Undergraduate Scholarly Showcase 2022 Guide to Posters

Contents

University of Cincinnati

AM POSTER SESSION

Category A: Living With COVID

A-01: Relationship Between COVID-19 and Substance Use Disorder
Atrium
Briana Proffitt, Social Work
Project Advisor: Dr. Gary Dick

Abstract
In 2020, the world was taken over by the Coronavirus also known as COVID-19. During this time, the majority of the year(s) were spent on lockdown meaning most businesses were closed, America had a curfew, gathering of multiple individuals was not allowed, people were to stay home, and so on. This time led to a downfall in individuals' mental state, the isolation became too much and certain habits were picked up. The COVID-19 pandemic did not stop the drug epidemic. In fact, COVID-19 has shown to increase and add to the drug epidemic as shown below.

A-02: COVID-19 and Its Impact on Those With Autism Spectrum Disorder
Atrium
Leah Dakin, Social Work
Project Advisor: Dr. Gary Dick

Abstract
The purpose of this study was to gather information about how the COVID-19 Pandemic has impacted those with Autism Spectrum Disorder as well as their caregivers and the professionals who are treating them. In order to answer this question, I used a mixed method survey study and sent out Google Forums to both the guardians of those with ASD and the professionals that treat them. The guardian survey was a 20 question Likert Scale survey and the professional survey consisted of 5 long-form questions. My total respondents for the guardian survey was 5 and the total respondents for the professional survey was 6. The outcome of my research was that the COVID-19 pandemic has overall had a negative impact on those with ASD and their caregivers, which is corroborated by those that work with them. The reasons and specifics of why the pandemic has had a negative impact varies.

A-03: An Active Lifestyle Versus COVID-19: Does Exercise Lessen COVID-19 Symptoms?
Atrium
Samuel Riccobelli, Pre-Occupational Therapy
Zack Peacock, Health Sciences
Angela Sisson, Health Sciences
Project Advisor: Dr. Susan Kotowski

Abstract

With the emergence of COVID 19, there has been a plethora of theories regarding how it affects different individuals. We wanted to analyze how exercise might affect the prevalence of various symptoms experienced as well as the severity and duration of these symptoms. Since the virus is new, there is minimal research on the many factors that may affect the disease's characteristics, therefore we felt it important to investigate. The purpose of this project was to determine if there are any potential correlations between exercise and COVID 19 symptom prevalence, duration, and severity. A survey was developed in REDCap which covered basic demographic and health status questions such as age, height, weight, sex, vaccination status, severity of symptoms, types of exercises completed, exercise frequency, and underlying health conditions. This project utilized a sample of convenience who were recruited through word of mouth, email, and various social media platforms. We hypothesize that individuals who live a more active lifestyle and are involved in more aerobic exercise activities will experience less severe symptoms than those who do not exercise.

A-04: Relationship Between Blood Type and Contraction/Severity of COVID-19

Atrium
Faith Ohmer, Health Sciences
Tia Karras, Health sciences
Sadie Garner, Health sciences
Project Advisor: Dr. Susan Kotowski

Abstract
Since the start of the COVID-19 pandemic, research has been done to investigate the factors that play a role in the infection rate of the coronavirus. It is known that many factors play a role in the contraction of COVID-19, including biological characteristics like blood type. Based on previous research, studies have shown that non-O blood groups have a greater risk of being infected with the coronavirus. The purpose of this project is to determine if blood type plays a role in the contraction of COVID-19. Secondary objectives were also to determine if the prevalence and severity of various symptoms differed by blood group type. Blood group types were compared to COVID incidence, severity, and hospitalization. A survey was developed in REDCap including questions in the areas of demographics, blood type, vaccination status, COVID contraction, symptoms, and comorbidities. The survey was sent to individuals of any age and any health condition in order to gather as much information as possible. We hypothesize that those who are non- O blood types will have higher rates of COVID contraction, with regards to vaccination status and other factors. By gathering this data, we have the potential to further knowledge on COVID-19 and the factors that may contribute to infection. This is an important topic as it could strengthen the ability to protect those from the virus.

A-05: Effects of the COVID-19 Pandemic on Suicide and Social Workers' Role in Prevention and Bereavement

Atrium
Rachel Hanna, Social Work
Project Advisor: Dr. Anjanette Wells

Abstract

With the policies of quarantine and its effects which consists of stress, mourning, economic problems, and loneliness, the World Health Organization warned that there will be an increase in mental illness, substance abuse, and suicide rates (Padron-Monedero et al., 2020). While there have been previous studies on the impact of COVID-19 on suicide rates, there is a lack of studies focusing on social workers' roles in suicide prevention and bereavement. Social workers often need to evaluate clients' moods and complete risk assessments, if clients appear to be suicidal then social workers need to be able to take action. If social workers are working with family members or friends of someone who has died by suicide, they should be able to properly assist them and implement crisis intervention if needed. At the Victim's Assistance Liaison Unit in the Cincinnati Police Department, social workers respond on the scene when there has been a suicide and then assist the family afterward. This qualitative study will be observing census data that the agency has collected on suicide rates throughout past years and during the pandemic to determine if there has been an increase. Interviews were also conducted with social workers at the Victim's Assistance Liaison Unit in the Cincinnati Police Department to explore what suicide prevention looks like to them and how they believe social workers can be of assistance when it comes to the bereavement process of suicide loss. This study found that suicide rates in Cincinnati increased by 21.2% since the pandemic.

A-06: The Mental Health of Nurses

Atrium
Hope Rieck, Nursing
Frankie Fife, Bachelor Science of Nursing
Samantha Level, Bachelor Science of Nursing
Project Advisor: Dr. Paul Lewis

Abstract

Research will be about stress management techniques and the purpose of the project is to educate nurses on how to manage their stress and mental health issues. We want to provide information about nurse burnout, stress for nurses, suicide rates, patient safety, and how the COVID pandemic has played a factor.

A-07: Impact of Mindfulness Strategies on Nurse Burnout

Atrium
Abby Ribar, Nursing
Madison Donohue, nursing
Brooke Niederegger, nursing
Project Advisor: Dr. Caroline Morrison

Abstract

Before the Coronavirus pandemic, the rate of burnout in registered nurses was 40%, and now the rate has grown to 70% creating a major dilemma in the medical field. Nurses often feel unsupported regarding personal stress and burnout that can be directly related to their jobs. The aim of this project is

to educate registered nurses on the importance and impact of mindfulness strategies (i.e. deep breathing exercises, yoga, resilience training, relaxation, and meditation) on their careers and patient care. A brochure and education session were designed to present to a selected group of registered nurses on a medical-surgical unit at Mercy Health - The Jewish Hospital. We emphasized essential mindfulness strategies and described different options that nurses can incorporate into their busy schedules. Pre- and post-education questions regarding confidence in completing mindfulness strategies, different strategy options to lower stress, and symptoms related to burnout in nursing were dispensed for evaluation of their knowledge gained after the education session. The nurses' knowledge of mindfulness strategies for burnout before education was 70% and increased to 92.5%. Likewise, after the presentation, the nurses are 64% more likely to incorporate healthy mindfulness strategies into their lives.

A-08: Preventing Nursing Burnout

Atrium
Cody Kemper, Nursing
Brie Reedus
Project Advisor: Dr. Paul Lewis

Abstract
Nurse burnout is something that is becoming more prevalent in today's society. Nursing is also a career that is in dire need right now, so there must be changes made to healthcare that will decrease the rate of burnout, so that nurses are not quitting because of unstable mental and physical health. As this problem is growing it is nerve racking being a soon-to-be new graduate nurse working under such conditions. We feel as if at least understanding, through education, some things that could really push yourself to get out of that mental fog after a long 12 hour shift, could encourage the new graduate nurses and current nursing staff. These mechanisms that we will soon provide in our project, were aimed at propleing these nurses to take a hold of their mental and physical health and work as that nurse that they once dreamed of. Some current things that are in place to decrease nursing burnout that we have heard of, are people like managers, getting the unit something like lunch or dinner to enjoy, just in thanks for all the hard work they put in. This is very encouraging and helps the nurses feel noticed by their leadership.

Category B: Stress, Trauma and Addiction

B-01: Workplace Violence and Its Effect on Nursing Care

Atrium
Mikayla Decker, Nursing
Mady Gilbert
Project Advisor: Dr. Paul Lewis

Abstract
The purpose of this project is to formulate and evaluate educational training on de-escalation techniques of violence that nurses experience first hand. Our group is presenting the project to the Neuro Science unit at UCMC which will include a pretest, an education session, a post test, and a time for questions. Our goal is to emphasize the importance of more frequent education and training for these techniques as well as stress the importance of the American Nursing Associations zero tolerance policy for workplace related violence. After this education the nurses should have more confidence and preparedness to handle violence situations and learn skills to prevent violent situations from occurring all together. Although we would like to administer the pretest, provide the education the session, and then periodically check in during the next six-twelve months, that is not feasible, so giving the post-test after will show us knowledge learned, as well as confidence and preparedness in the nurses.

B-02: Educating Bedside Nurses on Stress Reduction Techniques to Combat Burnout

Atrium
Ryann Kramer, Nursing
Mackenzie Abbitt, Nursing
Andrea Alfaro, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract
Currently in the United States, more than 50% of registered nurses have reported experiencing burnout leading to poor personal health and decreased patient safety. Nurses with poor mental and physical health are 26% to 71% more likely to report making medical errors compared to those in better health. It is imperative for nurses to recognize and implement interventions of reducing burnout to decrease the likelihood of becoming a statistic in the nursing burnout issue. The purpose of our project is to educate bedside nurses on techniques such as self care and mindfulness to prevent them from entering the burnout cycle. Bedside nurses on a medical surgical unit at The University of Cincinnati Medical Center received an education session in which we presented a pamphlet emphasizing the techniques of self care and mindfulness to help prevent the possibility of burnout. A pre and post test was distributed to the participants to assess the knowledge of the information presented and identify any knowledge gaps. After the information session was presented, of the nurses who took the test, 89% of participants showed growth in knowledge as evidenced by post test scores. Additionally, 67% of participants said they would be interested in adding self care interventions to their workdays.

B-03: Educating Nurses on an Abuse Screening Tool for Elderly Patients

Atrium

Erika Welsh, Nursing

Jenna Tucci, Nursing

Sophie Bause, Nursing

Project Advisor: Dr. Mohammad Othman

Abstract

Elderly patients, age 65 and older may experience abuse and neglect at home and in the healthcare setting that often goes unnoticed. Many of the statistics on elder abuse do not completely encompass the entire problem because they only reflect the number of cases that are actually reported. Additionally, it can be assumed that the problem of elder abuse will become more prevalent because the geriatric population in the U.S. is increasing every year. Elder abuse can contribute to many negative health consequences. The University of Cincinnati Medical Center (UCMC) currently does not have a specific screening tool in place for detecting elder abuse. Our project will address this problem because we plan to educate the nurses on how to use the Elder Abuse Suspicion Index (EASI) screening tool for detecting elder abuse, and how they can implement it into current practice. This will help nurses at UCMC identify elders who may be victims of abuse and then provide the next steps as to how to address the problem.

B-04: How Losing a Young Patient Impacts Nursing Staff

Atrium

Jack Fredette, Nursing

Julia Nail, Nursing

Julia Hartinger, Nursing

Project Advisor: Dr. Paul Lewis

Abstract

For many people, losing a loved one is hard. This can also take a toll on the nurses that have provided care for this patient. It can be even more taxing on pediatric nurses because they are losing a patient at such a young age. We believe that talking about death is extremely hard to do in a pediatric population due to patient ages and can sometimes be overlooked. In the hospital setting, debriefing sessions often include topics such as what happened to cause the patient's death and what can be done in the future to prevent the death. Post-mortem debriefing sessions fail to incorporate and acknowledge the feelings of loss among the healthcare providers. Although some hospitals offer employee support services such as therapy sessions, the constant cycle of death among pediatric patients can take a toll on nurses and lead to decreased job satisfaction, worsening mental health outcomes, and burnout. Therefore, we felt that focusing on education and coping mechanisms can ultimately help pediatric nurses in this difficult time and also lead to less burnout among these nurses.

B-05: Impact of Educational Intervention on Nurses' Knowledge About Burnout Prevention Strategies

Atrium

Jordyn Stewart, Nursing
Mallory Ambrosio, Nursing-BSN
Cecillia Wagner, Nursing-BSN
Project Advisor: Dr. Paul Lewis

Abstract

Our topic will address the issue of nurse burnout and test the impact of educational intervention on nurses' knowledge about burnout prevention strategies. According to the American Nurses Association's Healthy Nurse Healthy Nation (2020), nurse burnout is defined as "a state of emotional, physical, and mental exhaustion that stems from work" (Kurosaka & Payton, 2020). Burnout is a major factor in decreasing quality performance among all hospital employees. It is important for nurses to be knowledgeable about burnout prevention strategies to combat it and maintain performance quality. Along with affecting patient care outcomes, nurse burnout can have a significant impact on the nurse, physically, mentally, and emotionally (Seichter, 2018). The contributors of nurse burnout according to Kurosaka and Payton (2020) include, "lack of control, unclear expectations, dysfunctional work dynamics, extremes of activity, lack of social support, and work-life imbalance" (Kurosaka & Payton, 2020). The characteristics of nursing jobs, such as often facing death and dying, also puts nurses at a high risk for experiencing compassion fatigue and emotional exhaustion (Wei et al., 2019). Because this is such a well-known problem, hospitals have put policies in place in an attempt to reduce nursing burnout on their units. Current interventions include improving the work environment, strong leadership, and increased RN/MD collaboration. For nurse leaders, it is important that they use strategies to cultivate nurse resilience and prevent burnout among nursing staff, including facilitating social connections, promoting positivity, capitalizing on nurses' strengths, nurturing growth, and encouraging self-care/mindfulness (Wei et al., 2019).

B-06: Effects of Foster System on Behavioral Health and Inventions

Atrium

Amanda Ward, Social Work
Project Advisor: Dr. Anjanette Wells

Abstract

The correlation between foster youth and behavioral health can be identified through interventions that help negative behaviors in foster youth. A review of research regarding samples of individuals diagnosed with serious mental illness notes rates of trauma exposure ranging from 49 to 100% (Stinson et al., 2016). These mental illnesses can have negative outcomes: alcohol and drug use, homelessness, personality disorder, suicidality and self-harm, sexual risk behaviors, and lesser quality of life. It is found that as compared with youth in biological care, youth in foster care placements were 2.7 times more likely to show physical aggression, verbal aggression, negative language, and commit crimes (Washington, 2018). By using the database of the Children's Home of Northern Kentucky, Data from the individual's past will show the trauma the individual has endured in relation to their behaviors through a

content analysis. I will analyze the data of past history of biological family, foster homes, abuse, and neglect, comparing it to the number of incidents the child has in the residential program. Then, looking at the incident occurrences numbers relating to how far in the program that they are. The interventions that The Children's Home uses includes individual therapy, group therapy, the sanctuary model, trauma based approach and day treatment. Supporting the hypothesis, an association between the foster youth and behavioral concerns due to trauma was found and interventions can improve their behavioral health.

B-07: Impact of Court-Ordered Mediation on Juvenile Recidivism
Atrium
Jordan Muren, Social Work
Project Advisor: Dr. Anjanette Wells

Abstract
There is a lack of intervention surrounding juvenile recidivism and the strength factors that prevent youth from entering the court system. Court-ordered mediation has been found to be an effective way to bring a new perspective to juveniles within the court system and hopefully, prevent any future returns to court. This research proposes to study the impact of court-ordered mediation on juvenile recidivism through a pretest posttest research design. The 25 case subjects for this study were randomly pulled from a sample size of 100. These subjects were asked to complete a pretest survey before mediation as well as a posttest survey after the completion of the court ordered mediation. Follow-up data inquired about the subjects' court citations months after mediation. 2 sentences summarizing data. 2-3 sentences summarizing discussion, conclusion and implications of the study.

B-08: The Impact Child Abuse Has on Adults
Atrium
Sydni Vaughn, Social Work
Project Advisor: Dr. Gary Dick

Abstract
Many children go through an abundance of complex trauma experiences including emotional, physical, sexual abuse as well as neglect. Many of these forms of abuse can affect an individual in the long run which may cause psychological damage. Some of the traumas found in the study were; Emotional Abuse, Physical Abuse, Sexual Abuse, and Neglect. Children who are abused and neglected may suffer from both physical emotional and psychological problems. These problems may affect a child's behavior in school and possibly with the interaction, they may have with other children (Petersen, 2014).

B-09: Placement Preferences in the Foster Care System
Atrium
Jaelyn Mason, Social Work
Project Advisor: Dr. Anjanette Wells

Abstract

This study seeks to examine the preconception that teenagers tend to be unwanted within the foster care system. In the state of Ohio, alone, there are roughly 9,000 children living in foster homes and 3,000 waiting to be adopted. One-third of that number are teenagers. Do foster families prefer babies (0-5), younger children (6-12), or teenagers (13-18) for placements? This study is qualitative and examines preferences given by licensed foster parents at Focus on Youth, Inc. as to what age of children they would or would not be willing to consider for foster placements in their homes. Preliminary results show that foster care agencies have more options to provide placements for children aged 0-5 and there is a lack of foster caregivers for teenagers.

B-10: Homeless Families and Transportation

Atrium
Alexandra Engelhard, Social Work
Project Advisor: Dr. Gary Dick

Abstract

Transportation has been a consistent barrier when it comes to homeless families becoming self-sufficient. Homeless families that do not have car ownership run into obstacles such as maintaining a stable job, a stable house, and stable health. After interviewing with six families, three families that have car ownership and three families that do not have car ownership, transportation is viewed as more than how to get somewhere. After executing the qualitative study, some of the stories the families shared was that transportation is seen as an obstacle that does not make sense, or as freedom, and many other concepts that have opened new perspectives on what transportation really is to the homeless or at-risk families at Bethany House Services Emergency Shelter.

B-11: Why Women Stay in Abusive Relationships

Atrium
Keiasha Jones, Social Work
Project Advisor: Dr. Gary Dick

Abstract

Domestic violence is a worldwide issue, it impacts every community from urban and suburban to rural towns and villages, and it affects all types of families regardless of age, race, socioeconomic status, or religion. There have been several studies that research domestic violence, and one question always remains. What makes women stay in abusive relationships?

B-12: Preventing Sexual Harassment in Bar Environments Through "It's On Us" Bar Training Program

Atrium
Lena Tran, Social Work

Project Advisor: Dr. Anjanette Wells

Abstract
All populations face sexual harassment regardless of age, gender, race, socioeconomic class, and more. It may occur in a variety of environments. In alcohol-related situations, circumstances may escalate causing the victim to be in danger of sexual assault. Research has shown that there are many contributing factors to the display of aggression in a setting where alcohol is involved, such as a bar. This study proposes to study the implementation of a sexual harassment prevention and education training for bartenders, along with the promotion of customer safety. The study will go in depth by conducting personal interviews and observations from bartenders and customers before, during, and after the program implementation. The information conducted will reveal that customers feel comfortable to approach bartenders and other staff when they need help. Staff members of the bar will acquire knowledge of safe intervention through the program.

B-13: Understanding the Link Between Asthma and Post Traumatic Stress Behavior Using Mice Models

Atrium
Anisha Ajmani, Medical Sciences
Project Advisor: Dr. Renu Sah

Abstract
A high prevalence of PTSD has been reported in individuals with severe asthma, which is characterized by an increase in Th-17 cells and IL-17a. The premise of this study is to assess the impact of central IL-17a administration in order to understand the effects of inflammation directly in the brain. It was hypothesized that the localized increase of IL-17a in the brain will directly impact PTSD- relevant behavior in mice and will affect neuronal activation in brain areas that play a regulatory role in anxiety behavior. In order to test this hypothesis, mice were given injections of IL-17a directly into their brain in order to investigate the effects of central inflammation. Control and experimental mice were all put through behavior paradigms that test their anxiety, sociability, and fear levels. Additionally, a cFOS stain, an immediate early activation gene, was performed as an indicator of recent neuronal activity. The cells of the Basolateral Amygdala, the Medial-Prefrontal Cortex, and the Dentate Gyrus were quantified as these brain regions have been seen to be associated with an increased fear and anxiety response. The outcome of this experiment provides novel information which demonstrates that a central increase of IL-17a in the brain can impact anxiety and sociability behavior. Furthermore, the data suggests that IL-17a may play a significant role in the Amygdala. Overall, this study on IL-17a regulation of behavior and regional neuronal activation are relevant to the lab's interest in understanding the PTSD-asthma link.

B-14: Acknowledging Vape Usage and Effects on Young Adults

Atrium
Lindsey Shook, Nursing
Emma Ernst, Nursing
Elizabeth Klein , Nursing

Project Advisor: Dr. Paul Lewis

Abstract
Our project is centered around the negative effects of vape usage and proving that research suggests that education programs focused on these effects will influence young adults in their decision to quit vaping.

B-15: Narcan Administration and Recovery in Opioid Overdoses

Atrium
Palak Patel, Nursing
Samantha Luna, Nursing
Lindsay Dorman, Nursing
Project Advisor: Dr. Jessica Westman

Abstract
Educating community members, specifically college students, on Narcan (Naloxone) administration regarding opioid overdose can decrease the total amount of deaths seen in Hamilton County. The Ohio Department of Health reports that in 2019 there were 353 unintentional drug overdose deaths in Hamilton County. The purpose of our educational project was to educate college students on how to recognize an opioid overdose and Narcan administration in hopes to decrease the total number of overdose related deaths. We created an education session to present to the UC Panhellenic Committee. Before the educational session started, we had the participants fill out a pre-test to demonstrate any prior knowledge related to Narcan, opioid overdose and the arising epidemic. Our presentation included a powerpoint, videos, handouts and a physical demonstration of Narcan administration. Following the presentation, a link was provided for participants to request a Narcan kit from the Hamilton County Public Health Department via mail. The audience gained significantly more knowledge about Narcan, opioid overdose, and the epidemic arising as evidenced by the pre and post-test administered. The attendees actively participated during the educational session and asked relevant questions at the end. This indicated active learning occurred and that attendees gained knowledge regarding Narcan and opioid overdoses.

B-16: Assessing the Use of a Social Worker in the Hamilton County Public Defenders Office

Atrium
Madelaine Thompson, Social Work
Project Advisor: Dr. Gary Dick

Abstract
Increasing incarceration rates have prompted the need for alternative solutions for an ongoing problem. There are over 2 million people in the nation's prisons and jails-a 500% increase over the past 40 years (The Sentencing Project, 2021). The role of the social worker in the Public Defender's Office is to connect clients to resources that may be useful to them in diverse circumstances. This can relate to housing, substance abuse, mental health, and any other resource or help an individual might need addition of a

social worker in the public defender's office, or any law office, is to help provide alternative sentencing as well as decrease taxpayer dollars allocated towards the prison system. Data on in-prison rehabilitation found inconsistency in programs and a relatively low rate of significant success (Lipsey & Cullen, 2007). This study will assess the interventions and release plans put together by the Social worker in the public defender's office and how they have affected clients post-incarceration and recidivism. Data used will be gathered from the spreadsheet kept by the social worker since their time of hiring.

Category C: Chemical and Cellular Worlds

C-01: Large Scale Preparation of Human Enzymes Associated With DNA Damage Response

Great Hall
Tam Trinh, Biochemistry
Project Advisor: Dr. In-Kwon Kim

Abstract
ADP-ribosylation is a reversible post-translational modification process. It works by adding mono- or multiple (poly) ADP-ribose units to a target protein residue, such as Asp/Glu, Serine, and Arginine, from the cofactor called β-NAD+. This activity helps to control a wide array of cellular signaling pathways including gene expression, replication, cell cycle regulation, and DNA repair. Poly(ADP-ribose) polymerase 1 (PARP1) plays a key role in DNA repair by recognizing DNA damage, and the founding member of PARP family that comprise of 17 other member categorized according to the shared catalytic domain homology. Notably, PARP inhibitors are currently used for the targeted anticancer therapy, specially for the treatment of breast and ovarian cancer. However, how PARP1 is regulation by other proteins remains largely unknown. Towards this end, we selected three DNA-dependent PARPs, PARP1, PARP2, and PARP3 for biochemical and structural analysis. PARP1 and PARP2 are poly-ADP-ribosylating enzymes, while PARP3 is the mono-ADP-ribosylating enzyme. I have successfully overexpressed them in E. coli. Since PARP1 is the key player in DNA repair, I decided to purify PARP1. Using three independent chromatography columns, I was able to characterize my target protein during all the purification steps and successfully purify PARP1 with minimal impurities. Our collective results will provide a solid foundation to understand the basis of ADP-ribosylation upon DNA damage and to identify new small molecule probes specifically targeting individual PARP enzymes.

