

17<sup>th</sup> Annual  
Undergraduate Student  
Symposium



UNDERGRADUATE  
STUDENT  
SYMPOSIUM

Friday, April 6, 2018

Alvin Sherman Library, Research, and Information Technology Center



NOVA SOUTHEASTERN  
UNIVERSITY

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**Farquhar Honors College**

## Undergraduate Student Symposium 2018

The Undergraduate Student Symposium, sponsored by the Farquhar Honors College, presents student projects through presentations, papers, films, and poster displays. The event serves as a “showcase” demonstrating the outstanding scholarship of undergraduate students at NSU. The symposium is open to undergraduate students from all disciplines. Projects cover areas of student scholarship ranging from the experimental and the applied to the computational, theoretical, artistic, and literary. They are taken from class assignments and independent projects. Project presentations can represent any stage in a concept’s evolution, from proposal and literature review to fully completed and realized scholarly work. As in past symposia, the definition of scholarship will be sufficiently broad to include work presented in the biological and physical sciences, the social and behavioral sciences, computer science and engineering, mathematics, arts and humanities, nursing and health care, education, and business. This is the seventeenth annual Undergraduate Student Symposium.

### USS 2018 Keynote Speaker



Daniel E. Dawes, J.D., is a nationally recognized leader in the movement to advance health equity among under-resourced, vulnerable and marginalized communities. An attorney, scholar and health policy expert, Dawes brings a forward-thinking, inclusive and multidisciplinary approach to the law and public policy, and has been at the forefront of recent major federal health policy negotiations in the United States. Among his many achievements, he was an instrumental figure in shaping the *Mental Health Parity Act*, the *Genetic Information Nondiscrimination Act*, the *Americans with Disabilities Act Amendments Act*, and the *Affordable Care Act* (“ObamaCare”).

Dawes holds a Bachelor of Science degree in business administration and psychology from Nova Southeastern University and a Juris Doctor degree from the University of Nebraska. Dawes is currently an Associate Professor of Management in the H. Wayne Huizenga College of Business and Entrepreneurship.

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**17<sup>th</sup> Annual  
Undergraduate Student Symposium**

**April 6, 2018**

**Abstract Proceedings**

**Farquhar Honors College  
Nova Southeastern University**



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## A Search for Type III Secretion System Inhibitors Produced by Soil Bacteria

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### Abstract

Due to the misuse of antibiotics, antibiotic resistant bacteria have become prevalent in modern day. To circumvent this, instead of directly affecting bacterial growth with antibiotics, the virulence factors can be targeted. Type III secretion system (T3SS) pathogens exude toxins through needle-like protrusions found on their cell membrane. If the secretion of these toxins is inhibited, then the severity of the illness will be reduced. The purpose of this research is to find a T3SS inhibitor for pathogens through the analysis of soil bacteria. While T3SS pathogens are known to target humans, many are soil-dwelling plant pathogens. By studying the bacterial composition of the soil near plants with resistance/immunity to the pathogens, T3SS inhibitors may be found. To isolate and test bacteria for T3SS inhibition, soil samples of plants with resistance to high-temperature T3SS pathogens e.g. *Xanthomonas axonopodis* (citrus canker) were collected. Then, soil dilutions and patch plating were used to isolate the soil dwelling bacterium that grow in conditions ideal for the T3SS pathogens. These bacteria were tested against the ESKAPE alternative pathogens for antibiotic activity, and it was shown that five isolates had some form of antibiotic activity against the ESKAPE alternative pathogen. These bacteria will be tested against *Yersinia pestis* for T3SS inhibition.

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## **A Simple Fixed-End Kundt's Tube to Measure the Speed of Sound in Air**

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### **Abstract**

We designed, developed, and tested a simple, yet robust, device to measure the speed of sound in air. The apparatus is based on modified Kundt's tube that maintains a fixed length, in which the frequency of standing sound waves is to be determined electronically using a microcontroller board (Arduino). The system works by emitting sound waves, at different frequencies, that are to be detected at the opposite end of the tube. Resonance is detected by measuring the phase difference between the emitted and received waves. To improve the accuracy of the calculations, the frequency of the sound waves is varied several times. The whole process is carried out automatically by the apparatus, which calculates the speed of sound for each of the frequencies used. The instrument finally gives a read out of the average speed of sound for air under room conditions. The apparatus also monitors the temperature and it is also capable of measuring the length of the tube for calibration purposes. We plan expand the use of the device to other gases. An equipment such as this, can be used to find, for example, the ratio of the heat capacity of a gas at constant pressure to that at constant volume, a quantity that its useful in many chemistry calculations.

