

A critical issue in substance abuse research is why some individuals can actively use addictive drugs and quit with relative ease, while others may only try a small dose before becoming life-long dependent (Fitzpatrick et al., 2016). The use of designer receptors exclusively activated by designer drugs (DREADDs) may shed light on individual differences in learning behaviors and why some individuals seem to be more prone to addiction and relapse than others. Using stereotaxic surgery on rats, an in vivo dual-vector approach was used to bilaterally inject Cre recombinase into the nucleus accumbens (NAc) and an excitatory Cre-dependent, G protein-coupled DREADD into the ventral hippocampus (vHPC). Five weeks after surgery, clozapine-N-oxide (CNO) was injected intraperitoneally to selectively activate this pathway for six days. Rats were then given one day of cross treatment followed by conditioned reinforcement. These procedures allowed determination of whether activation of the vHPC-NAc projection affects acquisition and/or expression of Pavlovian conditioned approach (PCA) behavior. There were no statistically significant differences amongst treatment groups. However, trends in data support a differential role of the vHPC-NAc pathway in sign- and goal-tracking behaviors, suggesting a need for further investigation using larger sample sizes to determine the importance of this pathway. Although this study found no statistically significant evidence for the role of the vHPC-NAc pathway in PCA behaviors, current and future findings may add to an understanding of how learning and neurological activity may play a role in behaviors associated with addiction in human beings.

## CHANGES

CATEGORY	POSTER	NAME	TIME/LOCATION	TYPE OF CHANGE
Agriculture & Animal Science	109	Joselyn Ralph	11:00 AM - 12:30 PM, 1202 STEM Facility	Updated title and abstract
Biochemistry & Molecular Biology	341	Manhar Khanna	8:30 AM – 10:30 AM, Online	Updated abstract
Biochemistry & Molecular Biology	307	James Torres	11:00 AM – 12:30 PM, 2202 STEM Facility	Updated title and abstract
Biochemistry & Molecular Biology	336	Javi Tobar	8:30 AM – 10:30 AM, Online	Updated poster number
Electrical & Computer Engineering	817	Sean Elsworth	1:00 PM - 2:30 PM, 2202 STEM Facility	Changed timeslot
Electrical & Computer Engineering	818	Gabby Lovett	1:00 PM - 2:30 PM, 2202 STEM Facility	Changed timeslot
Health Sciences	1346	Jessica Lee	8:30 AM – 10:30 AM, Online	Switch from in-person to virtual
Integrative and Organismal Biology	1405	Jeremiah Hutson	1:00 PM - 2:30 PM, 2202 STEM Facility	Changed category
Social Sciences	2205	Teresa Starr	1:00 PM - 2:30 PM, 3202 STEM Facility	Added as co-presenter

### EUROPEAN FOULBROOD DISEASE DOES NOT SIGNIFICANTLY AFFECT FORAGING BY HONEY BEES (APIS MELLIFERA)

**Presenter(s):** Joselyn Ralph (Michigan State University)

**Agriculture & Animal Science**

**Section: 1**

**Time and Location:** 11:00 AM - 12:30 PM, 1202 STEM Facility

**Presentation Number:** 109

**Mentor(s):** Lauren Goldstein (Michigan State University), Meghan Milbrath (Michigan State University), Rufus Isaacs (Michigan State University)

European Foulbrood (EFB) is a disease of honey bee (*Apis mellifera*) larvae caused by the bacterium *Melissococcus plutonius*. Larvae become infected upon consuming food contaminated with this bacterium. They become twisted, discolored, and misshapen, and usually die within 4-5 days. Several studies indicate a connection between EFB prevalence in honey bee colonies and their placement in blueberry farms for pollination, but whether the disease affects worker bee activity is not well understood. In this study, we explored the relationship between disease prevalence and honey bee forager activity. We sampled 95 hives used for blueberry pollination in west Michigan in May 2022. These colonies were graded for EFB disease status based on the presence or absence of symptomatic larvae, with 25% of the hives showing symptoms of EFB. The same colonies were then sampled using one minute video recordings to determine forager bee activity. The range of returning forager activity was found to be between 0 and 169 bees per minute with forager activity positively correlated with number of frames. Colonies were assigned to three size categories, and foraging activity was compared between symptomatic and nonsymptomatic colonies. Foraging activity of small colonies was similar for those symptomatic and non-symptomatic, but tended to be lower for the symptomatic large colonies. However, there was no significant effect of the presence of EFB detected for any size category. This study suggests that presence of EFB does not affect the provision of pollination services by colonies despite its negative influence on long-term colony health.