C-02: Advancing Cell Biology Research Methods: Successful Large-Scale Production of an Enzyme Involved With Gene Expression

Great Hall
Sarah Smithrud, Chemistry
Project Advisor: Dr. In-Kwon Kim

Abstract
Post-translational modification is the specific chemical alteration of proteins following protein synthesis to create a properly functioning molecule or control proteins. ADP-ribosylation is an example of this

type of modification. In this process, ADP-ribose is transferred to an acceptor protein by an ADP-ribosyl transferases (ART). The addition of multiple ADP-ribose units, poly-ADP-ribosylation, is carried out by poly(ADP-ribose) polymerases (PARPs). ADP-ribosyl groups can then be removed by ADP-ribosyl-acceptor hydrolases (ARHs). These molecular modifications are essential for cell signaling pathways that are required for proper cellular functions. More specifically, ADP-ribosylation metabolism has been linked to DNA repair mechanisms and tumor neogenesis. SdeA, a member of ART, is an area of current interest and the subject of this study. In addition to catalyzing the addition of ADP-ribose to ubiquitin, SdeA also transfers the resulting phosphoribosyl ubiquitin to a secondary substrate. This further impacts cell signaling and the corresponding biochemical pathways. As a first step to mechanistically study the structure and function of SdeA, purified recombinant SdeA is needed. In this project, the overall aim was to overexpress and purify SdeA protein. We successfully overexpressed the catalytic domain of SdeA in E. coli BL21 cells, and purified in a milligram quantity by using three independent chromatography columns. Our collective results provide a useful foundation to understand the ADP-ribosylation by SdeA using biochemical and structural tools.

C-03: Exploring the Photoreactivity of a Geminal Diazide, a Compound with Metal-free C-N Bond Formation
Great Hall
Javeria Tariq, Chemistry
Project Advisor: Dr. Anna Gudmundsdottir

Abstract
Azides are materials that readily release N_2 gas upon exposure to light of heat and have potential to be explosive. However, before we can use azides in applications we need to understand their reactivity. Herein we report the reactivity of geminal diazido alkyl derivative (1). In more details we studied the photoreactivity of 1, using laser flash photolysis, cryogenic matrix isolation, and product studies. Combined these studies made it possible to elucidate the reaction mechanism for 1. The mechanism for photodecomposition of 1 will be discussed in details, along with it use of 1 in synthetical applications to form new C-N bonds and explosives.

C-04: Understanding How the Fungus Aspergillus Fumigatus Causes Pulmonary Infections
Great Hall
Darshit Dhanani, Biological Sciences and Neuroscience
Project Advisor: Dr. David Askew

Abstract
Aspergillus fumigatus is a human-pathogenic fungus that causes life-threatening pulmonary infections, particularly in individuals with compromised immunity. In order to obtain nutrients from the host, A. fumigatus secretes a high amount of enzymes to degrade the surrounded tissues in smaller molecules easier for uptake. When the secretory demand in the fungus exceeds the endoplasmic reticulum (ER) protein folding capacity, unfolded or misfolded proteins will accumulate causing ER stress. The eukaryotic initiation factor 2 (eIF2) is an essential component in the regulation of the synthesis of

proteins. In presence of several stresses, eIF2α is phosphorylated in order to halt the synthesis of proteins and reduce the overall protein load, minimizing the accumulation of protein damage until the stress is resolved. In A. fumigatus, this phosphorylation is mediated by two eIF2α kinases: IFkB (for initiation factor kinase B) and CpcC (for Cross Pathway Control). Our hypothesis is that loss of IFkB and CpcC will disrupt ER homeostasis and render the fungus susceptible to various stressors. To test this, we used different knockout mutants lacking IFkB, CpcC, or both IFkB and CpcC. These mutants were grown on plates with a defined culture media containing different stress agents, and their ability to grow was monitored and compared with a wild-type strain. Our results showed that the eIF2α kinases are required to overcome amino acid starvation and oxidative stress by paraquat. However, CpcC and IFkB are not required under a wide range of stresses conditions, such as ER stress, cell wall disruption, or antifungals drugs.

C-05: Changes in Platelet Transcriptome and Function Following Transcatheter Mitral Valve Intervention

Great Hall
Makayla Williams, Biological Sciences
Kelsey Poremba
Project Advisor: Dr. Donald Lynch

Abstract
Background: Mitral valve disease, affecting 2.5% of population, occurs when the valve does not close properly leading to inadequate flow of blood and development of heart failure. Left untreated, mitral valve disease is associated with significant mortality and over $8 billion annual cost to the health system. Up to 50% of patients are not candidates for surgery; therefore, transcatheter based approaches have emerged. Recent studies have demonstrated platelet dysfunction, platelet loss, and inflammation following transcatheter mitral valve intervention (TMVI). Our study investigated mechanisms of platelet dysfunction at level of platelet transcriptome following TMVI.   Methods: Twenty-one patients were enrolled prior to Mitraclip (N = 15) or transcatheter mitral valve replacement (TMVR, N = 6) at the University of Cincinnati. Flow cytometry was used to evaluate platelet for: 1) activation, 2) turnover and 3) clearance. Platelet spreading was evaluated with fluorescent microscopy. Platelets were isolated from 5 subjects pre and post Mitraclip after which RNA sequencing was performed.   Results: After TMVI, there was a significant decrease in platelet count ($P < 0.0001$). There was no significant difference in thiazole orange or Annexin V expression. There was a trend towards a decease in markers of platelet activation. Analysis of variance of platelet RNA demonstrated upregulation of 661 genes and downregulation of 329 genes following Mitraclip. Pathway analysis demonstrated an upregulation of genes involved in endosomal trafficking, including Sortin Nexin 11 (SNX11) which was previously not known to be in platelets.   Conclusion: Our study demonstrates inflammatory reprogramming of platelets among patients undergoing Mitraclip.

C-06: Therapeutic Ultrasound Stimulation of Schwann Cells for Peripheral Nerve Regeneration

Great Hall
Corinne Smith, Chemical Engineering
Lauren David
Project Advisor: Dr. Greg Harris

Abstract
Millions of patients in the U.S. suffer from peripheral nervous system (PNS) damage due to injuries and neurodegenerative diseases. The PNS possesses some regenerative potential due to the presence of Schwann cells, which can transdifferentiate into a regenerative cell type to support nerve recovery. Because Schwan cells have been shown to play a critical role in nerve regeneration, finding efficient methods to modulate Schwann cell behavior is an important strategy for developing PNS injury therapies. Application of low intensity ultrasound (US) to cells has gained focus as a non-invasive method for controlling cell behavior. However, the exact impact of US on Schwann cells is not well defined. Additionally, the effects of applying US in tandem with other cues such as electric stimulation has not been investigated. In this study, we analyzed the effect of US on Schwann cells on a piezoelectric PVDF-TrFE scaffold to determine the effect of US on Schwann cell regenerative behavior, and how this effect is mediated by the introduction of a piezoelectric substrate capable of electric stimulation to cells. Our preliminary results indicate that US did not significantly affect proliferation and elongation when cells were cultured on glass coverslips, but US significantly increased elongation for cells cultured on PVDF-TrFE. Thus, US may have a positive effect on Schwann cell regenerative behavior, and this effect may be enhanced when used in combination with a piezoelectric scaffold. The development of therapeutic US treatments can ultimately lead to the production of more effective PNS injury therapies.

Category D: Ecosystems and Biodiversity

D-01: Sexually Transmitted Parasites and Postcopulatory Sexual Selection in the Drosophila-Gamasodes System

Great Hall
Sahithi Nagisetty, Biological Sciences
Sandy Chan
Project Advisor: Dr. Michal Polak

Abstract
Sexually transmitted parasites (STPs), which encompass a broad spectrum of organisms ranging from mites and nematodes to protists and viruses, are expected to favor the evolution of female mate preference through direct fitness benefits females may receive by avoiding infected males. We tested whether the ectoparasitic, sexually transmitted mite, Gamasodes pachysetis, generates sexual selection in its natural drosophilid host, Drosophila albomicans. Mite transmission in the Drosophila-Gamasodes system occurs from male to female during copulation. In the laboratory, 419 mating trials were conducted where virgin females were individually paired with a male that was either parasitized or not. All matings were noted, copulation latency and duration were measured, and the behaviors of a subset of females during mating were analyzed. It was found that females mated with parasitized males with

similar frequency relative to unparasitized males. These results suggest that females do not discern parasite status of their would-be mates prior to copulation. In contrast, significant female postcopulatory responses to the parasite status of males were discovered. During copulation females exhibited a significantly greater frequency of kicking against parasitized males relative to unparasitized males. Interestingly, copulation duration with parasitized males was significantly reduced (by 24%) relative to unparasitized males. The results suggest that females have evolved postcopulatory choice against parasitized males, either to avoid becoming infected themselves and/or to reduce the quantity of sperm received from parasitized males. Experiments are underway to identify the precise fitness advantages that may accrue to females from these behavioral responses to Gamasodes mites.

D-02: Impact of Bacterial Infection on Reproductive Behavior in Wolf Spiders

Great Hall
Megan McConnell, Biological Sciences
Project Advisor: Dr. George Uetz

Abstract

The primary goal of this research project is to understand the effects of pathogenic infection on reproductive behaviors in wolf spiders; more specifically, to examine the impact of infection on male-female interactions during courtship and mating. Previous studies of the brush-legged wolf spider Schizocosa ocreata found that infection with a pathogen triggers a costly immune response and can be transmitted during copulation. Infection was also found to affect courtship vigor and the development of secondary sexual characteristics in males. Furthermore, infection in males can be detected by females through chemical cues and possibly result in differences in mating receptivity. Female S. ocreata are also larger than males and potentially cannibalistic. Resistance to courtship in females has been hypothesized as a tactic to assess potential mates and avoid undesirable ones. This suggests that there are evolutionary fitness costs associated with both becoming infected and mating with an infected individual.   Juvenile spiders were collected from the field and raised to maturity in the lab. Mating trials included all possible combinations of infected and uninfected males and females. Spiders were treated with either Pseudomonas aeruginosa bacteria or water (control) approximately 24 hours prior to trials. All trials were recorded, and videos were analyzed for courtship, receptivity, and aggressive behaviors. Results show that aggressive behavior in females is related to the infection status of males. From these findings, we conclude that females can recognize male infection and consequently behave aggressively toward infected males to avoid mating.

D-03: Behavioral Changes of Wolf Spiders in Response to Different Feeding Regimes

Great Hall
Kami Previte, Biological Sciences
Project Advisor: Dr. George Uetz

Abstract

Invertebrates, like spiders, are often thought incapable of learning, although recent studies have shown their behavior can and does change with experience. In this project, we investigated whether feeding

methods affect lab raised wolf spiders. In our lab research, we bring wolf spiders (Schizocosa ocreata) from the field into lab containers, where they are fed crickets using an aspirator. We wanted to know if S. ocreata is able to associate the puff of air from the aspirator with food, and if so, does this mean that spiders are able to overcome an innate fear response with reinforcement and learning? To test this hypothesis, we manipulated aspects of the feeding regime (i.e., the presence/absence of an aspirator tube, and the presence/absence of an air puff) paired with food reinforcement (crickets). Feeding trials were conducted successively over a four-day period, where response behaviors of spiders (capture latency, capture success) were recorded and scored. After four days of training, spider behavior changed in a similar manner for both sexes. Regardless of sex, prey capture latency was significantly shorter in the presence of an air puff compared to the aspirator. These results suggest spiders are capable of learning to associate a positive reward (food) with a negative stimulus (air puff) to which they have an innate fear response.

D-04: Behavioral and Postural Analysis of Mosquito Sleep Reveals This State Impacts Interactions With Their Hosts
Great Hall
Lucas Gleitz, Biological Sciences
Project Advisor: Dr. Joshua Benoit

Abstract
Throughout evolution, sleep has remained one of the most conserved phenomena across the animal kingdoms. In various animal systems, sleep plays a critical role in different biological processes like energy conservation, thermoregulation, and recovery from stress. Generally, the characterization of sleep states in different insect species relies heavily on behavioral factors and/or electrophysiological correlates. However, little is known about sleep in blood-feeding arthropods even though these systems have significant importance as vectors of disease-causing pathogens. In particular, sleep-based studies are non-existent in mosquitoes despite extensive focus on circadian rhythms which influence sleep in other animal systems. In this study, sleep was characterized using established behavioral correlates and we evaluated the effect of sleep deprivation on some indices of vectorial capacity. Our results revealed a definitive difference between an active/awake and sleep-like states in mosquitoes based on body and appendage position metrics. Sleep deprivation in the phase where mosquitoes are expected to be asleep induced by the delivery of vibration stimuli induced sleep rebound in the subsequent phase. Finally, sleep deprivation suppressed blood feeding and host landing in the phase when mosquitoes would normally be active and likely to blood feed. Our studies indicate that sleep-like states occur in mosquitoes and highlight the potential epidemiological importance of mosquito sleep.

D-05: Utah Versus Colorado Glover Silk Moth Cocoons
Great Hall
Nicholas Hiltbrand, Biological Sciences
Project Advisor: Dr. Patrick Guerra

Abstract

The purpose of my experiment is to see how cocoons of the same species, but located in different areas, differ in amount of water absorbed. More specifically, my experiment consists of Glover silk moth cocoons from Sandy City, Utah, and Teller City, Colorado. Teller City is much higher in elevation than Sandy City, so the goal of the experiment is to see if altitude has an effect on how much water is absorbed by the cocoon. To do this, we used an apparatus called a rain simulator, and kept the amount of rain given to each cocoon the same throughout each trial. We also had a string apparatus in the middle of the rain simulator to deflect some of the water particles. To calculate how much water is absorbed for each trial, we took a dry weight of the cocoon before the trial, and a wet weight after the trial. By subtracting these values, we are able to get a water weight in grams. My hypothesis is the Glover silk moth cocoons located in Sandy City; Utah will absorb more rainwater because they are located at a much lower altitude. My assumption is since there is greater precipitation in Teller City, Colorado, the cocoons adapted to not over saturate themselves, thus the cocoons will obtain a lower wet weight in this study.

D-06: Effect of Rainfall on Hyalophora Gloveri Based on Latitudinal Location
Great Hall
Nathan Cantrell, Biological Sciences
Project Advisor: Dr. Patrick Guerra

Abstract
Several studies have reported differences in the composition of a Hyalophora gloveri silk moth's cocoon when comparing cocoons from different geographical locations, however, there has been little to demonstrate the significance of the cocoon structure and how it is related to the amount of rainfall it receives. In this study, we will take H. gloveri cocoons native of Montana as well as H. gloveri cocoons native of Utah. A rain simulator will be utilized to produce the average rainfall from Montana. This specific rainfall will be simulated onto both the Montana and Utah H. gloveri cocoons. The level of absorbance each cocoon demonstrates will help determine the significance of its design and help us better understand the differences in H. gloveri's cocoon structure based on latitudinal variance.

D-07: The Effects of Climate Change on Local Tree Species
Great Hall
Drew Gehring, Environmental Studies
Abby Alexander, Environmental Studies
Sean Gallagher, Environmental Studies
Project Advisor: Dr. Teri Jacobs

Abstract
Our project aims to identify local tree species that will move out of our ecosystem due to the effects of climate change, and tree species from other ecosystems that could be transplanted here to replace those lost species. We also researched effective tree transplantation methods, and the effects of climate change on our local climate and soils. The end result is a list of tree species that may be brought here to stabilize our changing local climate, and the most effective methods to transplant them. To achieve

these goals, we reviewed previous literature on the subject and collected geographical data. We hope to give local nature centers and parks a plan of action to prepare for the changes in our ecosystem because of climate change.

D-08: Effects of Stream Restoration on Stream Habitat Structure and Biodiversity

Great Hall
Joseph Mangan, Biological Sciences
Colin Barrett, Environmental Studies
Jake Lawrence, Environmental Studies
Project Advisor: Dr. Kenneth Petren

Abstract
Urban streams are an integral part of our modern day ecosystems and health. These streams face a wide variety of problems including frequent large changes in water flow rate, increased chemical pollutants, loss of nutrients, overabundance of other nutrients, and alterations to stream morphology or structure. Restoration efforts aim to reverse these factors to increase the ecological health of urban streams. A common route for restoration is to create riffles, which are areas of large boulders to alter the flow of the stream, and create a wider diversity of habitats for fish and stream macroinvertebrates. Stream restoration success is not often quantified after completion because of the lack of funds. Our question was whether riffles installed nine years ago affect current levels of habitat structure and macroinvertebrate diversity of the restored stream. We tested this hypothesis at Twin Creek Preserve. The Mill Creek Alliance completed a stream restoration of the East Fork of the Mill Creek in 2012. We quantified the substrate of the streambed using standard methods to measure the relative amounts of different sized substrate materials. We compared stream habitat structure to macroinvertebrates collected, using standard methods. We sampled five sites, each with a riffled and non-riffled section, in a paired design. Preliminary results suggest that riffles are generally more rocky and accumulated more small cobble and pebbles, while non-riffle areas had more sand and silt. We test these patterns statistically and compare these data to measures of macroinvertebrate abundance.

D-09: Effects of Stream Restoration on Macroinvertebrate Biodiversity

Great Hall
Brandon Anson, Biological Sciences
Jazz Vaughn, Biology
Colin Hoerth, Biology
Project Advisor: Dr. Kenneth Petren

Abstract
Streams in urban environments are subject to ecological degradation like the installation of impervious surfaces such as pavement and rooftops. The Mill Creek watershed flows through multiple areas in the Greater Cincinnati area, and the health of the stream is significant and correlated to the health of the people who live in those communities. At one time, the Mill Creek was the most polluted and physically degraded stream in the U.S. The Twin Creek wetland preserve is a stream a part of the Mill Creek and

has undergone restoration efforts since 2011. The main approach for restoration has been to install seven stream riffles to control the flow of the stream during storms, preventing flooding, along with creating more habitat for macroinvertebrates. Macroinvertebrate biodiversity is a common benchmark used to assess the health of the stream. Our goal was to determine, with the use of standard methods, if the inclusion of the rifflies affected the population size of the macroinvertebrate in the stream.

D-10: Near and Deer: How Does Deer Overabundance Affect the Floristic Quality of Urban Habitats?

Great Hall
Jack Fogle, Biological Sciences and Neuroscience - Neurobiology Concentration
Lillie Braun
Project Advisor: Dr. Stephen Matter

Abstract
White-Tailed Deer (Odocoileus virginianus) are abundant in the Cincinnati area and the Cincinnati Parks System. High urban deer densities have been shown to lead to lower native biodiversity due to their increased browsing activity, and preference for native plants. To evaluate the extent of this impact, floristic biodiversity can be quantified in the form of an index, the Floristic Quality Abundance Index (FQAI). Do higher concentrations of urban deer in Cincinnati's Parks lead to lower floristic quality? We hypothesize that the overabundance of White-Tailed Deer is negatively affecting the floristic quality in the Cincinnati Parks System. The University of Cincinnati and Cincinnati Parks have collaborated to assess the relationship between white-tailed deer and occurring spring ephemeral intensity throughout urban parks of greater Cincinnati. Select parks maintain local deer populations through bow hunting and sterilization practices to lessen the impacts that deer overabundance has on forest regeneration and seasonal ephemeral emergence. Camera traps have been placed at each Cincinnati Park, and deer population metrics can be extrapolated from the frequency with which they trigger the cameras. We established 50-meter transects in each park within the system to perform plant surveys. Using the FQAI, we predict that parks with lower deer abundance will have higher floristic quality and vice versa. These data will help Cincinnati Parks Land Managers evaluate deer management techniques, as well as provide valuable insight on the ecological effects of deer overabundance, and more broadly, the effects of predator extirpation.

D-11: A Trot in the Park: Identifying What Geological Features and Topography Indicate High Deer Abundance

Great Hall
Sean Pettit, Environmental Studies
Project Advisor: Dr. Stephen Matter

Abstract
Deer populations in the Cincinnati area are exposed to an array of landscape features, habitat size, and local land usage. Everything from urban parks to relatively suburban parks are home to growing deer populations. What park features and topography best predict large deer populations? To better

understand what makes parks preferable for deer, this study outlines the specific geological features and topography that are associated with high deer abundance. The more isolated the deer population is from urban environments, the higher chance there will be a large abundance of deer. Using ARCGIS Online, a GIS software, a comprehensive map was made to highlight the unique geological features and park topography that indicate larger deer populations. Actual deer abundance was then collected using camera traps. Relative distance from roadways, other parks, and park areas were all also considered when predicting deer abundance. By comparing predictive data to the actual deer abundances, the preferable park and landscape features were then identified, as well as the parks with the highest deer abundance. Identifying what key features that predict larger deer abundances will allow parks managers to put their best efforts forward, efficiently, in managing deer populations across all parks in Cincinnati, as well as nationwide.

D-12: Comparing Techniques Used to Estimate Abundance of White-Tailed Deer (Odocoileus Virginianus)

Great Hall
Sara Langworthy, Biological Sciences
Grace Edmonston , Biology
Max Lackey, Biology
Project Advisor: Dr. Stephen Matter

Abstract
Increasing White-tailed deer (Odocoileus virginianus) populations across urban areas have had detrimental effects on biodiversity and ecosystem services. High deer densities increase the amount of browse in urban woodlands and alter vegetation composition. As populations increase, it becomes necessary to have an accurate method of population estimation. Infrared flyovers over populated areas have been used to estimate density, but this method can be expensive. Deer scat transects can be done quickly and inexpensively, and are easily repeatable over a long period of time. In this study, we compare the density calculated from scat transects to infrared flyovers to determine the effectiveness of this technique in urban parks.

D-13: Genomic Evidence for a New Species of Spiny-Throated Reed Frog from the Ukaguru Mountains Tanzania

Great Hall
Erin Siemer, Biological Sciences
Project Advisor: Dr. Lucinda Lawson

Abstract
Amphibians all over the world are in mass decline due to habitat loss, climate change, disease, and many other factors. The Eastern Mountains and coastal forests of Tanzania contain the highest known

concentration of plants and vertebrates and is in danger due to high fragmentation and the burning to make charcoal with not enough conservation efforts in place to protect it. Based off previous studies, a new species of the spiny-throated reed frog was discovered in the Ukaguru Mountains in Tanzania. We used bioinformatics to identify and more precisely arrange the phylogenetic tree of the spiny-throated reed frog clade. It was concluded that the new species, H. ukaguruensis is most closely related to H. ruvuensis, another critically endangered and possibly extinct species, and distant from all other known spiney-throated reed frogs.

Category E: Sensing and Sensory Systems

E-01: Behavioral Analysis of the Brightness Discrimination Threshold in Phidippus Audax Jumping Spiders
Great Hall
Nuthara Jayasinghe, Biological Sciences - Animal Biology Concentration
Project Advisor: Dr. Nathan Morehouse

Abstract
Jumping spiders, or Salticidae, are known for their phenomenal vision and have been subject to many behavioral experiments based on tracking behavior which typically utilize high contrast stimuli to investigate jumping spider visual behavior. However there has been no behavioral evidence identifying the minimum contrast level that is sufficient for a spider to discriminate between two lights. This information would help us to understand how these spiders behave in realistic low light situations. Therefore, we are analyzing behavior to investigate the achromatic contrast threshold in Phidippus audax jumping spiders using a video playback paradigm paired with a trackball to measure behavioral responses. Our first objective was to optimize stimulus properties to maximize the reliability of response from the animal, by altering size, speed, and predictability of the stimulus path. This design was then used to test the achromatic contrast thresholds by varying the degree of achromatic contrast between the stimulus and the background. We investigated 15 different contrast levels between 24% and 0.026%. If the jumping spider can resolve the difference between the object and the background, it is expected to turn towards the object. We then use this rotational response to determine the contrast threshold at which a spider can no longer reliably discriminate between the two brightnesses. We expect that contrast levels lower than 5% will be difficult for the animal to resolve. Identifying the exact value of the threshold will then allow us to further investigate their visual capabilities with chromatic contrast experiments.

E-03: Isolation and Imaging of the Zymogen Adam17 Protein Structure Using Electron Microscopy
Great Hall
Maria Rich, Medical Sciences
Project Advisor: Dr. Tom Seegar

Abstract

ADAMs (A disintegrin and metalloproteinase) are a family of transmembrane proteins functioning in cell adhesion, intercellular communication, and signal transduction. There are 21 ADAMs encoded in the human genome, 13 of which are known or predicted to be catalytically active enzymes that play key roles in the shedding of membrane-tethered proteins, changing their biological functions. ADAM17, a catalytically active family member, is a critical regulator of mammalian development and has been shown to play a vital role in human pathogenesis. ADAM17 is initially translated in the cell as a zymogen (a precursor to an enzyme) bound by a prodomain that functions to control enzyme latency, thereby disabling the enzyme from processing protein substrates at disproportionate times and subcellular compartments. While some of the ADAM17's domains have been structurally categorized, a zymogen form of the enzyme remains undetermined and clear mechanistic details into enzyme activation are missing. To address this gap, we have purified the ADAM17 into a detergent micelle and developed preliminary structural information to categorize the atomic details of the ADAM17 zymogen. Bridging the gap between ADAM17 function and structure may assist in furthering our understanding of neurodegenerative pathology, chronic inflammatory conditions, cancers, and immune responses.