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## **Are some thoughts “stickier” than others? Examining emotionally valenced mind wandering**

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### **Abstract**

Mind wandering is when our thoughts drift away from the current task. These task unrelated thoughts (TUTs) may consume up to 50% of our waking hours (Killingsworth & Gilbert, 2010). The occurrence of TUTs results in poorer cognitive functioning and performance (Banks & Boals, 2016). However, the consequences of mind wandering are moderated by the emotional valence of the TUT, such that negatively valenced TUTs, but not positively valenced TUTs, predict poorer cognitive performance (Banks, Welhaf, Hood, Boals, & Tartar, 2016). One possible reason for the impact of negative TUTs is that they are “stickier” than positively valenced TUTs. A cyclical relationship appears to exist between negatively valenced mind wandering and mood. Negatively valenced mind wandering predicts future negative mood and negative mood predicts subsequent negatively valenced mind wandering (Poerio, Totterdell, & Miles, 2013). In the current investigation, we examined whether the impact of emotionally valenced TUTs was due to the duration of the mind wandering episode. A mediation analysis examined whether duration of a mind wandering episode mediated the relationship between TUTs and sustained attention task performance (SART). The impact of negatively valenced TUTs on SART performance occurred through a direct effect, 95% CI [-.58, -.14], and a significant indirect effect-- mediated by duration of mind wandering episodes, 95% CI [-.19, -.02]. However, no direct or indirect relationship between positive TUTs and SART performance was observed. These findings suggest that negative TUTs are “stickier” and therefore have a greater negative effect on task performance.

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## **Behavior of Eastern Mosquitofish from Areas of Varying Hydroperiod in the Everglades Ecosystem**

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### **Abstract**

We explored fish behavior and migration in the Everglades. During the wet season, most areas are inundated with water. However, during dry season many areas dry out forcing fish to locations with more permanent water. If the fish do not migrate to deeper areas they die by getting stranded or are eaten by birds. We were interested in understanding how the behavior of mosquitofish varies between different sites of varying hydroperiod. We hypothesized that fish from areas that dry annually would have adaptations increasing their likelihood of surviving the drydown. Lake Okeechobee does not dry out therefore we predicted that the fish might display different behaviors. We collected Eastern Mosquitofish from Lake Okeechobee and short hydroperiod wetlands in the Everglades. We filmed them exploring an artificial environment in the lab to ascertain differences in their “boldness” and other measures of their behavior. Fish from Lake Okeechobee swam a greater distance and longer fish swam further. As the dry season approached fish from the Everglades, but not fish from Lake Okeechobee, increased their exploration. This met our predictions that fish from areas that dry must change behavior to increase survival rates. None of our other variables varied among treatments. Understanding mosquitofish migration and behavior in the Everglades is vital to develop restoration projects to restore hydrology. Management of populations of prey organisms and their habitats is critical for restoring populations of wading birds and other threatened predators.

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## **Bilingualism and Wandering Thoughts: Does Bilingualism Protect Against Mind Wandering?**

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### **Abstract**

Previous research demonstrates that the benefits of speaking two languages extend beyond verbal communication to non-linguistic, executive function (EF) abilities. One component of EF, the ability to inhibit or ignore distracting information, has been shown to be better developed in bilinguals relative to monolinguals. However, little is known whether speaking two languages also enhances the ability to inhibit unwanted or intrusive thoughts. These intrusive thoughts, or mind wandering, have been shown to negatively impact performance on tasks of EF. Thus, the purpose of our study was to compare monolinguals and bilinguals on a self-report measure of mind wandering and performance on tasks of EF. We hypothesized that due to more developed EF abilities, bilinguals would report less mind wandering and show better performance on EF tasks. Results revealed that bilingualism does affect mind wandering and performance on some, but not all, tasks of EF.