### **IMAGING OF THE LUNG USING MPI WITH SPIONS**

**Presenter(s):** Manhar Khanna (Hunter College)

**Biochemistry & Molecular Biology**

**Section:** 5

**Time and Location:** 8:30 AM - 10:00 AM, Online

**Presentation Number:** 341

**Mentor(s):** Ping Wang (Michigan State University)

Magnetic particle imaging (MPI) is a new and relatively underutilized imaging technique that specifically and sensitively detects superparamagnetic iron oxide nanoparticles (SPIONs). SPION-based MRI imaging/tracking is one that does cater to a high sensitivity. However due to the dependence to proton relaxation for MRI, there is a low specificity due to noise from biological tissues. Moreover, there are nuclear imaging techniques that are highly sensitive and specific but expose patients to ionizing radiation. Using MPI in conjunction with SPIONs could overcome these challenges. **Methods:** Using superparamagnetic iron oxide nanoparticles (SPIONs) we see that we can track them in vivo with a decent sensitivity using an underutilized technique known as magnetic particle imaging (MPI). A plethora of proof-of-concept experiments are done for different lung applications like those involving tracking the primary deposition in vivo, high resolution of the collective mucociliary clearance pathway starting from the lung, moving up to the epiglottis and down to the GI tract. **Results:** In the past, lung imaging of SPIONs using magnetic resonance imaging (MRI) was not successful and limited. In these results, we find that we are able to image the lungs with a high sensitivity using MPI with SPIONs. **Conclusion:** It is shown how MPI in conjunction with SPIONs can be used as a novel imaging technique that will allow for breakthroughs in many realms of the clinical setting such as the domain of precise diagnostics.

### **AHR AND TSPO AFFECT THE EXPRESSION OF MICU2 IN MLE-12 CELLS**

**Presenter(s):** James Torres (Pontifical Catholic University of Puerto Rico)

**Biochemistry & Molecular Biology**

**Section:** 1

**Time and Location:** 11:00 AM – 12:30 PM, 2202 STEM Facility

**Presentation Number:** 307

**Mentor(s):** John LaPres (Michigan State University)

The Aryl Hydrocarbon Receptor (AHR) is a ligand-activated transcription factor which is responsible for sensing planar aromatic hydrocarbons, such as 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), in our environment. In the absence of ligand, AHR is in the cytosol and when exposed to TCDD, it moves to the nucleus where it regulates the expression of a large battery of genes which many of these encode detoxifying enzymes but some influence mitochondrial-associated proteins. Previous RNAseq data suggest that loss of AHR impacts the expression of genes that encode subunits of the mitochondrial calcium uniporter (MCU), most notable the Micu2 subunit. Interestingly, loss of the Translocator Protein (TSPO), an outer mitochondrial membrane protein, also impacts Micu2 expression. We hypothesized that crosstalk between AHR and TSPO regulates Micu2 expression and mitochondrial calcium loading. To test our hypothesis, we used wild type (WT), AHR<sup>-/-</sup>, and TSPO<sup>-/-</sup> mouse lung epithelial cells (MLE-12). These cells lines were treated with PK11195, (a TSPO ligand), TCDD, and both concurrently or their respective vehicles solvents (i.e. ethanol and DMSO). Following a 6-hour exposure, RNA was isolated and analyzed for the expression of genes that encode MCU subunits encoding genes. Results showed loss of TSPO and AHR caused a decrease in Micu2 expression. In contrast, treatment with TCDD or PK11195 did not alter Micu2 expression. These results suggest that there could be possible crosstalk between AHR and TSPO, playing a crucial role in regulating the expression of genes that encode MCU complex subunits, such as Micu2 critical to mitochondrial calcium homeostasis.

## WITHDRAWS

CATEGORY	POSTER	NAME	TIME/LOCATION
Arts & Humanities	207	Newt Kelbey	1:00 PM - 2:30 PM, 1202 STEM Facility