E-04: The Ventroposterior Lateral Nucleus of the Thalamus Selectively Contributes to Thermal Somatosensory Processing

Great Hall
Akansha Khadka, Biological Sciences
Project Advisor: Dr. Steve Davidson

Abstract

20% of adults globally experience chronic pain. Pain research is crucial to reducing the burden of chronic pain by identifying novel therapies. Pain is a multidimensional experience with affective, cognitive, emotional and behavioral factors. My work focuses on the Ventral Posterolateral nucleus (VPL), a thalamic nucleus of the brain which acts as a relay station by sending neural signals to the cortex. It is unknown as to what aspect of the multidimensional pain circuitry, sensory or affective, the VPL contributes. The goal of my project is to investigate whether activation of the VPL alters sensory and affective behavior in naive mice. I hypothesized that activating the VPL will increase pain-related sensory but not affective behavior. To test my hypothesis, I used Designer receptors exclusively activated by designer drugs (DREADDs) to activate the neurons in the VPL. The DREADDs were used with Clozapine N-oxide (CNO), a designer drug that selectively activates the DREADD receptors. The behavior tests performed were radiant heat to test for thermal threshold, and pressure-sensitive monofilament test for mechanical threshold. To test VPL contributions to affect the conditioned place preference (CPP), open field, and elevated zero maze tests were performed. The results indicated no significant differences in affective behaviors. However, in the radiant heat test, mice with VPL activation had a significantly lower withdrawal latency compared to when the VPL was not activated. Overall, this study concluded that the VPL selectively enhances thermal sensory processing.

E-05: Silver Nanoneedle-Based Ion Channel Probe for Resistive Pulse Nanopore Sensing

Great Hall
Brittany Rice, Biological Sciences

University of Cincinnati

Project Advisor: Dr. Ryan White

Abstract
I am performing undergraduate research in Dr. White's laboratory. My research goal is to understand how the underlying electrode substrate affects the ability to perform stable, protein channel measurements for the ultimate goal of performing localized single molecule detection using these protein channels. More specifically, I am working with our newly described nanoneedle platform that serves as a support for single channel measurements. The nanoneedles are conically-shaped, etched silver wire on which lipid bilayers are deposited when the tip is displaced across the interface of a aqueous solution and a lipid/decane solution. When protein channels insert into the supported bilayer, they open a current pathway. When these channels are occupied with small molecules, we observe a quantized decrease in current. These current pulses occur we are measuring single molecules. A unique feature of our probe geometry is the ability to "unzip" the bilayer and reform it to control protein insertion. This control is crucial for long term stability and single channel measurements. The specific hypothesis that I will test is that we hypothesize there is an optimal nanoneedle geometry (dictated by the half cone angle of the conical tip) that maximizes bilayer stability while also maximizing the ability to control this bilayer unzipping and reformation for maintained single channel activity. I will explore various etching parameters to tune the probe geometry and perform the channel insertion and de-insertion (with unzipping) measurement. I will characterize the time to de-insertion and correlate this with tip displacement. Moreover, I will characterize how bilayer

E-06: A Drone Lidar Digital Elevation Model of the Cooper Creek Experimental Watershed, Cincinnati, OH
Great Hall
Patrick Boylson, Geology
Project Advisor: Dr. Dylan Ward

Abstract
The goal of this project was to collect and analyze drone-based, high-resolution LiDAR (Light Detection and Ranging) topography to support multiple ongoing studies of hydrology, geology, ecology, and urban planning at the Cooper Creek Experimental Watershed, Hamilton County, Ohio. Sub-meter resolution bare-earth topography are needed for these applications, but existing airborne LiDAR topography for the site has meter-scale resolution, and is of poor quality in the densely canopied gully of Cooper Creek. Data were collected using a Phoenix Lidar Systems Miniranger laser scanner on a DJI-M600 hexacopter platform flown at 60 m above ground. After processing the laser point cloud to remove canopy returns, we produced a 25 cm bare-earth digital elevation model (DEM). Here we present initial analyses of this DEM, in particular a comparison of field-measured geomorphic cross-sections with those measured from the LiDAR data.

E-07: Implementing Effective Knowledge of Pediatric Pain Assessments
Great Hall
Olivia Neufarth, Nursing

Lane Kabbes, Nursing
Mallory Perdue, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract
The assessment of pain, although not clinically measured the same way as routine vital signs, is a crucial indicator of a patient's status and can give insight into potentially concerning issues. Pain is assessed through the use of pain scales and a variety of subjective questions. It is one of the most mismanaged assessments completed by pediatric nurses. One of the main causes for misevaluation of pediatric pain is due to poor education on the different scales. With pediatrics, pain can be perceived in many different ways. Contributing factors that lead to the selection of a specific pain assessment scale used includes: language/culture barriers, physiologic status, developmental level, and age of the pediatric patient. Given the wide variety of pain assessment scales available and the multiple contributing factors, it is important to choose the most optimal pain scale available for the specific situation. The aim of this project is to educate current pediatric nurses on the definition of each pediatric pain scale, the differences in the pain scales, and the indications of use for each scale. A group of selected pediatric nurses at Cincinnati Children's Hospital & Medical Center received an educational PowerPoint with the material at hand. A pre- and post-educational intervention questionnaire assessed knowledge gained after the viewing of the educational PowerPoint and handouts. The PowerPoint also included resources specific to pediatric pain assessments that are easily accessible through Children's website, Centerlink. Results of the education session are pending.

E-08: Vibratory Courtship Signals and Female Receptivity in a Wolf Spider

Great Hall
Amanda Somerville, Biological Sciences
Project Advisor: Dr. George Uetz

Abstract
Wolf spiders in the genus Schizocosa have been studied extensively as a model for the evolution of animal communication. The main objective of this research is to have a better understanding of courtship in a recently discovered species, Schizocosa saltatrix, and to determine whether aspects of male courtship vibration signals are related to mating success.   Wolf spiders were collected from the Cincinnati Nature Center in September of 2021 and raised to maturity in the lab under controlled conditions. Once mature, male and female spiders were paired randomly, and courtship and mating behaviors were recorded. Male courtship vibration signals were recorded with a Laser Doppler Vibrometer (LDV), while behaviors were recorded by video camera. Male vibration signals were analyzed using Raven® and SpectraPlus® software.   The male vibration signal of S. saltatrix consists of pulses of low frequency vibration, with three distinct components: "hum", "rattle" and "strike". While the overall average amplitude of signals is not related to mating success, individual components appear to play a role. Data analyzed so far suggest males that use more hums than rattles or strikes in their courtship behavior have lower mating success than those that use more rattles and strikes. Amplitude of these two components is also related to mating success. The data suggest that signal quality (i.e., structural components) may play a larger role than amplitude (loudness) in successful mating.

E-09: Reducing the Noise Effects in UWB Sensors for Developing a Robust Positioning System

Great Hall

Tri Nguyen, Aerospace Engineering

Project Advisor: Dr. Donghoon Kim

Abstract

A robust positioning system (PS) is useful in several aerospace applications, such as the localization of robots and UAVs in scenarios where GPS doesn't work like factories and buildings. PSs can be constructed using various sensor technologies, such as Bluetooth, WiFi, LoRa, camera, and ultrasonic sensors. Ultra-Wideband, or UWB, sensors offer various advantages over the mentioned technologies including low size, weight, power, and resistance to disturbances in the environment. For these reasons, UWB sensors are selected to develop a robust PS in this work. In real-life environments, UWB sensors are susceptible to disturbances due to unexpected obstacles nearby, and therefore filtering techniques are required to reduce such effects and increase accuracy. In this study, after studying the effects of noise on UWB sensors, we applied two different filtering techniques like the moving average filter and the Savitzky-Golay filter to reduce the disturbance from the measurements. This resulted in improving the localization performance of a target in the disturbed environment.

E-10: Music Therapy and the Progression of Neurodegenerative Diseases

Great Hall

Aditi Tarkar, Neuroscience

Project Advisor: Dr. Stefan Fiol

Abstract

One of the most commonly used interventions for people with neurodegenerative diseases (PwNDDs) is music therapy. Music therapy can help in reducing anxiety and depression, as well as stress. A few examples of NDDs that can affect one's memory and recall process are strokes, Parkinson's disease, and dementias like Alzheimer's. Through the course Music and Brain Health, I have worked with my quartet, consisting of me, a fellow student, a PwNDD, and their caregiver. Over each semester, our quartet had eight sessions, which were recorded via Zoom. Each session involved music and arts-based activities. For my research, I am specifically doing a case study on two PwNDD/caregiver pairs using data from the sessions from the past two semesters (Spring and Fall 2021). I want to see how the psychosocial signs associated with NDDs progress throughout the semester in the course. For the data coding and data collection process, I am looking at non-verbal cues indicating involvement and participation, like smiling, eye contact, and action reciprocation to see how they are affected. The findings of the study can help us better understand how music therapy can aid in the improvement of signs associated with NDDs.

E-11: EEG Methodology: Comparing the Values of Basic Tests and Setups for Undergraduate Educational Settings

Great Hall

Shelby Hatton, Neuroscience - Neurobiology Concentration

Project Advisor: Dr. Annette Stowasser

Abstract
The use of the electroencephalogram (EEG) has become common practice in research and health related fields focused on understanding the neurophysiology of the brain and its disorders. Many studies highlight standards, policies, and protocols for EEGs used at the academic level and healthcare. However, proper guidelines for the educational use of EEGs in teaching labs have yet to be defined. This paper aims to establish a broadly applicable setup needed in order for students to comprehend the complexity and variability of brain activity as detected by EEGs. In this study, 4 different setups, a 1 channel, 2 channel, 8 channel, and 16 channel EEG, were tested with a basic eyes open and eyes closed test. Alpha to Beta ratios were then analyzed and compared to fundamental known concepts such as distribution, origin, total power, and arousal of the different waveforms to determine the validity and usability of the setups in undergraduate education.

Category F: Community and Cultural Connections

F-01: Komponistinnen: Women Composers of the Romantic Period
Great Hall
Maya Gulani, German Studies and Political Science and International Affairs
Project Advisor: Dr. Svea Braeunert

Abstract
The website Komponistinnen approaches the Romantic Period in music through a different lens: that of the woman composer. It is the result of an independent research project in German Studies, honing in on the European musical tradition of the 19th century and its gendered realms of possibility. This is accomplished through three perspectives. First, I present the story of the Romantic Period in music differently: where, for example, Frédéric Chopin or Johannes Brahms are usually cited as examples of romantic composing, I instead cite works by composers such as Amy Beach, Cécile Chaminade, or Clara Schumann. Second, I discuss the experiences of women composers during the Romantic. Connections through family and friends, the importance of salons, difficulties in having symphonic works performed, etc. are examples of factors that I explore in detail, as they demonstrate what circumstances enabled women to compose as well as what barriers were in place that prevented them from composing. Third, I provide space to focus on the music itself. Ultimately, my project is about composers - it is vital for their compositions to be shared and appreciated. Thus, I create 'sonic spotlights' to make audible the extensive creative skill of composers. By emphasizing the creative output and experiences of women in the 19th century, my project provides a new perspective of musical romanticism, not only highlighting the participation of women in the cultural sphere but also analyzing their compositions as key contributions to musical history.

F-02: Paleoethnobotanical Analysis of Elite Households at Aventura
Great Hall
Cameron Syner, Biological Sciences

Project Advisor: Dr. David Lentz

Abstract
The archaeological site of Aventura, found in Belize, is home to remains of a Maya city, of which archaeologists and researchers have collected samples for study regarding various aspects of the Mayan way of life. This community flourished during the Late Classic period (600-900 CE), inhabiting a unique ecological region that led to their success, unlike other Mayan sites. One large component of the lifestyle in Aventura was the use of plant materials, whether it be in consumption as food, use in construction, or burning as firewood. Charcoal deposits can be found at this site with reasonable integrity due to the carbonization it experienced during burning. Samples collected from an elite household were analyzed and sorted into groups based on common characteristics. These samples were imaged using a scanning electron microscope, analyzed, and identified based on specific characteristics seen in the wood.   Identification of these species allows us to have a better understanding of how people lived in Maya civilizations and can give insight into how they used and shaped the environment around them.

F-03: An Analysis of Macrobotanical Remains From Commoner Households at the Ancient Maya Site of Aventura

Great Hall
Anna Salem, Biological Sciences and Neuroscience
Project Advisor: Dr. David Lentz

Abstract
Paleoethnobotanical remains are a useful resource in further understanding the way of life for ancient civilizations. In this study, macrobotanical remains were collected from the excavation of the archeological site of Aventura between 2017 and 2019. Aventura reached its peak during the Late Classic Period in 600-900 CE, following the decline of many other Maya cities. This poster presents paleoethnobotanical data from commoner households at Aventura, and seeks to identify culturally significant, routinely used plant species. The samples were identified down to the family level based on the transverse surface, and then mounted for more precise identification. Once the plant remains were mounted, they were imaged using a Scanning Electron Microscope (SEM). These micrographs of the samples were used to visualize microscopic botanical features, which allowed for identification to genus and species. This data was used to determine how the commoner households of Aventura interacted with their botanical environment.

F-04: General Paleoethnobotanical Analysis of Aventura, Belize

Great Hall
Kyra Johnson, Environmental Studies
Project Advisor: Dr. David Lentz

Abstract

The distinction between mankind and the natural world was not common for the majority of human existence. Maya cultural practices are deeply intertwined with their surroundings blurring the line between man and nature. In the Late Classic Period (600-900 CE), the Mayan city of Aventura (located in Northern Belize) was flourishing due to its reliable access and control of water sources, whereas other Mayan cities were suffering collapse. During the 2017-2019 field seasons, charcoal samples were collected from various cultural contexts. These samples were sorted, analyzed, and identified based on the unique natural fingerprint of each species. Several of the species revealed are documented as playing a vital role in the daily life of Mayan people, past and present.

F-05: Policies and Procedures of Village Life Outreach Project

Great Hall
Stephanie Matuszak, Communication and Psychology
Miranda House, Communication and Marketing and Media Production
Micaela Goldstein, Communication and Marketing and Media Production
Project Advisor: Dr. Michael Sharp

Abstract
The purpose of our project is to revise and implement policies and procedures for Village Life Outreach Project. We are collaborating with the Village Life Outreach Project staff to ensure that these policies will be useful. We will measure the success of our policies through a survey, as well as through feedback from individuals who are taking trips to Tanzania through Village Life Outreach Project. (One of two groups presenting this poster)

F-06: Village Life Outreach Project: School Garden Project

Great Hall
Mischelle Price, Communication and Psychology
Erin Evans, Communication
Augusta Hooks, Communication
Project Advisor: Dr. Michael Sharp

Abstract
(We are 1 of 2 groups presenting this project) Village Life Outreach Project is a non-profit organization located in Cincinnati that works with Tanzania, their mission being to unite communities to promote Life, Health, and Education. We are doing the School Garden Project for Village Life. The Village Life Outreach Project is working through us to be a global service partner with Cincinnati Public Schools to teach students about food insecurity. We have created 6 modules to teach a food insecurity curriculum to students in grades 6-9 at Hughes High School. In addition to the modules, we are partnering with Gabriels Place to factor in the garden part of the project.

F-07: Developing Clinical Training for Augmentative and Alternative Communication Implementation for Bilingual Speakers With Aphasia: a Methods Presentation

Great Hall
Camille Johnston, Speech Language Hearing Sciences
Jessica Stross
Project Advisor: Dr. Cassandra Stall

Abstract
Augmentative and Alternative Communication (AAC) is used to assist patients' functional communication with low tech or high-tech tools. There is limited implementation of AAC devices with bilingual populations, despite the growing need. There is a gap in the literature as this relates to persons with aphasia (PWA) which leads to a perceived lack of competence in Speech-Language Pathologists. This research study aims to (1) develop a training module for student clinicians on AAC implementation for bilingual PWA and (2) analyze the efficacy of the training through pre- and post- training surveys. Research subjects were recruited nationally. Participants self-enrolled and verified through a consent survey that they are all either undergraduate or graduate students within Communication Sciences & Disorders. Research subjects were asked to complete three training modules related to high tech AAC, and semantic treatment as it relates to both bilingualism and AAC. Participants were also asked to complete pre- and post- training surveys to demonstrate perceived growth in knowledge and competence as it relates to AAC, multiculturalism, and language competencies. Each module, through an Open Canvas Course, included narrated PowerPoints, video implementation, and a case study which followed a bilingual (Spanish and English) speaker who had a stroke causing non-fluent aphasia. Surveys and progress checks were completed via REDCap, a HIPPAA compliant database. The results of this study are pending completion of the training by participants; however, it is anticipated that there will be self-reported growth in knowledge and competence of clinical skills related to AAC, bilingualism, and aphasia.

F-08: Characterizing Multilingual Children's Functional Speech Intelligibility in the Jamaican Context Through Parent Perspectives

Great Hall
Jessica Saylor, Speech Language Hearing Sciences
Project Advisor: Dr. Karla Washington

Abstract
This international community-based participatory study examined parents' perspectives of Jamaican Creole (JC)-English-speaking preschoolers' ability to be clear and understandable across multiple communication partners (i.e., functional speech intelligibility) in the COVID-19-milieu. JC is a minority language with speakers of JC-English representing an understudied but growing linguistic community in the US. The current evidence base on multilingual children's speech primarily consists of data based on well-studied languages and linguistic paradigms, leading to a narrow understanding of speech development. This practice contributes to the ongoing concerns regarding the misidentification of speech sound disorders in multilingual children. To address this concern, this study offers an opportunity to explore JC-English as a model system for better understanding functional speech intelligibility while

also extending evidence-based practices to include clients' perspectives. A qualitative research design was employed to gather parent responses using telehealth modalities to describe their children's functional speech intelligibility for JC and English. Parent responses were examined using a modified Grounded Theory approach that incorporated the tenets of a content analysis to ascribe meaning from text. This current study addresses the National Institutes of Health (NIH) and National Institute on Deafness and Other Communication Disorders (NIDCD) strategic plans regarding improving diagnosis, treatment, and prevention for understudied populations. In addition, this qualitative study explores how to utilize parent report measures such as the Intelligibility in Context Scale (ICS) and the ICS-JC to facilitate descriptive parent responses that can be used to reduce bias and inform our understanding of functional speech for other understudied populations.

F-09: Feasibility of Acoustic Analysis to Measure Fricative Speech Characteristics in Jamaican Creole and English-Speaking Bilingual Preschool Children

Great Hall
Molly Berns, Speech Language Hearing Science
Project Advisor: Dr. Karla Washington

Abstract
Bilingual children who speak both Jamaican-Creole and English are an understudied population in the Communication Sciences and Disorders field. The overall goal of this project is to conduct a feasibility task to determine clinical adaptability and usability of acoustic analysis to discriminate linguistic and dialectical differences versus Speech Sound Disorder in a multilingual population. If feasible, the training and protocols utilized in this study could be adapted to create a valuable resource for Speech-Language Pathologists assessing and treating multilingual children. For this study Praat, an acoustic analysis software, will be used to measure frequencies of sounds produced by bilingual preschool-aged (3-5 years old) Jamaican children. Audio from previously recorded speech assessments will be extracted into words and then individual fricatives, defined as productions of sounds characterized by constriction and constant airflow (i.e., /f/, /s/, and /v/). Praat will then measure spectral center of gravity to determine the average frequency of each fricative produced on 30 samples from children previously diagnosed with both typically developing speech and Speech Sound Disorders. Results from spectral center of gravity measurements will provide an average range of frequency measures for both typical and disordered speech sound productions in the given population. This study will provide knowledge regarding clinical feasibility of learning and utilizing acoustic analysis to measure speech sound productions through specific training and protocols.

F-10: Autonomy in Action: Improving Children's Ability to Self-Regulate Their Math Practice

Great Hall
Anna Schnell, Psychology
Brandie Matalka, Psychology
Nile Najmi, Psychology
Project Advisor: Dr. Heidi Kloos

Abstract

This study examined the role of self-regulated math practice for elementary school students in an urban setting. Self-regulated math practice is imperative because when practice is intrinsically motivated, students have a higher chance of academic success. This is especially important in urban schools where students consistently underperform in math.   We predicted that giving children autonomy over what to practice is helpful in fostering math learning. To test this, we used an existing data set from an enrichment program carried out at a local elementary school. In the program, students chose math problems to practice from the math enrichment application, IXL. To help inform their choices, students were provided with practice guides based on their estimated grade level. These practice guides listed different math skills and were separated into three levels of difficulty. During most weeks, the volunteers worked one-on-one with students to provide support during math practice sessions. However, as a manipulation of autonomy, during one week children were given less guidance from volunteers.   The data set consisted of two separate weeks. Data for both weeks included the time students spent practicing, students' attitudes toward practice, and questions answered correctly. Results indicated that when children had more autonomy they practiced for longer periods of time, but practiced simpler math than they did when working one-on-one with a volunteer.

Category G: Health and Body

G-01: Nutritional Management in Pregnancy

Great Hall
Morgan Farmer, Nursing
Anna Shindler, Nursing
Rebecca Janka, Nursing
Project Advisor: Dr. Paul Lewis

Abstract

Our capstone project aims to address the management of nutrition during pregnancy as it is a vital component that can greatly impact the gestational outcomes of the fetus and the mother. Adverse outcomes can occur when nutritional needs are not adequately met or managed during pregnancy such as nutritional deficiencies, gestational diabetes, premature birth, low birth weight, fetal deformities, and much more (Jardí, C., et. al, 2019). For example, adequate folate is essential to reduce the risk of fetal spinal abnormalities, iron is essential to help prevent iron deficiency anemia, and additional calcium is needed to help bone and heart health. (Foster, 2015). Through research, a lot of information has been found on effective nutrition during pregnancy (Ashman, 2017). Currently, there are resources that women can utilize to become educated on nutritional management but it is an individualized motivation that will determine whether or not the education is impactful (Foster, 2015). As well as this, it is essential that a woman tries to incorporate regular check-ups with an OBGYN before, during, and after pregnancy to continue receiving updates on her nutritional status as well as her child's so that complications can be avoided and detected early. For example, a pregnant woman should see her OBGYN about every 4 weeks throughout the first trimester of her pregnancy to get physical exams, lab tests, fetal abnormality screenings, and to discuss any lifestyle barriers. ("Prenatal", 2020).

G-02: Safe Sleep Practices in Infants

Great Hall
Sarah Layman, Nursing
Catherine Ankenbauer, Bachelor of Science in Nursing
Hailey Wick , Bachelor of Science in Nursing
Project Advisor: Dr. Paul Lewis

Abstract
In the United States, there are roughly 3,400 sudden unexpected infant deaths each year, making it the leading cause of death in infants 0-12 months. Two major components to these infant deaths are sudden infant death syndrome and accidental suffocation and strangulation in bed, both which can be greatly reduced through important sleep practices. The purpose of this project is to teach the necessity of implementing safe sleep practices such as being alone in the crib or bassinet, sleeping on their back, use of swaddling, and avoidance of bedsharing for infants under the age of one in future parents, caregivers, and guardians. Education that emphasized infant sleeping practices that are encouraged by the American Academy of Pediatrics was provided to a prenatal pregnancy class composed of expectant mothers and their companions. The education component included a presentation, video on swaddling, and handouts used to test for effectiveness with a pretest and post test. The ability to identify unsafe sleep practices improved an average of 19.7% following the education. Parents and caregivers reported they were more likely to utilize the safe sleep practices with their own children and they felt comfortable with these practices, reporting an average comfort level of 9.25/10 (0 being not comfortable at all and 10 being very comfortable). These results conclude that even one education experience makes parents and caregivers more likely to implement these practices demonstrating that education should be more widely utilized to decrease situations where sudden infant death can occur.

G-03: Importance of Vaccinations in Infant and Pediatric Populations

Great Hall
Johanna Westrin, Nursing
Mckenzie Cain, Nursing
Jessica Wetzel, Nursing
Project Advisor: Dr. Paul Lewis

Abstract
Early childhood immunizations are a safe and effective way to protect the pediatric population from potentially life-threatening preventable diseases early in life especially since they are vulnerable. It is recommended that infants receive immunizations for 14 diseases by 24 months. In our PICOT our group will be addressing the importances of the pediatric population getting their vaccinations.

G-04: Effects of Exercise on Mental Well-Being

Great Hall

Emily Daugherty, Nursing
Rebecca Smith, Nursing
Amy Barto, Nursing
Project Advisor: Dr. Jessica Westman

Abstract
Our project aims to provide education to the general public to help increase knowledge about the effects of exercise in promoting mental well being.

G-05: The Relationship Between a Nutritious Diet and Psychological Well-Being in Adolescents

Great Hall
Catherine Happel, Nursing
Leah Becker, Nursing
Evelina Cristino, Nursing
Project Advisor: Dr. Paul Lewis

Abstract
When adolescents were asked to identify if a relationship exists between a healthy diet and psychological well-being, 88% were unable to do so. A lack of knowledge regarding this topic is detrimental, as research shows that adolescents with a poor diet have an 80% higher risk of developing depressive symptoms. Therefore, the purpose of this project was to educate adolescents on the relationship between a nutritious diet and psychological well-being. An education plan was created that included a PowerPoint presentation, an educational video, and an in-class activity. The effectiveness of the educational presentation was determined by administering a pre and post-survey. The results of the surveys showed that 98% of students indicated they learned something new after education. Specifically, 95.2% of students correctly identified foods that enhance well-being, a 14.2% improvement from baseline. Additionally, 84.1% correctly stated the relationship between psychological well-being and diet, a 6.3% improvement from baseline. Lastly, 54% of students expressed that they are likely to change their diet after education. In conclusion, the population demonstrated an overall understanding of the concepts and an increased likelihood to change their diets. Ultimately, psychological well-being is at the center of many challenges adolescents face today, such as social exclusion, learning difficulties, and even mental health illnesses. Therefore, bringing awareness and offering education on this topic can play a huge role in improving the quality of life for adolescents.