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## **Characterization of Coastal Marina Fish Assemblages in South Florida using an Observation-Class ROV**

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### **Abstract**

The Florida Intracoastal Waterway is a highly trafficked system of canals connecting major ports to the interior of the state. Urban development along these canals has created manmade fish habitats such as pilings, walls, as well as floating docks and boats. Previous to development, these areas would have been natural estuarine habitats, such as mangrove thickets and seagrass beds. Estuarine fish assemblages in urbanized habitats have not been extensively studied in South Florida. Previous studies have used underwater visual surveys using SCUBA or snorkeling. However, this can be a hazardous undertaking in marinas due to boat traffic and the frequent presence of toxic pollutants. This study used a new low-cost, mini-ROV (remotely operated vehicle) to assess fish assemblages. The OpenROV 2.8 is a user built kit that utilizes an open source operating system, allowing operation with rudimentary infrastructure. A previously developed modified timed swim survey was conducted at several marinas along the Intracoastal Waterway, including the NSU Oceanographic Center, using the OpenROV 2.8. The video data were then analyzed to determine species richness and abundance of fishes utilizing various structures in marinas. This study provides useful information on urban coastal habitat use by local economically important species and demonstrates the effective use of small observation-class ROV-technology as a survey tool.



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## **College Vitality as measured by the SEHS-HE and a Behavior Checklist predicts success in diverse first-year college students**

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### **Abstract**

Academic competence is tightly linked to social and emotional competence in first-year college students (Wyatt & Bloemker, 2013). The Social Emotional Health Survey, or SEHS-HE, assesses emotional intelligence as a measure of co-vitality, which is made up of four aspects: belief-in-self, belief-in-others, emotional competence, and engaged living (Furlong, You, Shishim & Dowdy, 2016). Emotional intelligence factors such as these have been shown to be essential for understanding the successful transition from high school to college, especially for ethnically diverse students (Brackett, Rivers, & Salovey, 2011). Persistence, retention, and academic achievement are all reliant on emotional intelligence skills and the SEHS-HE has proven a reliable and valid measure of it (Jones, You & Furlong, 2013). In the present study, the SEHS-HE is predicted by a College Student Behavior Checklist (CSBC),  $r = .61$ ,  $p < .05$ . The CSBC includes 3 main structural components. The primary component is a set of successful first-year college student behaviors: College Vitality. College Vitality includes asking for help from professor and from peers, reassessing study habits, going to office hours, studying in a group, speaking up in class, planning more, reading before class, going to tutoring and testing centers, and being aware of grades.

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## Computational Flow Study of a Simon Nitinol® Inferior Vena Cava Filter

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### **Abstract**

More than 60,000 people die from pulmonary embolism every year in the US. Conventional treatments for embolisms include anti-coagulant drugs (Warfarin® or Heparin®), clot anti-thrombotic therapy (streptokinase®), bypass surgery, and thrombo-aspiration. In cases where the patient shows contraindication, failure or complication to anticoagulation drugs, the patient usually receives an inferior vena cava filter (IVCF). Despite its increase in popularity, complete and exhaustive blood flow analysis need to be performed for scenarios that can lead to IVCFs failure. Such scenarios include basket over-filling and filter tilting, among others. In this study, we wanted to compare the behavior of blood flow as it travels through the Simon Nitinol® IVCF with and without occlusions. All simulations were performed using ANSYS CFX. The inlet's normal velocity was set to 5 cm/s. For the outlet, zero relative pressure was prescribed. The walls of the vessel were constrained to no-slip conditions. A viscosity of 3.5 centipoise and density of 1125 kg/m<sup>3</sup> were utilized for the blood's properties. All solutions were set to converge at 10<sup>-4</sup> error margin for the momentum and continuity equations. As the occlusion size increased, the velocity of the blood flow increased proportionally. The velocity of blood flow was different in certain parts of the filter as seen in fig. 1. The spikes in the graphs represent the blood flowing through the first and second traps of the filter. The peak velocity occurred where there is less distance from parts of the filter to the wall. For future work, we will add occlusions for all of the filters in order to determine which filter is best for trapping blood clots. We will also incorporate a more realistic vessel wall. These studies will help design IVCFs with superior performance.