G-06: Examining Athletic Trainers' Impact on Student Athlete Emergency Room and Urgent Care Visits Using Electronic Health Records

Great Hall
Abraham Kim, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract

Athletic Trainers (ATs) are crucial to the process of coordinating care and preventing injuries for student athletes. Despite this, not all high schools have ATs for various reasons. Therefore, it is imperative to justify the critical need of full-time ATs. In this mixed methods study, we examine student athlete medical records and conduct semi-structured interviews to determine the influence of AT presence on the number of Emergency Room visits.

G-07: Effects of Caffeinated Pre-Workout Supplement on Cardiovascular and Resistance Training
Great Hall

Therese Gerth, Exercise Science
Maddie Torbeck
Project Advisor: Dr. Susan Kotowski

Abstract
Many of those who participate in physical activities and exercise include the use of a pre-workout supplement in their workout routine. Pre-workout serves to provide extra energy to fuel a more intense workout. The purpose of this project is to help understand how pre-workout consumption can affect exercise performance during resistance and cardiovascular training. Twelve (6 male/6 female) healthy subjects completed 6 trials each - a control trial, and then a randomized placebo and experimental trial for both resistance and cardiovascular training. During the experimental trial, the subject consumed the pre-workout supplement which consisted of a flavored powder mixed into water per the manufacturer's instructions. The pre-workout contained l-citrulline, beta alanine, caffeine, and choline. During the placebo trial, the subject consumed a similar drink mix drink powder, with no caffiene or other additives (crystal light). Participants were blinded to whether they were completing the experimental or placebo trial. To analyze the affects of pre-workout on cardio, the stationary bike will be used for a total of 4 miles. To analyze resistance training, weighted squats and bench presses will be done to failure, with the weight being carried based on gender and body weight. With the data collected during these three activities, the times/intensity/repetitions will be compared between the three trials for each subject. This research project will give us a better understanding on the effectiveness of pre-workout consumption of different categories of exercise.

G-08: Effects of Various Pre-Test Taking Strategies on Cognitive Performance
Great Hall

Jenna Burns, Health Sciences
Audrey Bard, Health Sciences Pre-Med
Mykah Long, Health Sciences Pre-Med
Project Advisor: Dr. Susan Kotowski

Abstract
Previous research has shown that certain pre-test taking strategies can be beneficial to performance on a given assessment. Some strategies involve the digestion of certain foods and/or drinks, while others may be more behavioral such as exercise. The purpose of this project is to determine the effects that different consumable supplements and actions (exercise or meditation) can have on an individual's

performance on a cognitive test fundamentally based on the Stroop effect. The subjects completed a survey that was conducted via RedCap which included information regarding their age, gender, weight, the amount of caffeine consumed per week/weekend, pre-test taking strategies, how often they participated in physical activity, as well as other baseline questions necessary for adequate assessing. The Stroop test was taken by each participant following each supplement ingestion or activity three times and then an average was taken. Activities completed by the participants included: exercise (jumping jacks), meditation, consumption of caffeine (coffee), Red bull, and green tea. The research was conducted on healthy individuals between the ages of 15 and 30 who were recruited via a sampling of convenience. We hypothesize that subjects will best perform on the cognitive test when exercising or meditating beforehand, depending on which of these two actions he/she is most used to.

G-09: Effects of Energy Drinks and Caffeinated Pre-Workout Supplement on Cardiovascular and Resistance Training

Great Hall
Krish Kadakia, Health Sciences
Alex Shood, PT
Max Lendhardt, PT
Project Advisor: Dr. Susan Kotowski

Abstract
Energy drinks and caffeinated pre-workout supplements are said to enhance cardiovascular and resistance training. Some energy drinks are geared towards energy for working out and some are for energy in general. The purpose of this project is to analyze if the claims of the effects on exercise are true and if there is any difference between Red Bull and Celsius in exercise performance. Our group brought in a total of 30 participants; 15 of those were female and 15 of those males over the age of 18. Each participant had to fill out a pre-workout survey before being able to engage in exercise to receive background information and health history. These questions were aimed to screen out participants that were unfit for the study and ensure safety with our participants. Each participant was brought into the health sciences building three separate times to consume 4.5 ounces of water, RedBull and Celsius. Each participant participated in three different exercises after consuming the drinks and the effect of these drinks were measured using a rating of perceived exertion scale (RPE) and repetitions of push-ups, sit-ups and jump squats. These exercises were performed for 2 minutes, and participants were given a 2-minute rest period in between sets. We hypothesize that there will no significant difference in performance when comparing RedBull and Celsius, however, we expect for performance to increase when comparing to the control.

G-10: Does It Matter When You Exercise: The Impact on Morale

Great Hall
Ian McCulloch, Pre-Physical Therapy
Vincent Gerrish, Pre-Occupational Therapy
Cassidy Jenkins, Pre-Occupational Therapy
Project Advisor: Dr. Susan Kotowski

Abstract

Previous research has shown that there are a wide variety of advantages and disadvantages to exercising at different times during the day. The purpose of this project was to determine how exercising at different times of the day (e.g., morning, afternoon, and evening) affects morale. Twenty participants over the age of 18 were recruited to participate in this project. Participants filled out a baseline survey which included demographic questions and questions related to exercise habits including what exercises they regularly participate in, duration of exercise per week, and time of day normally exercise is normally completed. Participants also completed a second survey immediately prior to, immediately after, and 24 hours after completing each exercise session. There were fourteen survey questions directed at evaluating numerous emotions of the participant (e.g. mood, attitude, energy level, ability to focus, stress, anxiety, etc.) upon which overall morale was predicted and defined. Each participant completed 3 different exercise sessions, one in the morning, one in the afternoon, and one in the evening. The type of exercise completed during each session was self-selected. It is predicted that morale will be highest after exercising in the morning.

G-11: Does Sex Education Increase Adolescent Understanding of Safe Sex Practices?

Great Hall
Jennifer Payne, Nursing
Riley Hanger, Nursing
Julianna Williams, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract

The capstone topic was chosen based on the high rates of adolescent pregnancies in the greater Cincinnati area, as well as poor sex educational systems across the United States. The goal is to increase the knowledge in adolescent students on sex education to prevent pregnancy/STIs. The strategy for achieving this goal includes presenting to an adolescent health class and comparing their sex education knowledge before and after the presentation. The outcome will be based on the results of a survey before and after the presentation to determine if the teaching was successful.

G-12: Promoting Mental Health in Socially-Isolated Older Adults Through Telehealth

Great Hall
Kate Stark, Nursing
Kayla Wiley, Nursing
Jake Waters, Nursing
Project Advisor: Dr. Caroline Morrison

Abstract

Likelihood of mortality in older adults is increased by around thirty percent in those expressing feelings of isolation and depression. Up to 50% of older adults are at risk for social isolation due to a multitude of reasons. Feelings of loneliness, depression, and anxiety have been identified as risk factors for conditions such as heart disease and strokes, as well as reduced resistance to infection and higher cognitive/physical impairment. Telehealth interventions that incorporate creativity, reflection, exercise, discussion, and group interaction can be used to provide a sense of routine, connection, and belonging to improve health outcomes in socially isolated older adults over time. We identified two knowledge gaps in the nursing staff population: the extent to which social isolation affects older adults and the positive effects of telehealth interventions on socially isolated older adults. The aim of this project was to educate nursing staff on social isolation in older adults and the positive effects of implementing telehealth interventions. A group of selected progressive care nurses at Mercy Anderson Hospital received an educational pamphlet and presentation on social isolation and telehealth interventions. We administered a pre and post-test to examine the difference in scores after viewing the educational pamphlet and listening to our presentation. Out of the five questions from our pre and post-test, there was an increase in correct answers in all questions except one. There was an evident increase in knowledge about social isolation and the positive impacts telehealth can provide.

G-13: Exploring the Sleep Patterns of Students in a Medical Sciences Baccalaureate Program Using Self-Reported and Wearable Data
Great Hall
Gargi Rajput, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
Poor sleep patterns are commonly associated with stress in college students. However, to understand their perception of sleep behaviors, this study explores current sleep patterns amongst pre-medicine undergraduate college students. By self-report measures, it was found that students appeared to experience worse sleep than they expected. Additionally, sleep monitoring experience via Fitbit was assessed in a focus pilot group. As a result, students saw benefits in monitoring sleep and gave further suggestions to improve usability.

G-14: Implementation of Bedside Report to Improve Communication and Safety
Great Hall
Jackson Kirk, Nursing
David Moskowitz, Bachelor of Science in Nursing
Marco Palmentera, Bachelor of Science in Nursing
Project Advisor: Dr. Paul Lewis

Abstract

Of all consequential medical errors within hospitals nationwide, 80% occur from miscommunication during caregiver handoff. Studies show that handoff at the bedside compared to at the nurse's station can significantly decrease communication errors, improve patient safety, and result in overall better patient outcomes. The purpose of the project was to encourage registered nurses working on inpatient units to incorporate bedside report into practice. Education sessions were provided based on evidence that discussed the benefits of bedside report such as decreased falls in the hospital, increased patient and nurse satisfaction, and increased patient participation. Data was collected from pediatric and adult intensive care units, medical surgical floors, and an emergency department. Assessments were administered in order to distinguish prior knowledge on the topic and knowledge learned. Out of the 34 nurses participating in the education session, 8 stated they utilize bedside report. After the education session, 31 out of 34 nurses felt they had an increased understanding of bedside report based on the knowledge they received. Notably, the assessment showed that 64.2% of nurses who previously stated they would likely not use bedside report indicated that they would be more willing to utilize the practice.

G-15: Prevention and Management of ICU Delirium

Great Hall
Emma Belsley, Nursing
Kristen Stueve, Nursing
Sarah Sullivan, Nursing
Project Advisor: Dr. Caroline Morrison

Abstract
ICU delirium is a phenomenon where patients admitted to intensive care units do not receive adequate rest to support normal cognition, which results in an acute form of psychosis. ICU delirium is a common occurrence among patients, affecting as much as 80% of those receiving mechanical ventilation, and 50% of patients not receiving mechanical ventilation (Bounds, 2016). Overall, ICU delirium can have serious repercussions such as harm to self and/or providers, as well as a much higher cost of care. ICU nurses are expected to complete hourly assessment scales on patients, to assess for delirium. While assessment helps diagnose delirium, it does not prevent it. The purpose of this presentation is to discuss the significance of the wakening, Breathing, Coordination, Delirium prevention and management, and Early mobility (ABCDE) bundle in preventing the occurrence of ICU delirium. The ABCDE bundle is used to prevent, detect earlier, or shorten the duration of ICU delirium and has been implemented in select ICU's. This bundle incorporates holistic measures to significantly benefit patients' physical, functional, and neurocognitive status through awakening, breathing, coordination, delirium prevention and management, and early mobility. We created an educational powerpoint to present the efficacy of the ABCDE bundle and the importance of preventing hospital delirium. A pre and post survey was utilized to test the participants knowledge which showed an increase in overall understanding, with 9/10 participants showing a willingness to implement the bundle into practice within an ICU setting.

G-16: Education on Prevention of Ventilator-Associated Infections

Great Hall

Karis Wilson, Nursing
Jacob Parrott
Project Advisor: Dr. Caroline Morrison

Abstract
We are looking at Ventilator Associated Pneumnonia (VAP) prevention bundles with various interventions such as head of bed >30 degrees, using chlorhexidine, in-line suction, clean suctioning practice etc. Currently, different facilities use different standards of care when looking at policies for VAP prevention. Regardless of VAP bundle, we want to look at whether or not having a bundle used makes a difference in comparison to not using a bundle. We hope to find what bundles have the best success throughout our research in a 6-month time frame.

Category H: Digital Futures

H-01: Developing a Strategy to Improve Workflow Efficiency in National Registry Submissions in Pediatric Cardiology and Thoracic Surgery

Great Hall
Hager Hamed, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
National registries in pediatric cardiology are an important component of learning health systems and they are common. Through the use of such registries, healthcare workers can learn from previous and current practice. However, submitting data to registries can be time-consuming and cost ineffective. Three studies were done focusing on the workflow when using cardiology registries in a heart institute. The registries were: Improving Pediatric and Adult Congenital Treatments (IMPACT), Pediatric Cardiac Critical Core Consortium (PC4), and the STS National Database. This paper reviews all three studies (done in 2018) to draw insights on design implications. A four-level strategy on optimization of the workflow of these registries is proposed as well as strategies to improve on the common issues found.

H-02: Assessing the Readability of Patient Education Materials in Obstetrics and Gynecology

Great Hall
Anunita Nattam, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
The equitable dissemination of health information depends on the readability levels of Patient Education Materials (PEMs). This study aimed to assess the readability of OB/GYN PEMs using four readability measures and to compare the scores in four categories: Government, Commercial, Non-Profit, and Educational. The results indicated that the four readability measures are not consistent in their scores for readability, the average readability level of PEMs was 11th grade, and the governmental

PEMs had the lowest average readability, and were easiest to understand. Future work includes further content analysis and advanced readability scoring and validation.

H-03: Developing a Note Template to Improve the Understanding and Actionability of Clinical Notes for Diabetic Patients

Great Hall
Shwetha Bindhu, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
Improving the readability of clinic notes is crucial to maximizing the efficacy of clinic note sharing with patients. Through physician interviews and preliminary clinic note analysis from a sample of diabetes patients, four targets were identified for note revision, including text reorganization, text simplification, text summarization, and lab test visualization. These can be addressed through automated text simplification to generate a clinic note template that is inclusive of different patient health literacy levels.

H-04: Developing a Data Pipeline to Facilitate the Understanding of the Interrelationships Between Humans and Technology in Smart Buildings

Great Hall
Andy Gao, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
Office work environments often greatly impact the well-being of the occupants within them. In this study, a data pipeline was developed and refined on two cohorts of participants to integrate sensor, building performance, and a well-being survey data. There were several challenges in developing a pipeline of this magnitude including date/time manipulation and correlating sensor to participant data. This study outlined the importance of separating the exploratory analysis and hypothesis testing stages of a pipeline.

H-05: Exploring the Technical Feasibility and the Context of Use of a Machine Learning Model Predicting Unplanned Cancer Readmissions

Great Hall
Tripura Vithala, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
Unplanned cancer readmissions can cause significant burdens to patients due to care fragmentation and increased hospital costs, and is associated with higher mortality rates. Therefore, it is clear that there is a need to develop intervention strategies to reduce unplanned cancer readmissions. The objective of our study is to develop a clinical decision support system (CDSS) as an informatics-based intervention to

reduce unplanned cancer readmissions and help improve outcomes. This stage of the study focused on the identification of user needs and understanding of the context of use for this CDSS. This primarily involved identifying a key area of focus, and interviewing related clinicians in the semi-structed interview format.

H-06: Predicting Thirty-Day Unplanned Cancer Readmissions Using Machine Learning and Artificial Intelligence

Great Hall

Hoang Vu, Computer Science
Project Advisor: Dr. Danny Wu

Abstract

Unplanned cancer readmission is one of the primary outcomes of cancer treatments and a key indicator of the reduced quality and length of cancer survivorship.1,2 It can cause significant burdens to patients and increase hospital costs.3 Moreover, cancer patients readmitted into intensive care units in an unplanned manner face significantly higher mortality rates during their hospital stay or shortly thereafter.4,5 It is therefore imperative to identify intervention strategies to reduce unplanned cancer readmissions. Our first step to approach this problem was to develop a predictive model to identify patients likely to have a 30-day unplanned readmission using electronic health records with machine intelligence. This abstract reports the technical development process and the model performance.

H-07: Coarse-Grained Simulation Studies on the Dynamic Stability of a Biological Nanomachine

Great Hall

Kwaku Appiah, Chemistry
Project Advisor: Dr. George Stan

Abstract

Molecular chaperones such as bacterial ClpB are essential for guiding disassembly of toxic protein aggregates to assist with refolding misfolded proteins. Protein aggregation is the known cause for most neurodegenerative diseases, which makes the study of protein disaggregation important. ClpB, a member of the AAA+ (ATPases Associated with various cellular Activities) superfamily, homo-hexameric structure with a narrow central pore that serves as conduit for the polypeptide chains extracted from aggregates. In this research, we developed a structure based SMOG2 coarse-grained model of the ClpB disaggregation nanomachine and performed simulations using OpenMM python module. The simulation results are analyzed by Root Mean Square Fluctuation (RMSF) and single molecule fluorescence resonance energy transfer (smFRET) to compare with the experimental and all atom simulations results. This would give us a better understanding of all the different proposed disaggregation mechanisms.

H-08: Fake It Till You Make It: Synthetic Generation of Pediatric Liver Ultrasound Images Using Generative AI Models

Great Hall

Phuc Nguyen, Biomedical Engineering
Project Advisor: Dr. Surya Prasath

Abstract
The field of artificial intelligence (AI) has seen huge advancements in recent years with extensive applications in medicine, from the diagnosis of diseases, personalized healthcare, drug discovery and medical image analysis. Its success relies on recent advances in deep learning (DL) models, a subdomain of machine learning, and the availability of high-quality biomedical datasets. However, large-scale labeled biomedical datasets that are required to train these AI models are difficult to access without collaborating with healthcare providers and obtaining patients' consent. Moreover, these datasets remain small in the medical imaging domain compared to other common DL datasets in other domains, creating a bottleneck in training viable models. Ultrasound is a medical imaging technique that utilizes sound waves for observing internal human organs. Despite ultrasound being a common imaging modality used across various medical diagnoses, large-scale ultrasound datasets tailored for training DL models are scarce. Addressing this issue, we present a method of using different models of generative adversarial networks (GANs) to generate synthetic liver ultrasound images from a limited dataset. These GANs were trained on a pediatric liver ultrasound dataset obtained from Cincinnati Children's Hospital Medical Center (CCHMC) to generate realistic liver images, which were then evaluated qualitatively by radiologists and identified as original or GAN-generated. Further, we utilized these synthetic ultrasound images to classify liver stiffness that would be useful in various liver diseases. Our work offers a promising application of GANs for other ultrasound images and enriching the already existing smaller ultrasound datasets.

H-09: Development of COVID-19 Intelligent Query System for Searching and Sharing Medical Articles

Great Hall
Khanh Le, Computer Science
Project Advisor: Dr. Danny Wu

Abstract
The ongoing fight against COVID-19 pandemic creates the need to discover, to accumulate, and to share scientific literature among physically apart members within research teams. Therefore, it becomes more critical to design a tool which can integrates a search engine on medical articles and provides the ability for all users to interact with shared resources. For this purpose, we decided to create COVID-19 Intelligent Query System (COVID-IQS). The system includes a text-based search engine using Elasticsearch for users to perform searching on our preprocessed article database. We also collect users' interactions and feedbacks to research user needs and improve our search algorithms with machine-learned ranking techniques. In addition, COVID-IQS allows the users to host a shared project, invite other users, and assign roles and privileges to all project members. The successful implementation of the COVID-IQS can support knowledge discovery and hypothesis generation in our institution and can be shared with other institutions to make a broader impact.

H-10: Time in the Vicinity of Conversation: A Comparison Between Parkinson's Disease and Healthy Controls

Great Hall

Erica Jenks, Speech-Language Hearing Sciences
Carrie Leeper, Speech-Language Hearing Sciences
Jamie Pyatt, Speech-Language Hearing Sciences
Project Advisor: Dr. Carrie Rountrey

Abstract

Parkinson's disease (PD) is a disorder that is characterized by a shortage of the neurotransmitter dopamine, which is critical for body movement. PD affects movement by slowly altering the control of motor movements, including movement for speech. Anecdotal reports indicate that People with Parkinson's Disease (PWPD) reduce their time in conversation because of these difficulties. Undergraduate researchers were called upon to create a workflow and manage volunteers to analyze a set of long sound files which sample natural speech for the purpose of comparing PWPD and Healthy Volunteers (HV) regarding time spent in the vicinity of conversation. These students were tasked with creating a workflow to splice and analyze the sound files and to employ and manage other student volunteers to execute the workflow. The workflow also attends to the analysis goals of a future mixed methods research study that select members of the project team will engage in. In a previously conducted study, 25 participants were recorded in their home and natural environments for approximately 15 hours each. This resulted in long, unlabeled sound files that were primed for mining for several research questions. This project aimed to answer the question: "What is the time spent in the vicinity of conversation, and how does it differ between PWPD and HV?" Hypothesis: PWPD spend less time in the vicinity of conversation than HV. This poster focuses on methodology and presents preliminary data for this ongoing project.

PM POSTER SESSION

Category A: Stress, Trauma and Addiction

A-01: Vaping and E-Cigarettes in the College-Aged Community

Atrium

Madison Schilling, Nursing
Sarah Horn, Nursing
Caitlin Bollheimer, Nursing
Project Advisor: Dr. Paul Lewis

Abstract

The purpose of our project is to inform college-aged students on the negative effects of using e-cigarettes and vapes. This presentation includes evidence-based research that supports the benefits of cessation and decreased use. The goal of this project is to decrease the prevalence of e-cigarette and

vape use in young adults. Pre- and post-surveys are completed by participants both before and after education is provided. Results demonstrate whether education is effective in reducing rates of use.

A-02: Impact of an 8-Week Mindfulness and Resilience Virtual Training on Stress and Burnout for University Faculty and Staff

Atrium
Conner Funke, Medical Sciences
Project Advisor: Dr. Sian Cotton

Abstract
Purpose: Mental well-being and reducing stress are critical to job performance and retention within University faculty/staff. The purpose of this study was to assess drivers of burnout, motivators for participation in, and the impact of attending a virtual 8-week mindfulness and resilience training (MRT) on faculty/staff stress and burnout.   Methods: A mixed methods pre-post survey was administered to participants of an 8-week virtual MRT offered at a Midwestern university to faculty/staff. Qualitative items assessed top stressors, motivators for participation, and personal and professional impacts of the training. Validated measures were used to assess burnout (Maslach Burnout Inventory); stress (Perceived Stress Scale); and a Likert scale assessment was used to examine 7 evidence-based drivers of burnout (Shanafelt, 2017). SPSS.25 was used to compare mean scores pre-post intervention and thematic analysis was used to describe qualitative data.   Results: 93 faculty/staff registered for the MRT while 21 participants completed both pre-post surveys and attended 6 or more sessions (mean age=42 years, 95% white, 95% female). Stress management (38%) and burnout (38%) were the top motivators for participation. Top drivers of burnout were feeling their workload was too much (35.6%) and having difficulties balancing work and life (18.6%). Participants reported significant decreases in stress (p=.00) and increases in PE (p=.05), as well as less EE (p=.24) and cynicism (p=.14) post-training. Conclusion: Addressing stress and burnout through a virtual MRT can reach a wide audience of university faculty/staff with positive impacts on mental well-being and reduced burnout at work.

A-03: Providing Children With Coping Mechanisms to Protect Themselves From Stressful Situations

Atrium
Daishia Runyon, Nursing
Shada Musa, Nursing
Project Advisor: Dr. Caroline Morrison

Abstract
American schools have placed a very low priority on mental health throughout the years by placing students in high-stress, competitive learning environments that prioritize academic success before the overall well-being of their students. This has caused significant damage over the years to students and has added to the already worsening mental health epidemic. The goal of our study was to determine if mental health education through multiple types of media would provide the students with the tools needed to decrease their stress during difficult times and determine if this would assist with their overall

mental well-being. In the past, people have attempted to educate children on mental health however, they typically only use one form of media which only reaches children of that specific learning style. Using a pre-test/ post-test evaluation method we found that the students were able to identify what mental health is, differentiate between a positive and negative coping style, and pinpoint their personal triggers. These findings show that the students in our population now have the coping mechanisms to protect themselves from negative mental health outcomes and have a greater overall well-being.

A-04: Examination of Harm Reduction Participants in Brown County, Ohio Needle Exchange

Atrium
Teri Wesley, Social Work
Project Advisor: Dr. Gary Dick

Abstract
The opioid epidemic has changed the way law enforcement officials, health professionals, mental health professionals, and even addiction specialists monitor and treat addiction. Devastating consequences include increases in opioid misuse and opioid related overdoses. Although this is accurate, what we define as "opioids" is a constantly changing and expanding variable. The opioid epidemic is an ever-growing public health crisis and understanding the ways that it has evolved over the past decade are imperative to the prevention and treatment of addiction. The study of how the opioid epidemic has affected rural counties such as Brown County, Ohio is important to social work because addiction does not discriminate. Anyone, regardless of their socioeconomic status, age, race, religion, etc., can become addicted. As the opioid epidemic has become increasingly detrimental to the health and safety of American citizens, the healthcare systems across the country are first-hand witnesses to the impacts of addiction. The overwhelming rates at which people are becoming addicted and the number of daily overdoses present devastating implications for the medical infrastructure and healthcare systems (Stiocea et al., 2019). The aim of this study is to evaluate the data gathered at the needle exchange in order to provide a descriptive profile of the subjects who attend the exchange.

A-05: Prevention and Treatment of Postpartum Depression

Atrium
Gracyn Vazquez, Nursing
Brooke Melford, Nursing
Mackenzie Wessel, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract
Do NICU nurses who received postpartum depression screening education as opposed to those who did not receive education demonstrate an increased understanding in using diagnostic tools?

A-06: Support Group Intervention When a Child Loses a Parent

Atrium
Lexie Pflager, Social Work
Project Advisor: Dr. Gary Dick

Abstract
The trauma that children endure when they lose a parent is unmatched. They can ultimately develop mentally damaging disorders that can last a lifetime that has the potential to further damage their livelihood. In order to address this problem and provide some sort of solution and/or relief, the understanding of how children feel after losing their parent is imperative. In order to do so, the examination of how intervention like support groups can affect this grief, a solution to aiding children bereaved by a parent may be achieved. In the social work profession, the mental health of the respective clients is heavily accounted for. When the grief of children that have lost a parent is concerned, the social work profession can play a large role. By ensuring the student's transition back into the school setting, the student will be able to better adapt to their new environment. By examining the effects of support group intervention, students who are struggling with a similar case can be more effectively served.

A-07: Trauma Informed Care Among Teenagers: Connections With Resilience

Atrium
Jacklyn Watson, Social Work
Project Advisor: Dr. Gary Dick

Abstract
Trauma-informed care (TIC) is viewed with the understanding that everyone in their lifetime has experienced trauma. Trauma is not new and has been perceived to only cluster of people who have experiences traumatic event such as, war, sexual assault, and abduction. Trauma is not viewed as something that happens daily and a regular experience that people go through, including children and adolescents. Resilience is one's power to overcome/recover from toughness. Trauma and resilience can balance each other; those who experience trauma may also show signs of resilience. The goal of this study is to examine the connection between trauma and resilience among teenagers by using the Connor-Davidson Resilience Scale, Personal Development Plan and Child Status Index to measure their progress.

A-08: Effects of Social Support From Family and Partners on Internalized Stigma in Young Sexual Minorities

Atrium
Austin Simon, Psychology
Project Advisor: Dr. Sarah Whitton

Abstract

Internalized stigma may lead to many negative outcomes in sexual and gender minorities (SGM) such as lower self-esteem and higher rates of depression. Social support, particularly family support, is associated with decreased rates of internalized stigma. It is possible that partner support may help reduce the negative effects of low family support on SGM well-being, including internalized stigma. This study aims to assess whether family and partner support are negatively associated with internalized stigma in sexual and gender minority (SGM) individuals, and if partner support reduces the effect of low family support. The sample included 347 SGM assigned female at birth currently in a relationship (average age = 20.4; 37.2% black, 26.5% Hispanic/Latinx, 23.6% white, 8.6% multiracial). Participants completed measures of family support, romantic partner support, and internalized stigma. Within a multiple regression analysis, relationship support was tested as a buffer for lack of family support against internalized stigma. Contrary to hypothesis 2, partner support did not moderate the negative association between family support and internalized stigma (standardized = 0.052; p-value = 0.334). Family support (standardized = -0.232; p-value = <0.001) had a significantly negative direct effect on internalized stigma, but partner support (standardized = -0.084; p-value = 0.123) did not have a significant direct effect.

A-09: Teen Suicide Rates and How to Combat Them

Atrium
Logan Pennington , Nursing
Ryann Pedoto, Nursing
Rylie Dunnette , Nursing
Project Advisor: Dr. Caroline Morrison

Abstract
In 2018, suicide was the second leading cause of death from ages 10-24 in America. This number has been on the rise in the past two decades and does not appear to be showing any signs of improvement. Mental health concerns carry a stigma and many teens do not get the opportunity to openly discuss and learn about mental health issues. Research shows that education on mental health helps adolescents better recognize suicidal behavior and leads to earlier intervention, which is key in preventing suicide attempts. We created a presentation over mental health disorders, coping strategies, having discussions about mental health, and resources available. The presentation was given to two different groups of adolescents. One was given to Beavercreek Youth Council and another to Wesley Chapel Mission Center. Though the demographics of the groups varied, the results were pretty standard. The pretest and post test quizzed the teenagers on depression/anxiety, coping strategies, and approaching a peer about mental health. Both groups showed an average of a 30% increase in test scores from the pretest to the post test showing an increased awareness of general mental health issues. A survey was also given after the presentation to gauge the adolescents interest in mental health. The results showed that 80% of the teenagers that were shown the presentation "strongly agreed" or "agreed" that this content would be useful in their school, helped them better understand mental health, and helped them better understand how to approach someone about mental health.

A-10: Analyzing Staff Satisfaction With the Signs of Suicide Prevention Program in Clermont, Ohio

Atrium

Emma Cousino, Social Work

Project Advisor: Dr. Gary Dick

Abstract

In 2020, suicide was one of the top leading causes of deaths for adolescents ages 10 through 14. With the increase of modern technology and global crises that threaten the mental health of the nation, identifying effective ways to educate students on the importance of mental health services and self-harm prevention are more pertinent than ever. This study aimed to answer if school staff and mental health providers believed the suicide prevention programs, specifically the Signs of Suicide Program, were effective to their students. To address this question, staff participants of the Signs of Suicide Program in a local Ohio middle school were asked to share their observations and feelings regarding the program through a voluntary survey that was sent out to the selected school district and local mental health agency, Child Focus. This provides the perspective of both staff facilitating the program and staff observing the students and their opinion on future suicide prevention education. The school district observed completed this training in the Fall of 2021 for grades sixth through eighth. With 100% of participants stating that they believe the program to be beneficial to students, it asks the question why this and other similar programs are not utilized in every school district across Ohio. There is speculation surrounding the effectiveness of the program utilized at different grade levels, however, the overall satisfaction rate of the program and its effectiveness are rated high in Clermont, Ohio.

A-11: High Turnover in Caseworkers: Describing Characteristics of Past Child Welfare Workers

Atrium

Meredith Hilke, Social Work

Project Advisor: Dr. Anjanette Wells

Abstract

High rates of job turnover pervade many areas of social work, especially in regard to child welfare. This lack of retention correlates with individual characteristics of each caseworker along with qualities pertaining to child welfare agencies and the caseworker role itself (Kruzich et al., 2014). When agencies are unable to limit staff turnover, the children and families they serve are negatively impacted. Recent studies focusing on contributing factors and recommendations to increase caseworker retention are further examined. This research study describes characteristics that could influence the turnover of child welfare caseworkers at Hamilton County Job and Family Services. These characteristics include gender, age, race, highest degree achieved and field of study, additional licensure, number of years spent at the agency, what child welfare department they worked within, caseload, and total number of assigned children. The relevant information of 198 child welfare workers that left the agency was de-identified and examined. The majority of these individuals were found to be female, 25-29 years old, and White. The most common degree type was a bachelor's degree and criminal justice was the most prominent field of study. Most of these past employees did not have additional licensure, spent less than one year at the agency, worked in the assessment unit, and were assigned 10-19 cases that consisted of 20-39 children in their last full month of employment.

A-12: Workplace Violence With a Focus on Interventions

Atrium
Lindsay Geise, Nursing
Sophia Monte, Nursing
Stephanie Bobb, Nursing
Project Advisor: Dr. Paul Lewis

Abstract
Our poster will be on Workplace Violence in healthcare. Violence against nurses and other healthcare personnel is a huge issue. Our PICOT question is: In Co-Op nursing students, did the presentation of a de-escalation training program increase knowledge and comfort levels on handling incidents of workplace violence compared to knowledge and comfort levels prior to the presentation? Our goal is to teach and educate soon to be members of the healthcare workforce on de-escalation techniques on how to prevent violence in the workplace. The outcome of our work will be formation of new knowledge and understanding to enter the workforce in a safe and prepared manner.

A-13: Patient Monitoring and Alarm Fatigue in Critical Care Nursing

Atrium
Katherine Carney, Nursing
Angela Farolino, Nursing
Hannah Hill, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract
Alarm fatigue is a phenomenon in which there is a heightened exposure to medical machine alarms that leads to alarm desensitization, causing an overall lack of attention to alarms or a delayed response to alarms. The American Association of Critical Care Nurses (AACN) stated, "Clinical alarms are designed to alert clinicians to changes in the patient's conditions, but their sheer numbers and resulting noise pose a significant threat to patient safety" (AACN, 2018). As a result of the new technological machinery, healthcare workers are now overstimulated with alarms, most of which are non-actionable alarms, meaning the flagged event is either not clinically significant and/or requires no medical intervention by the nurse or physician. Based on the findings of the data collection process, our Evidence Based project will focus our educational efforts toward providing nurses with proper instructions on how to customize certain alarms, when to customize/disable certain alarms, and determining alarms that are not clinically appropriate/significant for their specific patient's status.

A-14: Using Self Care to Prevent Burnout in New Graduate Nurses

Atrium
Jordanna Burris, Nursing
Emily Caton, Nursing

Julia Brueggemeyer, Nursing
Project Advisor: Dr. Caroline Morrison

Abstract
An estimated 17.5% of newly licensed registered nurses leave their first nursing job within the first year, and one in three (33.5%) leave within two years. New graduate nurses are much more likely to experience burnout due to higher stress levels and fewer adaptive coping mechanisms than experienced nurses. The purpose of the educational project was to educate newly graduated nurses about how they can use self care techniques to prevent them from developing burnout. Included in this presentation was information about what burnout is, factors that contribute to burnout, why newly graduated nurses are more susceptible to burnout, and different self-care techniques that have been proven effective in preventing burnout in new graduate nurses. A group of selected third-year nursing students at the University of Cincinnati received an educational PowerPoint with the material at hand. A pre and post-test were administered to allow for the analysis of their knowledge gained after viewing the educational PowerPoint.   Overall, students reported increased knowledge of what burnout is, factors that contribute to burnout, and self-care techniques that can be used to prevent burnout from developing in the first place.

A-15: Effects of Experiencing Domestic Violence on Self-Compassion in Women Aged 18-65

Atrium
Bethany Fowler, Social Work
Project Advisor: Dr. Anjanette Wells

Abstract
Domestic violence affects over ten million individuals in a year, roughly twenty people every minute. Experiencing domestic violence impacts an individual in many ways. One potential area that can be impacted by experiencing domestic violence is an individual's self-compassion - a crucial aspect of an individual's well-being. Previous studies conducted posed the idea that self-compassion is important in the treatment of mental health following stressful life events. As demonstrated in previous clinical studies, the population of women who have experienced the repeated trauma of domestic violence/intimate partner violence exhibit a negative relationship between rates of self-compassion and symptom severity of PTSD. This descriptive, qualitative research study examined the relationship between experiencing domestic violence and self-compassion, focusing on women aged 18-65. The determination of a negative correlation between domestic violence and self-compassion can better inform current clinical interventions and help to progress advocacy efforts. Content analysis of data collected through interviews with participants recruited via social media was conducted to determine a negative correlation between experiencing domestic violence and self-compassion. Results of the study indicated that self-compassion was negatively correlated to experiencing domestic violence.

A-16: The Benefits of Early Intervention When Chronic Medical Conditions Are Accompanied With Anxiety and Depression in Later Adulthood

Atrium
Katrina Perkins , Social Work
Project Advisor: Dr. Gary Dick

Abstract
The overall purpose of researching individuals (women) who suffer from chronic illness with anxiety and depression is to see how early intervention can increase their overall quality of life including their mental and phycial health. The organization that was used to determine the significance of this study was Carestar by including their notes from the individuals from enrollment to their disenrollment (or lack there of). These notes showcase their overall imporvement, and the disenrollment indicates the individual imporved enough mentally and/or physically in order to no longer need the intervention; which was the program they were enrolled in.

A-17: Promoting Mental Health and Preventing Mental Illness Among Nurses

Atrium
Grace Tonnis, Nursing
Bridget Lanham, BSN
Justine Eversole, BSN
Project Advisor: Dr. Caroline Morrison

Abstract
Promoting the mental health and well-being of nurses has become an increasingly popular topic of discussion, especially due to the unprecedented amount of stress healthcare workers experienced during the coronavirus pandemic. Nurses encounter various types of stressors in the workplace, which can impact their mental health tremendously. An alteration in a nurse's mental health can further impact the quality of care they provide to their patients, thus putting their safety at risk. In addition to worsening nurse population health outcomes, the mental health crisis has also created costly job turnover rates leading to an increased need for more nurses. Focusing on prevention at the system level may help reduce the number of nurses who reach a state of burnout or experience an acute mental health crisis, enhance patient outcomes, and decrease healthcare expenses. The purpose of our educational project is to educate nurses on the effects that wellness and self-care practices can have on mental health. A group of selected nurses from Mercy West Hospital sat in on a presentation discussing the negative effects of nursing and how to combat them. In addition to education, they were provided different resources, including an informative handout and a direct link to an online website, which they can use as future references. A pre- and post-test were administered to determine the level of knowledge gained about the effects of mental health issues in nurses as well as techniques in which they can use to promote their mental well-being. Results pending.

A-18: Nurse Burnout at the Bedside

Atrium
Alyssa McDonald, Nursing
Emily Mills, Nursing
Megan Nippert, Nursing
Project Advisor: Dr. Paul Lewis

Abstract
Educating Nurses on Positive Coping Strategies for Burnout at the Bedside   According to The Journal of Advanced Nursing, approximately 30-60% of nurses experience high levels of burn-out. The purpose of our educational presentation was to improve knowledge of positive coping mechanisms and their impact on decreasing burnout among nurses at the bedside. We created an education plan that was presented to bedside nurses on a medical-surgical unit, that included the basics of what burnout is and three examples of positive coping mechanisms they can implement into their daily lives. These coping mechanisms were diaphragmatic breathing, coloring, and building interpersonal relationships. In addition to educating, we handed out information sheets and provided visual aids to enhance the learning process. The attendees showed increased knowledge on positive coping mechanisms, readiness to implement these coping mechanisms, and identification of stress.

A-19: Educating Acute Care Nurses on Mindfulness to Reduce Work-Related Stress and Burnout

Atrium
Michaela Roepken, Nursing
Samantha Bany, Bachelor of Science in Nursing
Nicholas Spangler, Bachelor of Science in Nursing
Project Advisor: Dr. Caroline Morrison

Abstract
A growing number of healthcare professionals are finding themselves unable to cope with high levels of stress, with studies reporting that up to 70% of intensive care unit (ICU) nurses and over 40% of hospital nurses experience work-related burnout. The purpose of our educational project was to introduce mindfulness techniques to acute care nurses in Cincinnati hospitals to increase their knowledge of this practice to combat burnout. We created an educational session which included an informational brochure and demonstrative videos. We presented statistics about burnout, described how to perform mindfulness, and provided resources for the nurses' personal use to enhance their practice of mindfulness in their workplace. Pre-and post-educational surveys were provided and utilized to assess if their knowledge of mindfulness improved. Findings showed that most nurses demonstrated an increase in comfort and confidence in utilizing mindfulness in the workplace. Overall, 8/9 nurses we educated report struggling with work-related stress and burnout. After our education session, 8/9 nurses felt either extremely or very confident in their knowledge of mindfulness techniques to improve these struggles.

A-20: The Single Dose Cocaine Reinstatement of Lever-Pressing Behavior in Rats is Explained By the Compulsion Zone Theory

Atrium
Jhanvi Desai, Neuroscience
Project Advisor: Dr. Andrew Norman

Abstract
The compulsion zone theory of the cocaine self-administration paradigm states that lever-pressing behavior is induced when cocaine levels fall to or below the satiety threshold. Single injections of cocaine are known to reinstate lever-pressing in rats trained to self-administer cocaine. We investigated whether this phenomenon can be explained by the compulsion zone theory. Male Sprague-Dawley rats (n = 5) were trained to self-administer cocaine i.v. on an FR-1 schedule. Once trained, these rats were administered a single dose of cocaine (2 - 12 µmol/kg, i.v.) in four daily sessions per week, and the time to lever-pressing, the number of presses and the duration of pressing were recorded. The latency from the start of an injection to the resumption of lever pressing increased with the cocaine dose and ranged from approximately 2 min at 2 µmol/kg to more than 15 min at 12 µmol/kg. The D1 dopamine receptor antagonist SCH23390 (10-30 nmol/kg i.v.) decreased the latency to reinstatement of lever pressing, following a dose of 12 µmol/kg cocaine. The increasing latency to lever-pressing is consistent with the increasingly higher cocaine levels taking longer to fall to the satiety threshold, while the lower doses are immediately within the compulsion zone. An antagonist-induced elevation of the satiety threshold explains the reduced latency to reinstatement. The number and duration of lever presses may reflect the time that the cocaine levels are within the compulsion zone. The cocaine satiety threshold model explains the dose-dependent delay in the reinstatement of lever-pressing behavior and the effect.

A-21: Investigating Sex Differences in PTSD-Relevant Behaviors in Mice: Assessing Fear and Arousal Regulatory Noradrenergic Neurons in the Hindbrain

Atrium
Allison Wilson, Biological Sciences
Project Advisor: Dr. Renu Sah

Abstract
Post-traumatic stress disorder (PTSD), a fear-associated disorder, afflicts approximately 6 million individuals annually with higher prevalence in war veterans. PTSD is characterized by maladaptive responding to a perceived threat and the persistence of fear memories associated with the original trauma. Studies in our lab are exploring a pre-trauma vulnerability factor that may promote PTSD: sensitivity to CO_2 inhalation, an internal homeostatic stressor. Pre-deployment studies in veterans have showed a role of CO_2 sensitivity as a risk for PTSD. We developed a mouse model where mice sensitive to CO_2 have displayed a fearful phenotype to a stimulus that they had associated with an adverse event. Our previous study was limited to male animals and studies are warranted in females, given the higher prevalence of PTSD in females. Previously, we reported differential behavioral responses and discrete neuronal activation in CO_2-fear conditioned (CO2-FC) female versus male mice, specifically active coping behaviors in females suggestive of arousal. However, the identity of neurons promoting these behaviors is unknown. The current study assesses noradrenergic (NE) neurons within the locus coeruleus (LC),

which regulates arousal and fear and is known to be sexually dimorphic. We hypothesized increased NE "tone" in female mice. DBH (NE-specific marker)- immunohistochemistry was used to label cells within the LC in air/CO_2/fear conditioned male and female mice. Cell counting and statistical analysis were conducted to assess group differences. Our study provides novel insights on the role of LC noradrenergic system in promoting sex differences in coping and fear relevant to PTSD vulnerability.

A-22: Dysfunction in the Power-Household: How Chronic Stress Precipitates Mitochondrial Dysfunction in Parvalbumin Interneurons

Atrium
Christine Moore, Neuroscience - Neuropsychology Concentration
Project Advisor: Dr. Annette Stowasser

Abstract
Abnormally diminished function of the prefrontal cortex (PFC) contributes to stress-related neuropsychiatric illnesses. Previous findings from our lab indicate that chronic stress enhances spontaneous miniature inhibitory neurotransmission in the PFC. Although it is clear that transmission affecting the neurotransmitter GABA in the PFC undergoes significant alterations during chronic stress, little is known about the mechanisms leading to prefrontal hypoactivity. Mounting evidence suggests that chronic stress leads to an increase in activity of parvalbumin (PV) expressing interneurons (INs) that affect GABA in the PFC. Recent RNA-sequencing (RNA-seq) data from the lab indicate alterations in mitochondrial function in PV INs following chronic stress. We wondered whether chronic stress influenced the function of these mitochondria. Therefore, the goal of this project is to validate if chronic stress leads to changes in mitochondrial morphology and function in PV INs. We used fluorescence immunohistochemistry using Tomm20 antibody to target mitochondria and determine how stress may affect mitochondrial volume and morphology. Mitochondrial volumetric measurements were performed using 3D reconstruction and morphometric analysis of PV IN mitochondria using Imaris Software. Results from this study will help validate the RNA-seq findings and also elucidate important mechanisms behind stress mediated PV IN plasticity and how that may lead to stress-related illnesses.

A-23: Understaffed Health Care Facilities: The Effects on Care Quality

Atrium
Skyler Gordon, Social Work
Project Advisor: Dr. Gary Dick

Abstract
Health care depends on patient centered care. Considering the staff that perform this care as well as the care quality they give, takes one on a journey of discovery. What is being qualitatively explored is how the lack of staff within long term care facilities effects the quality of care within a facility and how it also in turn effects the present staff.

Category B: Digital Futures

B-01: Best Practices for Returning Genomics Research Results to Participants, With a Special Focus on Marginalized Populations

Great Hall

Grace Miller, Biological Sciences

Project Advisor: Dr. Kathleen Grogan

Abstract

Human genomics research depends upon the trust and voluntary participation of its subjects, yet rarely do participants later hear from researchers about even the most general research findings. This lack of communication about study findings occurs in spite of the majority of participants and researchers supporting the return of research results to participants. Furthermore, when study participants are members of a marginalized group, this lack of communication can further damage trust in science and compound societal marginalization. The process of returning genomics results is hindered by multiple barriers, which can differ in part based on the type of genomic result, but the difficulty of overcoming these barriers must be balanced with the harm of not following-up with the community. Our review will discuss the best practices for returning genomic research results to participants, particularly those from marginalized populations, in ways that minimize the potential for miscommunication and emphasize the importance of a strong researcher/participant relationship. Incorporating these best practices would create a more equitable way of doing research and would empower the communities that are so vital for this research.

B-02: On Novel Methods of Integrating Highly Oscillatory Functions

Great Hall

Nathan Catlett, Biochemistry

Mason Hall, Mathematical Sciences

Prasanna Adhikari, Astrophysics & Mathematics

Project Advisor: Dr. Rockford Sison

Abstract

The integration of rapidly oscillating functions is of interest across a variety of fields. A numerical approach is often the best method for integrating these functions. Our research is focused on finding an efficient method of approximation. The method devised extracts a leading order oscillation via a Taylor polynomial expansion. A comparison of errors is made between the new method and existing methods.

B-03: Clustering Secondary Structure With Ramachandran Plots: a Classic Adaptation of Machine Learning

Great Hall

Vageesha Herath, Biochemistry

Project Advisor: Dr. Ruxandra Dima

Abstract

Microtubules (MT) are large cellular biopolymers responsible for functions such as chromosomal segregation during cell division. MTs are regulated by MT-associated proteins, such as katanin, which is a severing enzyme. These enzymes, which function as oligomeric assemblies of protomers, cut MTs using the energy from ATP hydrolysis. An open question is whether the motor is stable in its hexameric state or in lower-order oligomeric states. To answer this question, we carried out molecular dynamics (MD) simulations of lower-order oligomers of katanin in four ligand states. Simulations revealed changes in a region of the protomers, which is a part of the network of allosteric positions responsible for the coordination of the ligand-binding and oligomerization actions in katanin. To characterize the structural changes in this region, we developed an unsupervised learning method. The algorithm describes amino acids based on their backbone angles and clusters the identified structures. The performance of our algorithm was compared with two established methods for clustering secondary structures. The GROMOS method clusters structures using the structural similarity captured by the RMSD. The Combinatorial Averaged Transient Structure Clustering Algorithm (CATS) method clusters structures based on Gaussian distributions of the dihedral angles for each peptide bond. We found that our method classifies better structures compared to the CATS and the GROMOS methods. Using our methodology, we characterized the role of ligand binding on the dynamics of this region, and we determined that katanin trimers are not the stable state of the severing enzyme.

B-04: Computational Studies of Functional Dynamics of the ClpB Disaggregase Nanomachine

Great Hall
Akil Fletcher, Chemistry
Project Advisor: Dr. George Stan

Abstract

Protein aggregation is an event whereby a protein folds into nonfunctional cellular aggregates that leaves the cellular environment disrupted and causes diseases. Protein quality control ensures cell viability against such deleterious pathways through protein degradation, disaggregation, or folding assistance mediated by chaperones and proteases. Nanomachines in the AAA+ (ATPases Associated with diverse cellular Activities) superfamily actively participate in protein remodeling by performing degradation or disaggregation. ClpB (Caseinolytic Peptidase B) is a powerful AAA+ motor protein that converts chemical energy to mechanical energy by ATP hydrolysis to perform large conformational changes. Coarse-grained (CG) models are widely used to study the long-timescale dynamics of proteins involving folding and conformational changes. Coarse graining makes the energy landscape smoother and thereby provides more sampling through the conformational space. We performed coarse-grained molecular dynamics simulations using the SMOG2 all-atom structure-based model to elucidate the functional dynamics of ClpB. During the model optimization, we matched the native fluctuation of the CG model with previously obtained fully solvated all-atom simulations. In our study, we used smFRET (single-molecule Fluorescence Resonance Energy Transfer)-derived distance restraints to probe the dynamics within individual ClpB subunits. The calculated FRET efficiencies are in close agreement with the experimentally obtained FRET efficiencies.

B-05: Structure-Based Modeling and Machine Learning to Study Dynamic Asymmetry of ClpB Disaggregase Nanomachine

Great Hall
Thaddeus Weidle, Chemistry
Project Advisor: Dr. George Stan

Abstract
Following thermodynamic principles, proteins fold into unique, native, conformations, allowing them to interact with substrates or other chemical compounds in a specific manner. Misfolding of a protein can therefore yield defective conformations, which may result in the creation of non-functioning or insoluble biomolecules. To ensure cell survival, the HSP100/ClP family mediates protein quality control via protein degradation or disaggregation. ClpB (Caseinolytic Peptidase B) is a homohexameric protein containing two conserved AAA+ modules (ATPases Associated with diverse cellular Activities) that undergo large conformational changes driven by ATP hydrolysis. Recent biochemical studies showed that these nanomachines exhibit a non-planar organization of the protomers rather than a fully symmetric ring. The study of the structure and function of ClpB is therefore important as a means of understanding the biological mechanisms which may assist in remediation of misfolded proteins. To this end, we performed molecular dynamics simulations using the SMOG2 all-atom, coarse-grained, structure-based model, to elucidate the dynamic asymmetry of ClpB. Coarse-grained modeling carries benefits over "all-atom" modeling. It is not only faster and less computationally intensive, but also gives the benefit of "smoothing" the energy landscape of a simulation. Smoothing allows the simulation to seek the ideal "global energy minima", increasing the accuracy of conformational results. Our Machine learning methods involved Principal Component Analysis (PCA) of the hexamer, which indicated rigid-body domain motions that elucidate pore-opening and torsional events. Consistent with PCA, the Dynamic Cross-Correlation Matrix (DCCM) analysis probed the coupling of both inter and intra subunits of ClpB.