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## Coupling methods for 2,2'-bipyridines as precursors for novel Ru-bipyridine complexes

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### Abstract

The project aims to streamline the synthesis of 2,2'-bipyridine adducts, so they can be quickly and conveniently synthesized as precursors for ligands in novel organometallic ruthenium complexes. Specifically, the compounds being synthesized are 4,4'-methylated and 5,5'-methylated, 2,2'-bipyridines. The synthesis requires the homocoupling of brominated pyridines in the presence of an air sensitive nickel catalyst. The methodology has been developed as to ensure an air-free environment by assembling the closed reaction chamber in a nitrogen glovebox. Additionally, the prior literature reported an equimolar, in situ generation of the nickel catalyst, but the efficacy of the catalyst has been increased by making the catalyst as a precursor in the same inert, moisture-free environment. The reaction is completed on a Schlenk line assembly under an inert argon atmosphere. The product is isolated and purified via extraction and sublimation. Compound characterization is carried out utilizing GC-MS, NMR, and FT-IR. Bipyridines have many applications since they are excellent bidentate ligands with complexing abilities. Once incorporated into ruthenium complexes in a collaborative project, the bipyridines will become vital to increase the photosensitivity of these complexes, which may have applications ranging from synthetic photovoltaics to anti-cancer activity.

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## **Death Related Thoughts: A Mortality Salience Study**

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### **Abstract**

Being conscious of one's inescapable death is a fundamental attribute of humankind; it is what separates us from other species. Salience of our own mortality motivates individuals to behave in ways matching accepted cultural standards (Landau et al., 2004). Since mortality salience usually arouses anxiety, it has been suggested that individuals either suppress death-related thoughts following reminders of mortality or individuals increase thoughts not related to death to distract from death-related thoughts (Pyszczynski, Greenberg, & Solomon, 1999). To date, no study has tested this hypothesis. To examine this hypothesis, the current study randomly assigned participants to a mortality salience, negative life event, or control condition. Participants completed a writing task based on condition. Participants in the control condition wrote about the prior day, participants in the negative condition wrote a negative life event, and participants in the mortality condition wrote about what they thought would happen to them during death. Following the writing task, participants completed a sustained attention task (SART) with thought probes to assess the content of their current thoughts and a word stem completion task. In contrast expected results, no differences were found between the three groups on measures of mind wandering or the word stem completion task. A significant difference between groups was observed on non-target SART trials,  $F(2, 87) = 3.23, p < .05, \text{partial } \eta^2 = .069$ , such that performance was highest in the mortality condition. The current results fail to support prior hypotheses that mortality salience alters death thought accessibility.

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## **“Delacroix 1830-Chaos and Purpose” and its Inherent Surrealism**

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### **Abstract**

The varied collection of the Boca Raton Museum of Art houses many elaborate pieces. “Delacroix 1830-Chaos and Purpose” (stylized as “Chaos and Purpose”) is no exception. Created by Larry Rivers in 1993, “Chaos and Purpose” is an “oil painting on canvas that is mounted to sculpted foam board” that sits 80 1/4 x 98 1/4 inches. Although based upon “Le 28 juillet: La Liberté guidant le peuple [July 28: Liberty Leading the People]” (stylized as “Liberty Leading the People”) by Eugene Delacroix, Larry Rivers made crucial edits to the original to craft a unique piece. Distinct features of “Chaos and Purpose” correlate to surrealism; from the inclusion of a portrait, to the techniques used. Eventually, I will compare the work to the surrealist master Salvador Dali.

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## **Developing a Molecular Model to Explain the Role of O-GlcNAc Transferase (OGT) in O-GlcNAcylation**

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### **Abstract**

O-GlcNAcylation is a post-translational modification similar in importance to the mechanism of phosphorylation in its ability to affect signal transduction. This process is mediated by the enzyme, O-GlcNAc transferase (OGT). OGT catalyzes the addition of the sugar, N-acetylglucosamine (GlcNAc) from the carrier molecule uridine diphosphate N-acetylglucosamine (UDP-GlcNAc) to certain serine or threonine residues in more than a thousand target substrate proteins. The TAB1 (transforming growth factor-beta-activated kinase 1 binding protein) substrate was fused to OGT. GlcNAc was shown binding to three serine residues in TAB1. Six tetratricopeptide (TPR) repeats were identified. These alpha helical paired repeats fold together to produce a single domain called the TPR domain near the N terminus of OGT. Within the TPR domain, five asparagine (Asp) residues were identified that are involved in holding the substrate in place. Beta sheets in OGT were also indicated. If TAB1 does not receive GlcNAc, it will not be able to signal the proper response of the innate immune system. This work was funded in part by NSF-DUE 1725940 for the CREST (Connecting Researchers, Educators, and STudents) Project. Developing 3-D molecular models in this way is a relatively inexpensive process to visually represent important biological relationships that can be useful when trying to understand and explain complex molecular pathways.