B-06: A New Machine Learning Method for Analyzing Intrinsically Disordered Proteins' Secondary Structure

Great Hall
Jamie Rowley, Pre-Pharmacy
Project Advisor: Dr. Dima Ruxandra

Abstract
Enzymes often experience global changes in structure in order to carry out their functions. In our computational studies of different oligomers of katanin, we observed a more local change in the secondary structure. These changes were found in the domain of the protein not associated with ligand binding and therefore would be the result of its allosteric network. To identify the types of structures in the conformational landscape, we developed a method based in unsupervised machine learning that utilizes the phi/psi torsion angles to classify the geometry of each residue. We then applied our algorithm to molecular dynamics (MD) simulations of R2, a known intrinsically disordered region of tau, to test the capabilities of our algorithm. We then compared the results we got from our algorithm with the results from two other established algorithms, GROMOS and CATS, to analyze the performance.

GROMOS is the gold standard method for clustering MD data based on RMSD while CATS uses gaussians of the torsion angles to classify structure. The results indicate that our algorithm was better at distinguishing unique structures in comparison to GROMOS, and grouping similar structures than CATS.

B-07: Coarse-Grained Molecular Dynamics Simulation Studies of the ClpB Disaggregation Biological Nanomachine

Great Hall
Amy Dickerson, Chemistry
Project Advisor: Dr. George Stan

Abstract
This research investigates the molecular dynamics of ClpB by using computer simulations. To this end, we developed a coarse-grained model of the ClpB nanomachine using the SMOG model and we performed simulations using the GROMACS high-performance computing software. Simulation results are analyzed against the experimental data using single molecule fluorescence resonance energy transfer (smFRET) and root mean square fluctuation (RMSF) analysis. Focusing on the computational modeling of these biological nanomachines we are able to form a better understanding of the mechanism underlying different proposed models.

B-08: 3D Printed Remote Controlled Vehicle With Bluetooth Integration

Great Hall
Garrison Wettengel, Aerospace Engineering
Anna Bednasz, Mechanical Engineering
Sam Graler, Computer Science
Project Advisor: Dr. So Yoon Yoon

Abstract
The goal of this project is to determine the feasibility of a remotely controlled vehicle with primarily 3D printed body parts. We utilized computer-aided design techniques to design and develop a vehicle body as well as other parts to minimize the external parts required using 3D printers. In addition, we employed a method of communicating between an Arduino Uno Rev3 with a Bluetooth module and the control platforms using a mobile application. To determine the economic feasibility, we tracked the total expenses as well as the expenses that made it to the final iteration of the vehicle.

B-09: Risk Factors and Algorithms to Predict Return to Play in Sports Medicine: A Preliminary Systematic Scoping Review

Great Hall
Taran Ghuman, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract

Return to Play (RTP) prior to full recovery of an injury can result in chronic injuries and recurring injuries, affecting athlete's health long-term. Guidelines for RTP exist to allow the patient to safely return to the respective sport and to prevent such recurring injuries. However, such guidelines are not standardized and are extremely difficult to account for, given the uniqueness of each individual and sport.1 Those involved with the RTP decision not only have to consider potential reinjury factors with the sport itself, but also clinical factors of the physical injury, such as the type of injury, severity of the injury, and time required for healing, most of which are still subjective to clinicians in Sports Medicine.1 This systematic review aims to analyze the current literature regarding RTP and the feasibility of developing a machine-learning (ML) predictive model to aid the process of RTP.

B-10: Validating Readability Measures on Online Health Information: A Preliminary Systematic Scoping Review
Great Hall
Ikshitha Tippi, Medical Sciences
Project Advisor: Dr. Danny Wu

Abstract
When it comes to patient education materials (PEMs), assessment of readability can provide valuable information on how understandable PEMs are, aiding patients in making informed healthcare decisions. However, the use of traditional readability measures may not be optimal for health-related materials. New readability methods include deeper analysis of text features. Summarizing the work done to modify readability measurements supports the future development of better models to analyze readability in PEMS to improve patient education.

Category C: Medical Interventions

C-01: Carbon Dioxide Shows Promising Preclinical Ability to Prevent Traumatic Brain Injury in Mice
Great Hall
Owen Traubert, Neuroscience - Neurobiology Concentration
Project Advisor: Dr. Matthew Robson

Abstract
Traumatic brain injury (TBI) affects millions of people each year and has massive human and economic costs. Particularly prevalent among veterans and contact sport players, TBI can lead to long-term social and cognitive consequences. TBI has numerous modalities of injury, many of which are caused by the propensity of the brain to move within the skull (slosh) during rapid head acceleration-deceleration and rotation. A small amount of "free" space in the skull, the compensatory reserve volume (CRV), allows for acceleration-deceleration injury from the brain impacting the skull and rotational strain. Advances in helmet technology have not reduced slosh because helmets are worn outside of the skull and cannot further reduce forces imparted to it within practical design parameters.   Successful preclinical and

clinical preventative interventions against TBI, including the first FDA-approved non-helmet preventative device, have implemented slosh mitigation, which "fills" the CRV by maximizing the volume of blood in the skull. The most immediate and significant way of increasing cerebral blood flow and thus volume is increasing the partial pressure of carbon dioxide (CO_2) in blood, which immediately dilates cerebral arteries, a property previously unexplored in TBI.   We exposed mice to atmospheric air or 5% CO_2 atmosphere immediately before subjecting them to TBI or sham treatment. Preliminary results show that pre-trauma CO_2 exposure normalizes several behavioral, physiological, and molecular indicators of TBI in mice. Work presented here is the first evidence of a novel mechanism of slosh mitigation to prevent TBI, which could be translated to a medical device for humans.

C-02: Understanding Factors Affecting the Size of Liposomes for Liposomal Drug Delivery
Great Hall
Linh Tran, Biochemistry
Project Advisor: Dr. Yoonjee Park

Abstract
Liposomal drug delivery is important in therapeutics. It stabilizes the drug in the liposomes as a capsule for longer circulation in the bloodstream than free drug itself. Especially micron-sized large liposomes are advantageous over nano-sized liposomes because of containing more drug and releasing drug for a longer time. The study's purpose is to identify and understand factors affecting liposome size when synthesized by reverse phase evaporation (RPE) method. Briefly, the RPE method starts with lipids dissolved in organic phase and generates water-in-oil emulsion by adding aqueous phase and agitation processes such as sonication and stirring. Then, the organic phase is evaporated to create large liposomes. The inverse micelle and the liposome sizes are measured by dynamic light scattering (DLS). The hypothesis is that as the size of the inverse micelles increases, the size of liposomes also increases. In addition, the inverse micelle size is affected by different organic solvents, different ratio of organic phase and aqueous phase, the addition of cholesterol, and the agitation process. As a result, the organic solvents with higher boiling point (methanol > acetone > diethyl ether) and miscibility with aqueous phase produces larger inverse micelles, resulting in increased liposome size. Different ratios of two phases and the addition of DI water insignificantly affect the sizes. Although the addition of cholesterol does not affect the inverse micelle size, it decreases the final liposome size significantly. Understanding the factors affecting the liposome size is useful for further application and research in disease treatment by liposomal drug delivery.

C-03: Sex-Based Differences in Hypersensitivity to Musculoskeletal Pain
Great Hall
Diya Joshi, Medical Sciences
Project Advisor: Dr. Michael Jankowski

Abstract
Musculoskeletal pain affects up to 33% of the global population. Myalgia is experienced more often in females. A major cause of disease-based myalgia is from alterations in peripheral blood

flow/oxygenation which is observed in disorders such as fibromyalgia . A better understanding of the sex specific mechanisms of ischemic myalgia could lead to the development of more targeted pain therapies. Our previous data showed that mice experiencing repetitive ischemia with reperfusion injury (I/R) in the fore-limb due to occlusion of the brachial artery, display prolonged hypersensitivity after the second injury. Results corresponded with an upregulation of unique factors in the dorsal root ganglia (DRGs) in males vs. females. One factor in particular found to be enhanced in females and linked to sex specific responses in other cellular systems was the RNA binding protein AU rich element binding protein 1 (AUF1). Using a nerve-specific siRNA mediated knockdown strategy, we found that inhibition of I/R-induced AUF1 expression was able to prevent the prolonged pain-like behaviors observed in females while it had no effects on prolonged hypersensitivity in males. We further found that the I/R-related upregulation of factors induced in female DRGs was blocked by AUF1 inhibition while enhanced DRG gene expression after repeated I/R in males was not altered. The data suggests that sex specific gene expression patterns may underlie distinctions in hypersensitivity observed after repetitive I/R injury in males and females. Results could uncover new ways to develop pain therapies targeted to men vs women.

C-04: Dissecting the Therapeutic Potential of Nucleoside Analogues in Cancer
Great Hall
Samson Girsha, Biochemistry
Project Advisor: Dr. Tom Cunningham

Abstract
Many prevalent human malignancies, such as non-Hodgkin Lymphoma, colon, breast, prostate, and bladder cancer, have deregulated MYC expression (Dang et al., 2009). Increased MYC expression is thought to be involved in the development of at least 70% of all human malignancies (Dang et al., 2009). Under physiological conditions, MYC proteins have well-established pivotal roles in influencing basic cellular processes such as cell-cycle progression, cell proliferation and growth, cell size, energy metabolism, DNA replication, RNA production, differentiation, and apoptosis (Fagnocchi and Zippo, 2017). However, deregulated MYC could lead to constitutive overexpression and result in serious consequences, including cancer development (Kalkat et al., 2017). Given these findings, it stands to reason that research would focus on creating therapeutics that target dysregulated MYC. Common chemotherapeutic drugs target both oncogenic and normal cells (Dang et. al., 2009). Therefore, these chemotherapeutic drugs could produce significant toxicities in different organs, such as skin, kidney, and liver. In this study, we will try to target the nucleotide metabolism pathways downstream of MYC-activation. Nucleotide metabolism is comprised of de novo synthesis and salvage pathways of purines and pyrimidines. These pathways utilize an enzyme known as PRPS2 (Phosphoribosyl-pyrophosphate synthase 2), which transfers 2 phosphates from ATP to ribose-5-phosphate to form phosphoribosyl pyrophosphate (PRPP). It has been demonstrated that loss of PRPS2 selectively promotes apoptosis in B cells with c-MYC overexpression in the pre-malignant and malignant setting (Cunningham et al., 2014). This research study aims to develop an effective combinatorial chemotherapeutic drug regimen that has fewer side effects on cancer patients.

C-05: The Efficacy of Proteasome Inhibitors in Pediatric Muscle Contractures in Neonatal Brachial Plexus Injury (NBPI)

Great Hall
Indranshu Das, Medical Sciences
Project Advisor: Dr. Qingnian Goh

Abstract
Neonatal Brachial Plexus Injury (NBPI) is the most common birth injury, and leads to the formation of incurable muscle contractures, or joint stiffness. These contractures severely limit mobility and functional use of the limb, resulting in deformity and dysfunction. Contractures are caused by impaired longitudinal growth of denervated muscles, and this deficit in muscle length is driven by elevated levels of proteasome-mediated protein degradation. As proof of concept, we previously showed that treatment with Bortezomib, a proteasome inhibitor, successfully prevented contractures in a mouse model of NBPI. In this current study, we investigated the efficacy and therapeutic windows of additional classes of proteasome inhibitors in contracture prevention. Using our established mouse model of NBPI, we discovered that newer-generation of proteasome inhibitors prevented elbow and shoulder contractures at narrow dose ranges, but their therapeutic windows differed. Specifically, Marizomib (MRZ) differentially prevented elbow and shoulder contractures at distinct doses. In contrast, low doses of Carfilzomib (CFZ) and Ixazomib (IXZ) led to peak reductions in elbow and contracture severity. While CFZ is associated with high survival rates at all doses, high doses of MRZ and IXZ led to increased mortality. As all classes of proteasome inhibitors are able to reduce contracture formation, these results further validate the proteasome as a key regulator of NBPI-induced contractures. Furthermore, the narrow dose ranges of efficacy highlight the need for precise proteasome regulation in contracture prevention. Lastly, the toxicity of systemic proteasome inhibition highlights the need to identify muscle-specific targets for suppressing protein degradation to prevent contractures.

C-06: Performance Characteristics of Positive Expiratory Pressure Devices

Great Hall
Angela Demchuk, Neuroscience
Project Advisor: Dr. Robert Chatburn

Abstract
Background: Positive expiratory pressure (PEP) therapy imposes expiratory flow resistance to increase airway diameter and enhance mucus clearance. PEP is achieved several ways. Oscillatory PEP devices (OPEP) generate repeated occlusions that are known to reduce mucus viscosity. There are many marketed devices, but comparative performance is mostly unreported. The purpose of this study was to evaluate performance characteristics of many PEP/OPEP devices. For OPEP devices, we defined an optimal performance metric by creating an oscillation index that combines the OPEP performance characteristics. Methods: OPEP devices (Acapella DH, Acapella DM, Acapella Choice,) were tested by adjusting simulated expiratory flow from 5 L/min to 30 L/min in increments of 5 L/min using a standard flow meter. Results: All devices showed varying performance characteristics. As expiratory flow increased, mean PEP increased for most devices. OPEP devices, there was a major difference between pressure and flow waveforms. The Acapella DH, ShurClear, and Aerobika showed the highest flow

amplitude, flow frequency, and oscillation index. Conclusions: PEP devices behaved similarly and as expected, with increased pressure with increased flow (flow resistors) or flow independence (threshold resistors). There was much greater variation in the performance of the OPEP devices. A higher oscillation index indicates better mechanical performance characteristics. Many devices have similar characteristics. However, the devices with the highest oscillation index have the highest flow amplitude and frequency, which may indicate better clinical performance.

C-07: Synthesis of Nanoparticle-Based Photosensitizers

Great Hall

Danielle Cullen, Chemistry and Biological Sciences
Project Advisor: Dr. Peng Zhang

Abstract

In order to combat the rise of antibiotic resistant bacteria, new methods must be developed to treat bacterial infections, such as photodynamic antimicrobial therapy, which utilizes negatively or positively charged nanoparticles as photosensitizers to degrade the target bacteria. Before this type of photodynamic therapy can occur, the synthesis of the nanoparticles that will be used needs to be perfected - the method of their obtainment should be reproducible and consistent. Perfecting the synthesis of the nanoparticles requires numerous repeats of synthesis, checking results, and adjusting levels of additives, time spent stirring or heating the solution based on the results and then synthesis with the new adjustments. The success, or failure, of the synthesis of the nanoparticles was checked using TEM analysis. Over the course of eight weeks, the methods and materials of synthesizing the silver-based nanoparticles was perfected and set.

C-08: Sunscreens: Is It Possible to Better Protect Individuals Prone to Developing Skin Cancer?

Great Hall

Hiranya Atreyapurapu, Biological Sciences
Project Advisor: Dr. Ana Kadekaro

Abstract

Skin cancer, which include melanoma and non-melanoma, is the most common of all types of cancers. Skin cancer most often develops on areas exposed to sun, primarily due to the damaging effects of ultraviolet radiation (UVR) on cells. Cyclobutane pyrimidine dimers (CPDs) are highly mutagenic and the most abundant type of DNA damage found in UVR exposed skin. CPDs originate from the crosslink of two adjacent pyrimidines and can be formed by the direct DNA absorption of UV energy. CPDs can also be generated by the chemo-sensitization of pheomelanin, the type of pigment prevalent in light skin complexion, in a process dependent on high levels of reactive oxygen species (ROS). NOX enzymes are composed of a complex of proteins that are assembled and activated by UVR. In particular, the activation of NOX-1 causes acute elevation of ROS and a subsequent later surge in CPDs. This study evaluated a new inhibitor of NOX-1, denominated NOX-INH-5, on its effects on ROS and CPD formation in skin cells irradiated with UV derived from a solar simulator source. The efficacy of the inhibitor was tested using melanocyte and keratinocyte primary cells, as well as in human skin explant model. Viability

of cells and CPD formation assessment were compared in treated and untreated experimental groups. The results demonstrated that NOX-INH-5 significantly reduced ROS and increased cell viability by mitigating UV-induced CPD formation. This study suggests that incorporation of NOX-INH-5 into sunscreens could represent a new generation of products with enhanced capacity to provide skin photo-protection.

C-09: Investigating Sympathetic Innervation in Modulating Contractures in Neonatal Brachial Plexus Injury (NBPI)

Great Hall
Baraa Tarabishi, Chemical Engineering
Project Advisor: Dr. Qingnian Goh

Abstract
Neonatal brachial plexus injury (NBPI) causes complete muscle denervation in the upper limb, and leads to disabling and incurable muscle contractures (joint stiffness). These contractures severely limit limb function and mobility, and are driven by impaired longitudinal growth of denervated muscles. A rare form of NBPI maintains afferent and sympathetic muscle innervation despite motor denervation. Importantly, this type of injury is associated with normal muscle length and an absence of contractures in the affected limb. To decipher underlying mechanism(s) by which neural input governs longitudinal muscle growth and contracture formation following neonatal muscle denervation, we must rigorously investigate the roles of afferent and sympathetic innervation in protecting against contractures. Through pharmacologic modification of a major regulatory signaling pathway (NRG/ErbB), we previously showed that afferent innervation alone does not modulate contractures. Hence, our current study investigated the role of sympathetic innervation in modulating contractures. Using our established surgical mouse models of NBPI, we discovered that chemical ablation of sympathetic neurons, as well as pharmacologic stimulation of the regulatory pathway governing sympathetic innervation (β-adrenergic signaling), did not modulate contracture formation or muscle length. These findings suggest that sympathetic innervation itself does not protect against contractures. Instead, we found that perturbations in sympathetic innervation altered cross-sectional growth of normally innervated muscles, indicating that skeletal muscle length and cross-sectional area are differentially regulated. Future studies should elucidate the synergistic role of afferent and sympathetic innervation in contracture modulation, and further dissect the divergent pathways regulating longitudinal and cross-sectional muscle growth.

C-11: Assessing Cognitive Function in Normal Hearing Listeners Using Braincheck

Great Hall
Madeline Skeeters, Speech Language Hearing Sciences
Project Advisor: Dr. Fawen Zhang

Abstract
Human auditory processing involves both sensory representation of sound stimuli such as speech in the auditory system (bottom-up processing) and top-down influence from cognitive components such as memory, attention and executive function. Individuals with hearing disorders often have interruptions in

these processes, resulting in poor speech performance. This study aims to examine normal listeners' cognitive function using an online test battery in BrainCheck software. Data obtained in this study will serve as normative data for future studies that examine the cognitive function of individuals with abnormal hearing. A group of (n=8) normal hearing listeners were recruited. Cognitive tests (Trails A and B for visual attention; Immediate and Delayed Recall for memory; Stroop Color and Word Test for executive function; Digital Symbol Substitution Test for processing speed and accuracy) were self-administered in BrainCheck using participants' home computers or iPads. Results showed mean scores + standard deviations of cognitive tests were 101.25+13.40 for Trail Making Test A, 105.75 +7.80 for Trail Making Test B, 104.88+9.85 for Digit Symbol Substitution Test, 101.00+7.39 for Stroop Color and Word Test, 101.13+13.86 for Immediate Recall Test, 104.38+9.50 for Delayed Recall Test. Our results were consistent with the normative data (100+15 for each test) provided by BrainCheck. BrainCheck offers cognitive test batteries that can be easily self-administered, and it will be used to test individuals with hearing disorders in future studies.

C-12: Drying Out the Damage: Extending the Life of Donated Hearing Aids
Great Hall
Olivia Fluhr, Speech Language Hearing Sciences
Project Advisor: Dr. Brian Earl

Abstract
Moisture-related damages are a leading cause of hearing aid malfunction. The presence of moisture inside of hearing instruments creates distortion within the digital circuitry and decreases the strength and quality of the amplified sounds. To combat this problem, Redux, Inc., has engineered a vacuum drying unit that quickly reduces moisture in electronic devices and reports the total amount removed upon completion. This study aims to determine the correlation between the change in sound output of refurbished hearing aids and the amount of moisture removed by the Redux technology. A total of 20 hearing aids were tested in this study, ranging in style and model. Qualitative data were collected through a visual inspection of the hearing aids. Quantitative data was then collected using an electroacoustic test box to measure each hearing aid's average gain level with a 50 decibel sound pressure level (dB SPL) input before and after the Redux procedure. The amount in microliters of liquid extracted from the aids by the Redux machine was recorded and compared to average gain changes in the hearing aids after completing the drying process. Results indicated little to no change in the majority of the hearing aids, with the exception of 4 showing significant changes in their sound output post redux. Of those with significant increase, hearing aid one and two had >.5 microliters of moisture removed, likely contributing to the change in average gain. These results indicate that the Redux may be helpful in extending the functionality of donated hearing aids.

C-13: Is the Cure Worse Than the Disease? The Mortality of Full Mouth Extractions
Great Hall
Rohit Rambhatla, Biological Sciences
Project Advisor: Dr. Yotom Rabinowitz

Abstract

Full mouth extraction (FME) is a common procedure performed due to dental caries and periodontal disease. According to NCCDPHP, 17% of adults over the age of 65 in the United States are edentulous. Therefore, providers must address the oral health demands of an aging, sick population. The objectives of this project were to determine: 1. A mortality timeline following FME, 2. Associated factors, 3. A death-predicting calculator.   Investigators performed a retrospective chart review of demographics, medical insurance, medical history, and social history from July 1st, 2012, to December 31st, 2019. The primary outcome variable was post-FME time to death. Patient mortality was identified through chart review and National Death Index inquiry. Statistical analysis included simple descriptive statistics, multivariate survival analysis, and logistic regressions.   1829 patients were included in the study. 1709 patients were diagnosed with more than one co-morbidity. 170 patients (9.3%) were identified as dead; 51% of deaths occurred within the first two years of the procedure, and 86% occurred within five years. Post-FME significant predictors of mortality included age, ASA score, hepatic, and oncologic disease. One, three, and five-year predictive death models were developed for these patients with significant variables including the aforementioned predictors, alongside nursing home disposition and history of illicit drug use.   Patients who require FME may be at increased risk of mortality given their accompanying comorbidities, as approximately one in ten FME patients died within five years of the procedure. We recommend thoughtful consideration to the implications of FME on the well-being of our patients.

C-14: The Importance of Educating Nurses on the Proper Use of Restraints

Great Hall
Kylee Cozier, Nursing
Janey McManus, Nursing
Sara Spoelstra, Nursing
Project Advisor: Dr. Mohammad Othman

Abstract

Restraints are a common practice that includes physical or chemical means to prevent a client from self-inflicted injury. Education on restraint application is covered in undergraduate education, but there is often a deficit of knowledge retention and reinforcement once a nurse enters the workforce. It is a task further complicated by safety and ethical concerns. Injuries during physical restraint have been reported in 0.8-4% of cases. Evidence indicates that reinforced restraint education improves the knowledge base and skill level of nurses on safe application of restraints. The main objective of this project is to provide information on proper application and management of restraints. The focus of this objective is improving nurses' confidence and level of understanding, thus improving patient safety outcomes. Utilizing a pre and post-test for data collection, information on restraint application was presented to nurses working on 3 Ridgeway at the University of Cincinnati Medical Center (UCMC). The differences between indications of "violent" versus "nonviolent" restraints was emphasized, and the current UCMC hospital policy was provided as a guideline. Post-test findings indicate that confidence in both restraint application skill and situation of application increased 15% from the pretest score. The post-test knowledge scores increased by 25.15% from the pretest after the 30-minute education session. It is recommended for patient safety that care facilities implement yearly education reinforcement to ensure proper application and supervision of restraints.

Category D: Chemical and Cellular Worlds

D-01: Speed of Sound
Great Hall
Jude Ghuniem, Chemistry
Project Advisor: Dr. Jonathan Nickels

Abstract
N-methylacetamide (NMA) is formed by a single peptide linkage which is derived from acetamide. The linkage replaces one hydrogen at the Nitrogen atom, creating a methyl group. The dipole moment of the HN-CO component enables hydrogen bonding and the formation of hydrocarbons. Hydrogen bonding molecules are of interest because they can demonstrate complex phenomena. We hope to understand the structure and dynamics of hydrogen bonding molecules by investigating the sound velocity of the certain molecule with the data collected using a Fabry Perot Interferometer which measures the intensity of the molecule at a given temperature. Density can be calculated as a form of temperature and an equation of state is used for the molecular liquid (NMA or NEA N-ethylacetamide). Additionally, this adds a fascinating comparison between the linear hydrogen bond (HB) network of NMA and the HB network of water. Due to the complex phenomenon of hydrogen bonds, the H-bond provides a transient and directional attractive interaction. The structure and adiabatic sound velocity dynamic of the H-bonding liquid can be studied more in order to investigate the connectivity between the timescale of H-bond network reorganization and viscosity/solubility as well.

D-02: Understanding Palladium-Catalyzed Reactions Under Mechanochemistry Conditions
Great Hall
Thinh Tran, Biochemistry
Project Advisor: Dr. James Mack

Abstract
Catalysts are an essential component in facilitating bond formation however, the process of generating an active catalyst is time-consuming and laborious. For many years, scientists have dedicated a tremendous effort towards developing different pre-catalyst that balances both stability and reactivity. This delicate balance results in high prices for the pre-catalyst, tedious storage conditions and an overall extensive synthetic process. With the movement towards greener chemistry, mechanochemistry offers a solution to those limitations. By conducting reactions in a solvent free system, we are able to access new chemical pathways, stereochemistry and regiochemistry. To achieve our goal of creating an easy to use, cheaper and sustainable catalyst we have combined mechanochemistry with catalysis to create an active catalyst in situ. We intend to form carbon-carbon bonds by using raw palladium metal. Herein we demonstrate our active palladium catalysts and its function in Sonogashira, Suzuki and Heck coupling under mechanochemical conditions. The Sonogashira reaction was used as a baseline model for the genesis of this project. In our previous studies, different aryl halides were coupled in a para-substituted trymethylsilylacetylene and phenylacetylene along with tetrakistriphenylphosphine palladium(0) and

copper metal vial as the co-catalysts. In our current work, we substitued the premade catalyst tetrakistriphenylphosphine palladium(0) with palladium powder or palladium foil. We learned that through several use, the copper vial wall becomes embedded with palladium. Heat is an essential component in catalyst formation for all three reactions. Additionally, choice of base, ligand, reactants and aryl halide are all equally important in understanding the function of

D-03: Copper-Carbon Nanotube Composite for Lightweight Electrical Conductors in Aircraft Propulsion

Great Hall
Nhat Phan, Chemical Engineering
Project Advisor: Dr. Vesselin Shanov

Abstract
Replacement of traditional propulsion systems with Electrified Aircraft Propulsion (EAP) is needed to overcome issues with emissions due to fossil fuels, and noise levels in commercial transport aircrafts. Current generation EAP`s uses a huge amount of copper for power distribution, which limits the performance due to great heat losses and  high  weight. To enhance the efficiency of motors, generators, and other electrical systems in EAP`s, we are exploring copper-carbon nanotube (Cu-CNT) composite fibers as electrical conductors for power distribution. Carbon nanotube (CNT) fibers were spun from CNT arrays grown in a chemical vapor deposition (CVD) process. The fibers were then decorated with palladium before coating them with copper. The combination of electroless deposition of palladium and double electrodeposition of copper proved to play a key role to avoid copper dendrite growth thus contributing to the higher electrical conductivity of the composite fibers. With properties such as high tensile strength, good electrical conductivity, light weight, and scalability in production, Cu-CNT composite fibers are a very good alternative to pure copper wires in EAP`s.

D-04: The Evolutionary History and Clinical Relevance of Hemoglobin: A Literary Review

Great Hall
Mia Dragich, Biological Sciences
Cody Kisner, Biological Sciences
Project Advisor: Dr. Joshua Gross

Abstract
In this presentation, we provide a brief review of the evolution of the hemoglobin protein, and its relevance in clinical medicine. Hemoglobin provides an excellent opportunity to study the evolutionary mechanisms given that it has evolved through genomic duplication and neofunctionalization. Modern hemoglobin proteins famously transport oxygen to and from different organs and cells, however, ancestral globin-like molecules originally carried oxygen away from organelles due to its harmful reactivity. The genetic features that allowed oxygen binding in ancestral proteins have been surprisingly well conserved in modern organisms, however the downstream functions of oxygen binding have been dramatically altered. Following multiple, independent whole genome duplication events, physiological distinctions between different oxygen binding proteins have arisen. These genetic changes have

culminated in an incredible functional diversification of oxygen transport, and expanded the consequences of genetic aberrations. Further, we also investigated clinical abnormalities of hemoglobin, namely a class of diseases called "hemoglobinopathies". The cause of this group of disorders stems from inheritance of mutations in globin and other related genes. Mutations can be found in both coding and regulatory sequences, impacting function and/or expression hemoglobin. Thus, these diseases can be categorized based on abnormalities in hemoglobin structure or amount. Some consequences of insufficient oxygen delivery include a variety of conditions showing symptoms of hypoxia and anemia. This scholarly review demonstrates that insight to complex disorders, such as hemoglobinopathies, can be comprehensively understood through the lens of evolution. This in turn may provide deeper insight to underlying mechanisms of diseases of the hemoglobin protein.

D-05: LC-MS Based Quantitative Detection of Nucleic Acid-B[a]P Adducts

Great Hall
Cailey Grier, Chemistry
Project Advisor: Dr. Balasubrahmanyam Addepalli

Abstract
Benzo[a]pyrene (B[a]P) is an incomplete combustion product of organic compounds including environmental pollutants. The cellular detoxification system in humans metabolizes B[a]P into Benzo[a]pyrene diol epoxide (BPDE) for subsequent excretion. This highly reactive intermediate can form adducts with nucleic acids and proteins during elimination process. The genotoxicity of BPDE resulting from the formation of nucleobase-adducts in DNA has been well documented. In this study, we use liquid chromatography coupled with tandem mass spectrometry (LC-MS/MS) based analytical methods to identify and quantify the levels of adducts following in vitro exposure of nucleic acids to BPDE.

D-06: Effects of Tubulin Tail Post-Translational Modifications on Microtubule-Severing Protein's Dynamics

Great Hall
Jacob Stump, Chemistry
Project Advisor: Dr. Ruxandra Dima

Abstract
Microtubules (MTs) are directional polymeric biofilaments used for structure, transport, and mechanical processes in the cell. They are made up of protein monomers called tubulin. MTs go through cycles of polymerization and depolymerization, a fact that leads to them being described as having dynamic instability. This is important for proper cellular functioning, as it allows for MTs to be directed as needed by the cell. Dynamic instability is regulated by a variety of proteins, each of which interact with the MTs directly through a tail-like region on the C-terminal of the tubulin monomers, known as the carboxy terminal tails or CTTs. An example of these proteins is spastin, an enzyme that hexamerically assembles along the MT and pulls on a CTT to sever tubulin dimers at a point along its length. The dynamics of these proteins seem to be mediated by the chemical make-up of CTTs, introducing an additional method

by which the cell can regulate MTs besides at the genetic level. Due to a lack of dynamic resolution, understanding of the relation between CTT make-up and severing is unfortunately limited. In this project, we model and run all-atom molecular dynamic (MD) simulations of MT severing enzymes docked with various CTT sequences and post-translational modifications in order to study their effect on spastin dynamics. This will provide insight into how the MT encodes for and regulates the activity of these enzymes as well as how the cell regulates important processes.

D-07: A Phenol-Chloroform Protocol for Extracting gDNA From Egg Depleted Female Ticks
Great Hall
Thomas Brennan, Biological Sciences
Project Advisor: Dr. Joshua Benoit

Abstract
Ticks are blood feeding ectoparasites found on every continent. Despite their global presence these arthropods are relatively understudied. Developing methods for understand their biology is critical to understand and preventing tickborne diseases. Dermacentor albipictus is a species of tick native to North America primarily feeding on cervids. In this study, we have developed a working approach to extract genomic DNA (gDNA) from depleted D. albipictus females, which have blood fed, laid eggs, and expired. Isolating DNA from depleted female ticks allows for more efficient use of samples by allowing egg laying to study eggs and larvae. The negative aspects are the presence of host DNA from the blood meal and the poor body conditions of female ticks following egg laying. Here we tested several approaches for isolating gDNA from depleted female ticks. We address several complexities that make it difficult to isolate pure gDNA. We first tested extracting DNA from the whole body of the females, which resulted in high levels of host DNA mixed with tick DNA using a previously developed phenol-chloroform method. We also tested DNA isolations using the Qiagen DNeasy Blood & Tissue kit, however it resulted in unusable amounts of DNA. We found that a modified phenol-chloroform method of extracting from only the scutum and legs of female ticks resulted in the highest tick DNA purity and yield. This method of phenol-chloroform extraction provides a new tool for researchers to isolate DNA from arthropod samples that previously would have been considered unusable.

D-08: Examining Ideal in Vitro Conditions for Studying Primary Glial Cell Function and Interaction
Great Hall
Archit Deshpande, Neuroscience - Neurobiology Concentration
Project Advisor: Dr. Agnes Luo

Abstract
Glial cells such as microglia and astrocytes are vital for neuronal health and proper brain function. Glial cells such as these are difficult to culture in vitro without altering their normal functions. We established in vitro cell co-cultures with various conditions to establish the most in vivo like scenario to then learn about glial interactions, functions, and responses to various injury models. We found that using astrocytes and microglia from the same culture was more advantageous to mimic the in vitro

environment than adding primary microglia to pre cultured astrocytes. These conditions were chosen when evaluating various in vitro injury models.

D-09: Examining the Relationship Between Microbiome Composition, tRNA Modifications, and Phenotype of the Mosquito Aedes Aegypti

Great Hall
Taylor Wood, Biological Sciences
Project Advisor: Dr. Melissa Kelley

Abstract
Mosquitoes transmit various viruses and parasites. The yellow fever mosquito, Aedes aegypti, is found in subtropic and tropic regions throughout the world. As a vector for many viruses, A. aegypti is a great threat to public health and an economic concern. The microbiome is the composition of microbes in an organism, which can have a significant effect on the fitness of the host. Manipulation of the mosquito microbiome has been studied for potential new methods of remediation. Transfer RNA (tRNA) plays a vital role in the production of proteins in all life forms and requires chemical modifications to function. One tRNA modification, queuosine (Q), cannot be made by eukaryotes therefore eukaryotes must salvage this modification from the bacteria in the microbiome. tRNA ensures proper recognition of codons as well as accurately and efficiently carrying out protein synthesis, which can be reflected phenotypically. We hypothesized if we alter tRNA modifications in mosquitoes via changes to the microbiome composition, then we will see phenotypic differences. In these studies, we examined the effects of a microbiome lacking Q on the development of A. aegypti. The results of this study supported differences in pigmentation at various stages of larval growth among individuals with compromised Q levels. Thus, tRNA modifications, mosquito development and phenotype are impacted when Q provided by the microbiome is lacking. These studies indicate that changes in growth, development, and coloration of mosquitoes are associated with tRNA modifications.

D-10: A Novel Voltammetric Study of Serotonin in Intestinal Slices

Great Hall
Madison Pennell, Chemistry
Project Advisor: Dr. Ashley Ross

Abstract
Serotonin has been studied extensively in terms of its role as neurotransmitter in the central nervous system. However, this biomarker aids in pivotal biological pathways in other systems such as the enteric nervous system. Specifically, in the gut, serotonin has been shown to aid in the absorption of nutrients, secretion of electrolytes, muscle contractions, and serves as the precursor in the melatonin synthesis pathway. Though serotonin has been extensively studied in the brain, 90 percent of this biomolecule's innervations are found in the gut and there its function is not well understood or defined. In this work, we employ fast-scan cyclic voltammetry to help elucidate the role of this biomarker in the gut. We are doing this in a 2-fold approach: 1) we have developed a new culture method for the small intestine that allows for diffusion of oxygen and 2) we have made novel, voltammetric measurements of serotonin

from the intestinal villi within the cultured slices. Thus, setting our methodology at the precipice of this ever-evolving field.

Category E: Sensing and Sensory Systems

E-01: Spatially Variable Light and Environments in a Distant Galaxy
Great Hall
Riley Owens, Astrophysics and Physics
Project Advisor: Dr. Matthew Bayliss

Abstract
Following the Big Bang, our universe cooled enough to allow free protons and electrons to recombine into neutral matter. The first generation of stars and galaxies reionized this matter, but how exactly this happened remains poorly understood. In the local universe, insufficient ionizing radiation escapes galaxies to explain the amount of ionized matter observed. In light of this, we study a unique, especially bright galaxy which is known to leak significant amounts of ionizing radiation. Using observations of the UV light escaping the galaxy, we characterize its physical environments. Strong magnification of the galaxy allows us to distinguish physically distinct regions, across which we see significant spatial variations. These indicate large changes in the properties of gas along different lines of sight into the galaxy. The extreme ionizing radiation the galaxy emits is a property associated with the galaxies responsible for reionizing the universe. So, though the process of reionization predates the galaxy's age, this is suggestive that highly anisotropic gas in the first generation of galaxies is likely an important factor in explaining how the universe reionized.

E-02: The Chandra Strong Lens Sample: Radial Density of Supermassive Black Holes in Strong Lensing Selected Galaxy Clusters
Great Hall
Lauren Elicker, Physics and Astrophysics
Project Advisor: Dr. Matthew Bayliss

Abstract
A small fraction of all galaxy clusters are strong lensing; it remains unclear what physical properties are responsible for creating efficient strong lensing clusters. One way to study why these few strong lensing galaxy clusters are different than the majority of clusters is to compare supermassive black hole populations inside strong lensing galaxy clusters with those inside non-strong lensing clusters. We compiled lists of X-ray point sources, the supermassive black holes, in Chandra ACIS-I telescope observations of 19 strong lensing galaxy clusters. These raw X-ray images were manually reprocessed with optimal background filtering and the latest calibrations including finding Good Time Intervals by filtering flares from the light curves. Using the final processed data we modeled the background, point source population, and cluster emission. We used the processed images to construct a catalog of point sources with aperture corrected 0.7-7keV fluxes for all sources detected. The point sources were cross-

matched with catalogs from the Sloan Digital Sky Survey and other published optical imaging and spectroscopy to create value-added point source catalogs including optical photometry and redshifts. We used the final point source catalogs to measure the projected radial density of X-ray supermassive black holes in our strong lensing cluster sample, providing a new measurement to compare and contrast the properties of strong lensing clusters against general (mass-selected) cluster samples.

E-03: Artificial Light At Night Has Species-Specific Effects on Oviposition Behavior of Mosquitoes
Great Hall
Sabrina Daufel, Biological Sciences
Project Advisor: Dr. Mažeika Sullián

Abstract
Artificial light at night (ALAN) is a pervasive and growing issue worldwide. ALAN disrupts the physiology and natural crepuscular and nocturnal behavior of organisms, with widely observed effects on insects. Mosquitoes are disease vectors that select freshwater oviposition sites. Nocturnal oviposition site selection is a vital component of mosquito reproductive success with epidemiological implications; however, it is unknown how ALAN affects this process. In a field mesocosm experiment, we exposed artificial pools to light-emitting diode (LED) luminaires (3000K, ~13 lux) or ambient skyglow (control). We assayed the oviposition behavior of natural populations of mosquitoes by quantifying mosquito eggs (Diptera: Culicidae; Culex and Ochlerotatus) oviposited in the experiment over seven days. Mosquitoes had species-specific responses to ALAN. Mean nightly Culex egg raft oviposition was greater in control pools (20.97 ± 2.85) than in ALAN pools (10.13 ± 1.58). We observed no response of Ochlerotatus, potentially reflecting the risk associated with the alternative oviposition of the two species (eggs rafts vs. skip oviposition). Our results show that ALAN has species-specific effects on organisms, thereby complicating our understanding of the behavioral and epidemiological effects of this novel anthropogenic stressor.

E-04: Using Surface-Enhanced Raman Scattering to Detect Viral RNA
Great Hall
Joe Ungvary, Biological Sciences - Biomedical Studies Concentration
Project Advisor: Dr. Pietro Strobbia

Abstract
This project focuses on developing sensors that use SERS (surface-enhanced Raman scattering) to potentially detect viral RNA at point of care (RSAD2 in our case). SERS sensors using catalytic hairpin assembly with various nucleic acid arrangements are tested to be able to detect viral RNA quicker and more specifically than PCR and LFAs. Making these homogenous sensors and testing various DNA hairpin loops within the fuels that affect the amplification of our sensors comprises most of the work. It is hypothesized that the shorter the hairpin neck, the easier it is for the hairpin loop to form and therefore the more amplification we can get from the sensor. In short, neck length, toehold length, and fuel concentration are tested as factors for the sensors' efficacy in terms of limit of detection (outcome was ideally shorter neck, longer toehold, stronger fuel concentration).

E-05: Olfaction in the Monarch Butterfly, Danaus Plexippus

Great Hall
Abigail Goggin, Biological Sciences
Project Advisor: Dr. Stephanie Rollmann

Abstract
Animals use various sensory modalities to identify appropriate laying, feeding, and overwintering sites. To tease apart the specific sensory mechanisms that underlie such behaviors, the contributions of individual sensory modalities are often first examined in isolation. In insects, the contribution of the olfactory system to behavior has been well-studied in model systems such as Drosophila, but in other species olfaction may not be the principal sense guiding key behaviors. It has been proposed that many butterflies primarily rely on their visual system for the identification of resources. This research characterizes the olfactory system of the monarch butterfly Danaus plexippus, with the long-term goal of understanding its role in oviposition behavior and long-distance migration. This species selects milkweed host plants for oviposition and performs a multigenerational migration to its overwintering site. This research examined whether differences exist in the monarch butterfly olfactory system due to generation and sex. This was done by collecting two forms of data; the first of which was sensillum number. The sensillae of each antenna were counted and their numbers were compared across sex and generation. No significant differences were found between either of these groups. In a second analysis, electroantennograms were recorded and used to compare the olfactory responses to varying odorants between the sexes and generations. There is no difference in neuron response between the sexes. Between Summer and Fall Monarchs multiple odors elicit significantly different responses. These results may eventually aid conservation measures by informing the selection of host plant species during habitat restoration.

E-07: Using Hyperspectral Imaging to Model the Colorful Courtship Displays of a Paradise Jumping Spider (Genus Habronattus)

Great Hall
Leigha Brown, Biological Sciences - Animal Biology Concentration
Project Advisor: Dr. Jenny Sung

Abstract
Many animals display and view complex color patterns during communication, which can indicate an individual's sexual maturity, species identity, or even fitness conditions and health. For example, some butterflies have ultraviolet (UV) colors that are visible to the visual systems of conspecifics. Habronattus jumping spiders also have a UV-sensitive color visual system, and males of this genus have colorful, species-specific faces that may be used during courtship interactions. Traditional methods of image capture and color quantification often do not expand beyond the visible spectrum of human vision or do not measure colors in their naturally occurring spatial patterning. This poses a challenge for exploring how and why color patterns evolve across animals with diverse visual systems. To address these obstacles while studying the evolution of color patterning, we pioneer novel techniques using snapshot

hyperspectral imaging to quantify the facial colorations of 4 co-occuring species of Habronattus jumping spiders. This approach captures spectral information on a biologically-relevant scale while preserving the spatial relationship between colors needed to understand the nature and evolution of color patterns. We characterize the total number of colors used by each species and sex, and we examine the findings in the context of sexual selection and courtship. Our results support the utility of hyperspectral imaging for the study of complex color displays in small animals like jumping spiders and open up new frontiers for the study of color more generally.

E-08: Preference of Temperature in Drosophila
Great Hall
Macy Bain, Biological Sciences - Animal Biology Concentration
Project Advisor: Dr. Stephanie Rollmann

Abstract
Temperature effects all organisms, and can especially influence ectotherms that regulate their body temperature through behavioral strategies. One species, Drosophila melanogaster is naturally found in multiple temperate zones throughout the world, but Drosophila mojavensis, on the other hand, is exclusively desert-dwelling and found in the southwestern United States and northwestern Mexico. Here we investigate the similarities and differences in thermal behavioral preference within and between these two Drosophila species. Flies were tested in an apparatus consisting of steel tiles arranged in four apposed quadrants, their temperatures set by Peltier devices to alternating high and low temperatures. Flies were sorted by sex and allowed to freely move in the apparatus for ten minutes. Four temperature comparisons were made. The number of flies resting on high and low tiles was counted to provide a thermal preference index. Results indicated that both male and female D. melanogaster showed a strong preference for 25℃. Future work will focus on the comparison of D. melanogaster with D. mojavensis and geographic variation in temperature preference within D. mojavensis. Results indicate a behavioral mechanism that enables these ectotherms to maintain homeostasis.

E-09: Investigating the Forgetting Behavior in Adult Mice and Its Correlation With Firing Neurons in the Hippocampus of the Brain
Great Hall
Maxwell Weed, Neuroscience
Project Advisor: Dr. Agnes Luo

Abstract
Forgetting is attributed to the formation of new memories within the hippocampus. The forgetting process within infants, known as infantile amnesia, has been associated with neuron circuit plasticity in which newly established synaptic connections replace existing ones. In contrast, the mechanisms that regulate forgetting processes during adulthood are still undefined. More specifically, the time spent to forget pre-existing memories haven't yet been investigated longitudinally in wildtype mice. Therefore, a contextual fear conditioning (CFC) paradigm was used in this study to address the aforementioned

aim.We subjected adult mice to a CFC procedure (mild electric shock associated with a certain environment) and examined different cohorts of mice at different time points after the electric shock (24 hours, 1, 2, 6 weeks and 3 months) to measure how long it takes the mice to forget the previous adverse experience in the chamber. Mice were perfused to harvest brain tissue at 2 hours after they are exposed to the chamber environment to visualize the firing neurons by c-FOS and NeuN immunostaining.Our data show that the forgetting process (measured by the time the mice freeze in the chambers) in wildtype mice takes 3 months until the initial memory is forgotten. We are in the process of evaluating the c-Fos+/NeuN+ neurons in DG and CA1, which will be correlated with our behavioral data at different time points after the initial shock.

Category F: Ecosystems and Biodiversity

F-01: Establishing Gene Expression System in Naegleria
Great Hall
Kyla Doan, Biological Sciences
Project Advisor: Dr. Yoshi Odaka

Abstract
Naegleria fowleri is a pathogenic amoeba responsible for primary amebic meningoencephalitis (PAM), a rare but highly fatal infectious disease of the central nervous system with over a 97% fatality. To better understand the biology of Naegleria and to identify potential drug targets, we aim to establish a gene expression system in non-pathogenic Naegleria gruberi.   Previously, we reported that N. gruberi transforms to a metabolically dormant cyst-like form when treated with TOR (target of rapamycin) enzyme inhibitor, Torin-1, suggesting that TOR may influence the transformation through the direct or indirect phosphorylation of its target proteins. Further analysis identified that 228 phosphoproteins were highly sensitive to TOR activities. The enzyme, enolase, one of the identified phosphoproteins that participates in cellular respiration, is of particular interest because it has been implicated in cyst formation in Naegleria and another pathogenic amoeba, Entamoeba. Therefore, we hypothesize that TOR controls the transformation of amoeba through regulating enolase function.   The promoter region of the Naegleria ubiquitin (Ubi) gene was cloned and amplified by polymerase chain reaction (PCR) and placed in the upstream region of the RFP (red fluorescent protein) gene in the mammalian gene expression vector. Using the expression system, the Ubi promoter-driven chimeric gene, encoding GFP (green fluorescent protein)-fused enolase, was also generated. We are currently investigating whether the system can express these genes and where GFP-enolase localizes within the amoeba.

F-02: Hybridization and Gene Flow in Wild Hyacinth Plant (Camassia Leichtlinii and C. Quamash) in the Northwestern United States
Great Hall
Makeda Shiferaw, Biological Sciences
Project Advisor: Dr. Theresa Culley

Abstract

Gene flow is important in the relationship between allopatric and sympatric speciation, and can play a role in the emergence of new plant species via hybridization. We examined the genetic relationship between two Camassia species: C. quamash and C. leichtlinii. These species are collectively known as Wild Hyacinth. The majority of the populations that were studied occur in Oregon and Washington; some populations reside in northwestern California. Both species grow in similar habitat conditions. These two species look similar, however C. leichtlinii flowers appear a bit larger compared to C. quamash. The flowers can also be distinguished from each other by the way in which flowers finish blooming: C. leichtlinii petals eventually will twist together to cover the fruit, while C. quamash does not. It is unknown if gene flow occurs between these two species, which could break down normal barriers to speciation. Alternatively, hybridization could also lead to new genetic combinations, potentially resulting in the formation of a new species. Based on microsatellite data, gene flow generally appears to be restricted within each Camassia species in most sites, but can occur between the two species in at least one site. This suggests that restricted gene flow in Camassia might maintain current species boundaries, but there is also the possibility of hybridization leading to speciation in this plant genus.

F-03: The Effects of Invasive Wintercreeper Vine on the Diversity and Abundance of Arthropods of the Forest Floor

Great Hall
Kyelle Corcoran, Biology
Project Advisor: Dr. Theresa Culley

Abstract

Invasive plants are known to have detrimental effects on their environment, but their impacts on animals has rarely been examined. In this study, the effects of wintercreeper vine (Euonymus fortunei), now classified as an invasive species in Ohio, was observed on the diversity and abundance of arthropods of the forest floors. Arthropods such as beetles or other similar insects, provide food for other animals and are also primary decomposers, and thus are critical components of the ecosystem. At two sites in Cincinnati, 10x10m plots were formed in areas covered by Wintercreeper and in areas where the vine was absent. Within the plots, pitfall traps were placed in the ground to capture the insects roaming the forest floor. These traps were collected once a week and taken back to the lab to be counted and sorted into insect orders. After counting the samples, areas infested with wintercreeper yielded a much higher overall number of arthropods. In most cases, double the amount of insects were found in the infested sites than in the control sites. Interestingly, the presence of wintercreeper did not have much effect on the diversity of the arthropods that roamed the areas. This is the first study to examine impacts of the invasive wintercreeper vine on ants, crickets, and other arthropods. These results indicate that wintercreeper is changing the habitat within the forest floor, although exact mechanisms are still to be determined.