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## **Do Bilinguals have an Advantage Over Monolinguals When It Comes to Executive Functions?**

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### **Abstract**

The prefrontal cortex regulates processes necessary to support goal directed behaviors. These processes, known as executive functions (EF), include shifting ability, inhibitory control, and updating. Moreover, the prefrontal cortex is believed to be essential for language control in people who speak more than one language. That is, leading theorists propose non-target language is inhibited when a bilingual speaks. In support, prior research from our laboratory has shown differences favoring bilinguals over monolinguals in neural inhibitory control. In this study, we speculated that bilinguals would not only outperform monolinguals on tests of inhibition, but that a bilingual advantage would also extend to the other two components of EF (i.e., shifting and updating).

Monolinguals (N=69) and bilinguals (N=46) were matched on a test of nonverbal intelligence, socio-economic status, and parental education. Results revealed that indeed bilinguals outperformed monolinguals on a test (WCST) assessing shifting abilities. Specifically, compared to monolinguals, bilinguals achieved a higher number of categories and made fewer errors. On a test assessing updating (N-back), while monolinguals showed faster reaction times, bilinguals were more accurate. Lastly, contrary to our prediction, bilinguals did not outperform monolinguals on a test (Stroop) assessing inhibition. Overall, our findings support and extend a growing body of research showing that speaking two languages has advantages that go beyond linguistic abilities.

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## **Effectiveness of a Functional Movement Screen® Corrective Exercise Program as a Means of Preventing Injury in Collegiate Swimmers**

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### **Abstract**

The Functional Movement Screen® (FMS) is a test designed to identify asymmetries and dysfunctions in movement patterns with the goal of injury risk prevention. This screen and its subsequent corrective programming have potential to benefit collegiate swimmers in reducing the frequency of injuries. Therefore, the purpose of this study was to evaluate the effects of implementation of an FMS-based corrective exercise program on injury reduction in collegiate swimmers. 62 NCAA Division II male and female swimmers underwent FMS testing at their pre-participation examination in 8/2017. Scores were analyzed for asymmetries and dysfunctions. Movement patterns to be improved upon were identified based upon the most prevalent deficits. Corrective exercise programs were designed to address these deficiencies and were implemented by the researchers 2-3x/wk. The teams' athletic trainer tracked pre-season musculoskeletal injuries (MSI). Pearson Chi-square test of independence was calculated comparing the frequency of MSI frequency between fall 2017 were compared to MSI in fall 2016 (no corrective exercises, N=48). A significant interaction was found ( $\chi^2(1)=4.38, p=.036$ ). 22.9% of 2016 swimmers (no corrective exercises) sustained an MSI compared to 41.9% in 2017 (yes corrective exercises). Phi=.200 indicating a weak positive association between MSI frequency and the presence of a corrective exercise program. Implementation of FMS-based corrective exercise programs did not successfully reduce the frequency of injuries for men's and women's swimming teams. Other factors such as coaching and training differences between the years may have influenced injury rates.



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## **Evaluating the Efficiency of the Clorox® Total 360® System to Eliminate Bacteria on Hard-to-Reach Surfaces**

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### **Abstract**

Electrostatic Sprayers have gained popularity in a wide range of industrial settings, ranging from pest to bacterial control for both agricultural and commercial use. The Clorox® Total 360® System uses an industrial electrostatic sprayer that adds a charge to the liquid particles of the Clorox® Total 360® Disinfectant and thus enhances the disinfectant's ability to adhere to surfaces. The goal of this investigation was to test the efficacy of the Clorox® Total 360® System in delivering Clorox® Total 360® Disinfectant Cleaner to hard-to-reach surfaces and to determine if the ionized disinfectant particles can wrap around objects to kill bacteria on the front and back. A coverslip containing  $10^6$  *E. coli* was affixed to either the front or the back of a 250mL graduated cylinder. Disinfectant was sprayed for one or three seconds from three feet away. Controls were sprayed with water only. After 3 minutes, the bacteria were diluted, filtered and plated on nutrient agar. After overnight incubation at 37°C, the colonies were counted, and the percent and log reductions were calculated. The experiments were repeated using a traditional spray bottle for comparison. The Clorox® Total 360® System resulted in 99.9% reduction of *E. coli* compared to 82.6% for the spray bottle. When analyzing the ability to wrap around an object, the Clorox® Total 360® System resulted in 58.6% reduction of bacteria compared to 22.6% for the spray bottle. In conclusion, the Clorox® Total 360® System was more effective at wrapping the disinfectant around objects and killing bacteria when compared to a traditional spray bottle.