F-04: Temperature and Relative Humidity Drive Hatching Success of Winter Tick Eggs and Varies With Geographic Location

Great Hall
Emma Edgar, Biology
Project Advisor: Dr. Kennan Oyen

Abstract
Winter ticks are associated with a significant decline in moose populations and little is known about how environmental conditions influence winter tick egg survival. Establishing the environmental thresholds necessary for egg survival may improve predictions of tick responses to climate change. We sampled gravid female ticks from eight disparate sites, allowed them to lay eggs in the lab, and exposed eggs to one of several temperatures (2°C, 22°C, 2-20°C, or 30°C) and relative humidity (75%, 93% or 100% RH) treatments. After exposure, the samples were frozen and visually assessed for survival using a microscope. Unhatched eggs were scored as dead and newly hatched larvae were scored as alive. After analyzing the data, we have found that egg survival varied significantly between treatments with almost no eggs surviving at 2°C. Egg survival also varied by collection sites within treatments with eggs from females collected in Texas being more resistant to low humidity and high temperatures and those from Maine having low tolerance to low humidity and cold temperatures. Overall, egg survival varied with altitude and latitude of female collection sites where eggs collected from warmer sites had increased tolerance to heat and those from cooler sites had greater tolerance to cold temperatures. Our results suggest that the impact of environmental stressors on tick eggs is likely population-specific and that eggs are more vulnerable to low temperatures than other life stages. This study highlights the importance of measuring tolerance thresholds of several life stages when considering the impacts of environmental change on

F-05: Dynamics of Temperature, Humidity, and Clutch Size on Viability of Moose Tick Eggs

Great Hall
Derek Herges, Biological Sciences
Project Advisor: Dr. Joshua Benoit

Abstract
The moose or winter tick, Dermacentor albipictus, is a one-host species, feeding on moose and other ungulates. Most ticks spend a majority of their lives off-host, but as a one host species, the only stages off-host are the eggs and larvae. In specific, females will feed on a host, and then detach to lay their eggs in the surrounding environment, where the eggs will hatch and the larvae will then quest for the next host. This indicates that where the female ticks lay their eggs is vital to their survival as a population since the eggs must be able to thrive in the environment where deposited. Little is known about the effects of temperature, humidity, and clutch size on the viability of winter tick eggs. In this experiment, we investigate how these dynamics between the specific relative humidity, temperature, and clutch size affect the survivability of D. albipictus eggs. Our data shows that the best conditions for moose tick egg survivability are in larger groups of eggs, at higher humidity, and under lower temperatures allowing the moose tick eggs to retain high viability in areas with these conditions. These

studies on D. albipictus eggs are particularly of interest due to the lack of knowledge about the survivability of the tick within various environments.

F-06: Scrambling for Eggs: Does Sexual Selection Affect Mobility and Light Environment Usage in Sexually Dimorphic Jumping Spiders?

Great Hall
Jack Fogle, Biological Sciences and Neuroscience - Neurobiology Concentration
Project Advisor: Dr. Nathan Morehouse

Abstract
In many species, when sexually receptive females are scarce, males engage in scramble competition; males compete with other males to find receptive females, and faster males tend to have better reproductive success. This phenomenon has been observed across diverse taxa yet is not well studied in jumping spiders such as those in the genus Habronattus. Once a Habronattus male finds a receptive female, he performs a complex, colorful courtship display that allows the female to determine his suitability as a mate, the colors of which are visible only in high-light environments due to limitations of their color vision. How has sexual selection acted upon movement patterns and light environment usage in this group of jumping spiders? We hypothesize that male Habronattus jumping spiders are under sexual selection for increased movement and usage of high light environments. We quantified the location and activity of three species of Habronattus spiders (n=61) in their natural habitat at the Edge of Appalachia Preserve, Ohio, during fifteen-minute focal observations. During each trial, flags were planted at the spider's starting, ending, and pivot positions to record total distance moved. Spider position under sun or shade was also recorded. Although statistical analyses are ongoing, preliminary results suggest that males move more than females, but sexual differences in light environment usage are more equivocal. Future work should focus on male usage of light environments during courtship specifically. These results should provide insight into sexual selection's role in scramble competitions of sexually dimorphic spiders.

F-07: Assessment of Determinants of Song Structure in Urban Song Sparrows

Great Hall
Malasha Dalal, Biological Sciences
Project Advisor: Dr. Ronald Canterbury

Abstract
Song Sparrows are an abundant and widespread songbird throughout North America, including urban habitats. Despite numerous studies on the species, little is known about how different environmental factors affect singing in this species. We studied Song Sparrows in four different areas in the city of Cincinnati in order to assess whether singing rates differ among local populations. Study sites included the main campus of the University of Cincinnati, Burnet Woods and two Corryville areas. We tested the hypothesis that singing rate in this species does not differ between territorial males in urban territories with sparse vegetation compared to singing males in greenspace. Data were also collected on singing rate across different weather and time of day, singing height, and countersinging from neighboring

territorial males. We found no significant difference among singing rates among territorial males in the four locations, but also found few birds on the campus compared to the other locations. Response to song playback was weak among males in all locations, which merits additional study in an urban landscape, as the species is known to adjust song in urban environments compared to more rural landscapes.

F-08: Evaluating the Effects of Exclosures on Spring Ephemerals in Cincinnati Parks
Great Hall

Jordan Gerda, Environmental Studies
Max Lackey, Biology of Animals
Project Advisor: Dr. Stephen Matter

Abstract
White-tailed deer (Odocoileus virginianus) overpopulation in the urban southwest Ohio area could have a negative effect on spring ephemerals. To study the effects of the deer and meso mammal population, the Cincinnati parks have installed exclosures in several parks. The purpose of our research is to compare these exclosures to their corresponding control plots to record the effects of herbivory on spring ephemeral diversity and abundance. This research is a continuation of research done in the previous year. Our goal is to expand upon and strengthen the research. We expect to see a greater abundance and diversity of spring ephemerals within the exclosures than in the control plots.

F-09: The Relationship Between White-Tail Deer Intensity and Invasive Flora in Cincinnati Parks
Great Hall

Nathan Pack, Biological Sciences - Ecology & Evolution Concentration
Hayden Pittock, Biology
Project Advisor: Dr. Stephen Matter

Abstract
Urban deer populations have drastically increased over the past couple of decades, causing both economic and ecological problems. There have been many efforts and approaches to manage deer populations to achieve and maintain healthy population sizes. With regard to the Cincinnati parks, a select handful have implemented regulated bow hunting to try and bring populations to healthy levels; however, the success of this method is still unclear and there are various factors that need to be considered when trying to create a comprehensive management plan. One such factor pertains to the ecological aspects and how the presence or absence of a resource could potentially influence the intensity of deer within the parks of interest. We set out to calculate how the composition of the vegetation matrix with regard to the presence of invasive flora relates to deer intensities within the parks. Trail cameras were randomly placed within parks and the average number of bursts per hour was quantified. Vegetation transects were randomly conducted within the desired parks to obtain the vegetation data. We coupled the average number of bursts data with the mean abundance and species richness of the invasives from our vegetation data. Our data analysis consisted of running regressions to show potential relationships. The relationships could be helpful for management purposes when

attempting to consider all the different factors associated with managing urban deer populations. Future studies regarding deer management could provide insight on how managing deer has impacted any ecosystem processes in any measurable way.

F-10: Going With the Flow: Movement of Large Wood in a Flashy Urban Headwater Stream
Great Hall
Jayla Brown, Biological Sciences - Animal Biology Concentration
Project Advisor: Dr. Michael Booth

Abstract
The purpose of this research project was to analyze the movement of large woody debris in Cooper Creek-a stream running through Bechtold Park in Sycamore Township, Ohio. The presence of wood in streams is crucial for reducing flow and encouraging the development of deeper, more connected pools. These stream characteristics create better habitats for the aquatic life inhabiting the ecosystem. Wood movement does not allow for these benefits to develop and can cause damage to preexisting infrastructure like culvert pipes or bridges. Through this project we hoped to discover how stability and structural characteristics of wood impact their mobility. The large woody debris in the stream was mapped to the nearest meter, characterized with categories pertaining to size, alignment, stability, and individually marked using passive integrated transponder for identification purposes. After each storm event, we relocated each individual piece of wood and characterized any movements or changes. We measured streamflow using an electromagnetic flow meter and used continuously recording water level loggers to track the magnitude of storm related flows. By tracking the movements- or lack thereof - of pieces of wood, we were able to associate characteristics with the tendency to move. Large woody debris characterized as stable or intermediately stable continues to remain stable and resist mobility, while debris categorized as moveable accounted for all mobile wood in the stream. This project will provide helpful insight for improving habitat in urban headwater streams.

Category G: Community and Cultural Connections

G-01: Eco-Dorm
Great Hall
Halle Bodde, Chemical Engineering
Katerina Getgey, Chemical Engineering
Xavier Veselovec, Mechanical Engineering
Project Advisor: Dr. Junqiu Wang

Abstract
Dabney Hall, a residence hall on the University of Cincinnati's campus, has earned a reputation of being low quality, energy guzzling, and a mentally draining place to live. During 2022 Spring Semester, research was performed in order to develop a plan to renovate the residence hall into a carbon neutral or negative building as well as a building that contributes in a positive way to student's who live there's

mental health. Through many avenues, such as implementation of solar panels, HVAC improvement, insulation enhancement, as well as a new way of harnessing energy through the movement of water through pipes, transforming this dormitory of the 1960's into a hall of the future while saving funds in the long run and maintaining ethical integrity is proven to be entirely possible and in the best interest of the university.

G-02: Sexual Assault Prevention and Education Among College Students

Great Hall
Destiny Mundy, Nursing
Morgan Jackson, Nursing
Madelyn Bell, Nursing
Project Advisor: Dr. Jessica Westman

Abstract
Sexual assault is most evidently seen amongst the college population primarily due to age, college activities, and being a vulnerable group to seeking new involvements. Sexual assault can be defined as any non-consensual sexual interaction involving a perpetrator and a victim. Sexual encounters should always be clearly communicated, however there are still a high number of sexual assault cases at universities. In addition, students rarely report sexual assault to the university or police due to multiple reasons including shame, guilt, or not knowing how. The purpose of this educational project is to assess college students' understanding of sexual assault, consent, barriers to reporting, resources available, and next steps after an assault. The audience, a total of 89 female students at the University of Cincinnati between the ages 18-23, attended an educational presentation regarding sexual assault. Participants completed a ten question pre-test and post-test that consisted of the same questions to measure knowledge growth and strength of educational intervention. The audience was receptive to the material presented, expressing engagement throughout each of the points discussed. When comparing tests, results showed an increase in overall knowledge.

G-03: Unspoken Discrimination Experiences of International Students At University of Cincinnati

Great Hall
Marley Fahmy, Psychology
Martez Shelborne , Psychology
Gulei Liu, Psychology
Project Advisor: Dr. Donna Chrobot-Mason

Abstract
Discrimination can damage students' mental health, particularly by causing stress and affecting well-being. UC attaches the equal rights of all students, and Title IX has been emphasized in every course. However, microaggressions and discrimination still occur. The primary purpose of this mixed methods study is to shed light on how UC international students experience bias or discrimination on campus and the effect that discrimination has on students' stress levels. Postsecondary students who belong to non-dominant groups experience discrimination that includes both subtle microaggressions and overt acts of

bigotry and prejudice. There is growing evidence of the cumulative effects of perceived discrimination and stereotyping on the daily functioning, mental health, and academic outcomes of international students. Diversity research typically investigates race, gender, sex and does not place an emphasis on international status for students in UC. To address this gap, we will share the results from a larger mixed methods research study that was collected during Summer 2021. Data was collected from 327 students (62 international students, 260 U.S. students, and 5 no response) at UC. For this research, critical incidents of international students will be analyzed and the effects of microaggressions will be examined among students at the University of Cincinnati. We will conduct a thematic analysis of qualitative results of the types of discrimination experiences that international students face. We will also conduct correlational and t-test analyses to compare stress levels of international students to those of non-international student status and report the findings.

G-04: There Is More Honor in Death Than in Shame: Examining Honor-Based Violence in the Arab-Muslim Discourse Community

Great Hall
Malak Alwawi, Criminal Justice
Project Advisor: Dr. Sarah Haak

Abstract
Honor violence is a particular form of domestic violence in which the perpetrator(s) emotionally, psychologically, and/or physically assault or kill the victim to protect/uphold family reputation and honor that they believe the victim has threatened by committing an action(s) that violates cultural norms. The threat to honor can be real or perceived. Honor violence is a severely unresearched subject. From existing research, we know that women are the majority victims. There is limited documentation on male victims. This piece focuses on honor violence within the Arab-Muslim community. Information was gathered in an ethnographic fashion from interviews, field notes, and analyses of personal experiences with the community. This study provides a review of the concept of honor, an explanation of honor violence and how it occurs, the relationship between culture and religion and how both are used to facilitate honor crimes, the phenomenon of generational trauma and its connection to honor violence, and analyses of previously documented honor crimes and research. This study has come to find that honor is a vital concept in culture and controls important decisions made by community members. The effects of honor violence on a victim are tremendous and can lead to generational trauma. There is an undeniable connection between culture and religion and the ways in which both are used to justify honor crimes are interesting. Finally, honor violence is a human rights violation that is only increasing in occurrence, and a lack of research and awareness will aid in the femicide of these women.

G-05: The Effects of Building Characteristics on the Number of Bird-Building Collisions of Five Species on a Midwest University Campus

Great Hall
Brittany Powers-Luhn, Biological Sciences - Animal Biology Concentration
Project Advisor: Dr. Ronald Canterbury

Abstract
Bird-building collisions kill nearly one billion birds each year in North America. The majority of collisions occur during seasonal migration. While it has been established that certain types and proportions of glass are more likely to cause collisions, not enough research is known about building and ground/habitat features that contribute to these mortalities. The Avian Mortality Project (AMP) at the University of Cincinnati has been collecting data on collisions that occur on the main and medical campuses for over a decade. I have used data from summer of 2018 to the fall of 2021 to conduct research on the effects of height of a building, as well as its surrounding vegetation, and on the number of collisions among the top five species found in that timeframe. Ovenbirds, Mourning Doves, Ruby-throated Hummingbirds, Swainson's Thrushes, and Tennessee Warblers had the highest mortalities. For this study, the ten buildings with the most recorded collisions were analyzed. While similar studies from researchers in other locations resulted in statistically significant findings, I found no statistical causation among mortality, building location and height, and vegetation. Additional data and analyses may provide a more robust assessment of this trend. Moreover, as the UC AMP's research continues, it is likely that my study could be modified and replicated into more conclusive results.

G-06: Research for All: a Citizen Science Approach

Great Hall
Alexis Sampson, Health Sciences
Project Advisor: Dr. Susan Kotowski

Abstract
Citizen Science is when community members participate and collaborate in scientific research to increase scientific knowledge. Through partnered training with expert researchers, anyone, of any experience level, can become a citizen scientist. The goals of this poster and example project are to 1. Increase awareness of the concept of citizen science, 2. Bring awareness to the UC Citizen Science Club, and 3. Have UGSS attendees participate in a project to demonstrate the concept of a community driven collaborative research project. Through this interactively designed poster, participants will answer questions related to observations they make during the Undergraduate Scholarly Showcase. Answers will be displayed on the poster for viewing and discussion by attendees. Participants will also have an opportunity to signup for more information about the UC Citizen Science Club.

G-07: Policies and Procedures of Village Life Outreach Project

Great Hall
Jaylon Warren, Communication
Alex Ames, Communications
Project Advisor: Dr. Michael Sharp

Abstract
The purpose of our project is to revise and implement policies and procedures for Village Life Outreach Project. We are collaborating with the Village Life outreach Project staff to ensure that these policies will

be useful. We will measure the success of our policies through the survey, as well as through feedback from individuals who are taking trips to Tanzania through Village Life Outreach project.   (One of two groups presenting this project)

G-08: Village Life Outreach Project: School Garden Project

Great Hall
Lauren Labanc, Communication and Journalism
Alicia Cundiff, PR & Marketing
Olivia Cole, Communication
Project Advisor: Dr. Michael Sharp

Abstract
Village Life Outreach Project is a non-profit organization located in Cincinnati that works with Tanzania, their mission being to unite communities to promote Life, Health, and Education. We are doing the School Garden Project for Village Life. The Village Life Outreach Project is working through us to be a global service partner with Cincinnati Public Schools to teach students about food insecurity. We have created 6 modules to teach a food insecurity curriculum to students in grades 6-9 at Hughes High School. In addition to the modules, we are partnering with Gabriels Place to factor in the garden part of the project.

G-10: Water Treatment With Water Quality Monitoring

Great Hall
Danesh Sudhaharan, First year engineering program
Mitchell Koski, Engineering
Project Advisor: Dr. Cedrick Kwuimy

Abstract
We have partnered with student in BDU in Africa to come up with a a water treatment system that can be used in places with with unclean water. Our goal was to make this product cost effectively so that it can reach the most people. The product filters the water through a 4 stage filtration system and also checks for the quality of the water at the end of the process.

Category H: Health and Body

H-01: Importance of Sleep Hygiene for Night-Shift Nurses

Great Hall
Jacqueline Cain, Nursing
Maria Dietschel, Nursing
Emily Stevenson, Nursing
Project Advisor: Dr. Paul Lewis

Abstract
Night shift work has a great impact on nurses' health, sleep patterns, and sleep quality. Between 57% to 83.2% of nurses' sleep patterns and habits lead to sleep deprivation, poor sleep quality, fatigue, and increased risk of disease. The purpose of this project is to use an education plan to teach night-shift nurses about the importance of sleep and sleep hygiene strategies reported in the literature to increase competence on the subject. A group of registered nurses at The Christ Hospital postpartum unit and the neonatal intensive care unit at Good Samaritan Hospital were given an educational session consisting of a brochure, complementing lecture, and Google Forms questionnaires. Within the brochure, there are strategies to improve sleep hygiene and the impact that sleep deprivation has on personal health and work performance. Two Google
Forms were then given as a pre-test and post-test to evaluate if there was an increase in knowledge of the subject presented. Results pending.

H-02: Effects of Various Pre-Test Taking Strategies on Cognitive Performance

Great Hall
Andrew Wanger, Exercise & Movement Sciences
Michael Horner, pre-PT
Jacob Kuzma, pre-PT
Project Advisor: Dr. Susan Kotowski

Abstract
Previous research has shown that certain pre-test taking strategies can be beneficial to performance on a given assessment. Some strategies involve the digestion of certain foods and/or drinks, while others may be more behavioral such as exercise. The purpose of this project is to determine the effects that different consumable supplements and actions (exercise or meditation) can have on an individual's performance on a cognitive test fundamentally based on the Stroop effect. The subjects completed a survey that was conducted via RedCap which included information regarding their age, gender, weight, the amount of caffeine consumed per week/weekend, pre-test taking strategies, how often they participated in physical activity, as well as other baseline questions necessary for adequate assessing. The Stroop test was taken by each participant following each supplement ingestion or activity three times and then an average was taken. Activities completed by the participants included: exercise (jumping jacks), meditation, consumption of caffeine (coffee), Red bull, and green tea. The research was conducted on healthy individuals between the ages of 15 and 30 who were recruited via a sampling of convenience. We hypothesize that subjects will best perform on the cognitive test when exercising or meditating beforehand, depending on which of these two actions he/she is most used to.

H-03: Motivation for Movement

Great Hall
Christian Brown, Neuroscience - Neuropsychology Concentration
Project Advisor: Dr. Annette Stowasser

Abstract

With obesity rates higher than ever before, the New England Journal of Medicine has concluded that "the steady rise in life expectancy during the past two centuries (in the U.S.) may soon come to an end" (Olshansky). One way of combating this development is motivating people to be physically active, as it is known that regular exercise is the best thing to combat obesity. As stated previously, the current trend in obesity rates indicate a lack of motivation to exercise even with the wealth of information promoting its benefits. The purpose of this paper was to review current information on exercise and its biological and psychological benefits. The goal was to find an articulation of this information that is practicable/digestible, so it aims to provide a framework through which to understand the importance of exercise. A framework that accounts for the role of exercise and physical activity in human evolution and the contradiction between exercise and our culture today. Through examining it in this way, the hope is to find a way to create a positive and motivating force that inspires more people to exercise.

H-04: Effects of Energy Drinks and Caffeinated Pre-Workout Supplement on Cardiovascular and Resistance Training

Great Hall
Benjamin Mason, Health Sciences
Ashlin McGill, Health Sciences
Kate Glaser, Health Sciences
Project Advisor: Dr. Susan Kotowski

Abstract
Energy drinks and caffeinated pre-workout supplements are said to enhance cardiovascular and resistance training. Some energy drinks are geared towards energy for working out and some are for energy in general. The purpose of this project is to analyze if the claims of the effects on exercise are true and if there is any difference between Red Bull and Celsius in exercise performance. Our group brought in a total of 30 participants; 15 of those were female and 15 of those males over the age of 18. Each participant had to fill out a pre-workout survey before being able to engage in exercise to receive background information and health history. These questions were aimed to screen out participants that were unfit for the study and ensure safety with our participants. Each participant was brought into the health sciences building three separate times to consume 4.5 ounces of water, RedBull and Celsius. Each participant participated in three different exercises after consuming the drinks and the effect of these drinks were measured using a rating of perceived exertion scale (RPE) and repetitions of push-ups, sit-ups and jump squats. These exercises were performed for 2 minutes, and participants were given a 2-minute rest period in between sets. We hypothesize that there will no significant difference in performance when comparing RedBull and Celsius, however, we expect for performance to increase when comparing to the control.

H-05: Relationship Between Blood Type and Contraction/Severity of COVID-19

Great Hall
Shun Nakamura, Health Sciences
Sydni Schramm , Health sciences
Shreya Nandigam, Health sciences

Project Advisor: Dr. Susan Kotowski

Abstract
Since the start of the COVID-19 pandemic, research has been done to investigate the factors that play a role in the infection rate of the coronavirus. It is known that many factors play a role in the contraction of COVID-19, including biological characteristics like blood type. Based on previous research, studies have shown that non-O blood groups have a greater risk of being infected with the coronavirus. The purpose of this project is to determine if blood type plays a role in the contraction of COVID-19. Secondary objectives were also to determine if the prevalence and severity of various symptoms differed by blood group type. Blood group types were compared to COVID incidence, severity, and hospitalization. A survey was developed in REDCap including questions in the areas of demographics, blood type, vaccination status, COVID contraction, symptoms, and comorbidities. The survey was sent to individuals of any age and any health condition in order to gather as much information as possible. We hypothesize that those who are non-O blood types will have higher rates of COVID contraction, with regards to vaccination status and other factors. By gathering this data, we have the potential to further knowledge on COVID-19 and the factors that may contribute to infection. This is an important topic as it could strengthen the ability to protect those from the virus.

H-06: Effects of Caffeinated Pre-Workout Supplement on Cardiovascular and Resistance Training

Great Hall
Peter Spencer, Health Sciences
Olivia Evans, Health Sciences
Project Advisor: Dr. Susan Kotowski

Abstract
Many of those who participate in physical activities and exercise include the use of a pre-workout supplement in their workout routine. Pre-workout serves to provide extra energy to fuel a more intense workout. The purpose of this project is to help understand how pre-workout consumption can affect exercise performance during resistance and cardiovascular training. Twelve (6 male/6 female) healthy subjects completed 6 trials each - a control trial, and then a randomized placebo and experimental trial for both resistance and cardiovascular training. During the experimental trial, the subject consumed the pre-workout supplement which consisted of a flavored powder mixed into water per the manufacturer's instructions. The pre-workout contained l-citrulline, beta alanine, caffeine, and choline. During the placebo trial, the subject consumed a similar drink mix drink powder, with no caffeine or other additives (crystal light). Participants were blinded to whether they were completing the experimental or placebo trial. To analyze the affects of pre-workout on cardio, the stationary bike will be used for a total of 4 miles. To analyze resistance training, weighted squats and bench presses will be done to failure, with the weight being carried based on gender and body weight. With the data collected during these three activities, the times/intensity/repetitions will be compared between the three trials for each subject. This research project will give us a better understanding on the effectiveness of pre-workout consumption of different categories of exercise.

H-07: An Active Lifestyle Versus COVID-19: Does Exercise Lessen COVID-19 Symptoms?

Great Hall
Dominick Minda-Ramirez, Health Sciences
Nicholas Reichardt, Health Sciences
Justin Helton, Health Sciences
Project Advisor: Dr. Susan Kotowski

Abstract
With the emergence of COVID 19, there has been a plethora of theories regarding how it affects different individuals. We wanted to analyze how exercise might affect the prevalence of various symptoms experienced as well as the severity and duration of these symptoms. Since the virus is new, there is minimal research on the many factors that may affect the disease's characteristics, therefore we felt it important to investigate. The purpose of this project was to determine if there are any potential correlations between exercise and COVID 19 symptom prevalence, duration, and severity. A survey was developed in REDCap which covered basic demographic and health status questions such as age, height, weight, sex, vaccination status, severity of symptoms, types of exercises completed, exercise frequency, and underlying health conditions. This project utilized a sample of convenience who were recruited through word of mouth, email, and various social media platforms. We hypothesize that individuals who live a more active lifestyle and are involved in more aerobic exercise activities will experience less severe symptoms than those who do not exercise.