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## Examining the Effects of Blue Light on Melatonin, Mood, and Neurobehavioral Performance

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### Abstract

The pineal hormone *melatonin* can become dysregulated with evening light exposure and changes in sleep/wake behavior. Dysregulated melatonin is associated with impaired mood and cognitive performance. This study examines the effects of modifying short-wavelength (blue) light exposure on evening melatonin levels, sleep disturbances and self-reported mood. To that end, we are testing the effect of blocking blue light during the evening on salivary melatonin, sleep quality, cognitive performance, and mood. Participants undergo one control and one experimental condition involving the use of filtered glasses to attenuate blue wavelength light using a repeated measures, randomized crossover design. The control and experimental condition consists of five days of monitoring using actigraphy watches to non-invasively record sleep patterns, activity level, and light exposure. During the experimental condition participants are instructed to wear a pair of specialized glasses that reduces short wavelength light in the evening. Melatonin levels are quantified from saliva samples. We assess self-reported health through the NIH Toolbox Emotion battery. Neurobehavioral performance is assessed across cognitive domains through a series of tasks on the NIH Cognition Toolbox battery. Preliminary results show an increase in melatonin levels as well as an increase in self reported overall life satisfaction and a decrease in fear, sadness and anger after just five days of evening blue light suppression. The use of light altering glasses will show how this intervention can potentially be applied to at risk populations (e.g. shift-workers or students who spend nighttime hours studying with electronic devices) in order to lessen the deleterious effects of light exposure at night.

## **Exploring How Cell Phones Influence Behavior Across Cultures**

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### **Abstract**

This film will explore how cell phone use has affected human interactions across select cultures by interviewing international students from different backgrounds. Smartphones, although relatively new, feel as if they have been around forever. While they allow people to be more productive and connected, they have also created a bubble that can separate people from their communities and environments. The impact of this phenomenon varies by culture.

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## **Feasibility of using Bluetooth low energy beacon sensors to detect magnifier usage by low vision patients**

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IT Consultant

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### **Abstract**

**Purpose:** Bluetooth low energy beacons are an emerging technology involving sensors that record temperature and humidity, which we hypothesize could be used to collect data from low vision patients regarding their usage of optical magnification devices. This could help ascertain device abandonment in a timely manner to prompt a telerehabilitation session to resolve issues. We evaluated whether Bluetooth beacon data could indicate when low vision patients used hand-held optical magnifiers for reading.

**Methods:** We recorded temperature and/or humidity data from Estimote sticker and BlueMaestro Tempo Disc™ beacons attached to optical magnifiers used for reading by low vision patients in clinic (n=16) and at home (n=3).

**Results:** In clinic, patients whose hand/fingers made direct vs. indirect contact with Estimote beacons had greater temperature increases on average from baseline after 30 seconds (0.73°C vs. 0.28°C), 60 seconds (1.04°C vs. 0.40°C), 90 seconds (1.39°C vs. 0.60°C), 105-120 seconds (1.59°C vs. 0.62°C), and 135-150 seconds (2.07°C vs. 0.97°C). At home, BlueMaestro™ beacons measured rapidly increased temperature (5.6°C per minute on average; range 2.7-7.3°C) and relative humidity (19.4% per minute on average; range 8.7-34%). Humidity reached its maximum increase and returned to baseline significantly quicker than temperature ( $P=0.007$ ). All increases during magnifier usage were much greater than the maximum room fluctuations without use (clinic: 0.2°C over 120 seconds; home: 0.6°C and 2.4% over 1 minute). The beacons were non-intrusive and acceptable by patients.

**Conclusions:** Estimote and BlueMaestro™ beacons reliably detected temperature and/or humidity increases when held by low vision patients while reading with a magnifier.

## **Florida's Migrant Worker Industry: How Necessary is this Evil?**

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### **Abstract**

The United States' of America's development is rooted in a history of forced, intensive labor — annually, approximately 3 million migrant travel to the United States of America to cultivate much of the produce found in one's local grocery store. One quarter of these aforementioned migrant workers are located in South Florida, with Broward County being home to a notable community of Haitian and Mexican migrant workers alike. The migrant worker industry provides low income laborers across the seas with a means of work — however via the deeply integrated system of debt peonage, immigrant families are often forced into stagnant cycles that result in higher mortality and morbidity rates and a normalization of flagrant worker's abuses. Within the context of South Florida's economy, one must question the necessity of this industry offsets the infrastructural violence it has committed.

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## **Heavy metal concentration in loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*) in Broward County**

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### **Abstract**

Seven extant species of sea turtles are either threatened or endangered and one of the leading causes for their population decline is believed to be pollution. Heavy metals are a potential contaminant and their concentrations can be influenced by anthropogenic effects. An accumulation of non-essential heavy metals and an excessive amount of essential heavy metals can have life-threatening effects on these organisms. Concentrations of 9 heavy metal concentrations from loggerhead and green sea turtle eggshells turtles are used as a proxy for adult female turtles which nest along Broward County beaches. An Atomic Absorption spectrophotometer is used to test for cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc. Preliminary results indicate no detectable levels of vanadium, an essential element rarely found in nature. A range of metal concentrations for cadmium (not detected–4.32 ppm), chromium (not detected–100.38 ppm), cobalt (not detected–58.41 ppm), copper (10.73–77.99 ppm), lead (not detected–111.18 ppm), manganese (not detected–10.27 ppm), nickel (not detected–28.06 ppm), and zinc (not detected–71.44 ppm) have been measured for the loggerhead sea turtles. A range of metal concentrations for cadmium (not detected–1.62 ppm), chromium (not detected–42.77 ppm), cobalt (not detected–45.70 ppm), copper (not detected–58.00 ppm), lead (not detected–220.93 ppm), manganese (not detected–34.39 ppm), nickel (not detected–53.07 ppm), and zinc (not detected–20.59 ppm) have been measured for the green sea turtles.

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## **Histology of gonad tissue in a sequential hermaphrodite fish**

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### **Abstract**

The hogfish (*Lachnolaimus maximus*) is a sequential hermaphrodite. It is protogynous: on reaching sexual maturity hogfishes are all female, and transition to male on reaching a size of 30cm (at about 3 years of age). This transition is marked by a change in coloration (from drab and tan to orange with dark bands) and a major restructuring of gonadal tissue as it transforms from ovaries to testes. However, the histological changes associated with this transition have not been sufficiently documented. Therefore, hogfish gonad histology was examined in relation to fish length, age, condition, and coloration. Hogfishes were collected by spear gun from local reefs, weighed, measured, and the gonad tissue excised and stored in formalin. Samples from the center of the gonad were dehydrated in EtOH, embedded in histological media, sectioned along the transverse plane, mounted onto slides, and stained with hematoxylin and eosin. Sections were then mounted on slides and scanned for germ cell development, appearance of the tunica albuginea, and formation of atretic bodies. Oocytes were counted and their stage noted, along with the presence of postovulatory follicles. When spermatogenesis was noted, the specific stage was recorded. Data were collected semi-quantitatively based on observations of the first 200 cells on each slide. These results were analyzed in the context of the morphological transition in hogfish size, condition, and coloration.

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## Identifying neuronal damage biomarkers in Bortezomib-induced peripheral neuropathy (BIPN)

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### Abstract

Multiple myeloma is the second most common hematological cancer of plasma cells. Bortezomib (BTZ) is a proteasome complex inhibitor commonly used as a chemotherapeutic agent to treat multiple myeloma patients. However, it is also known to cause a dose-limiting toxicity known as BTZ-induced peripheral neuropathy (BIPN). The aim of this study is to determine the BTZ-induced neuronal damage, identifying biomarkers of neurotoxicity, and testing novel strategies for its prevention or reversal. In our preliminary studies, we utilized PC12 cells as the *in vitro* neuronal model. These studies included culturing and differentiating PC12 cells using nerve growth factor (NGF) at 100 ng/ml concentration for 7 days. Undifferentiated and differentiated PC12 cells were treated with BTZ for 24 hours, followed by western blot analysis for the neuronal damage biomarkers such as cyclic AMP response element binding (CREB) protein and Neuron-specific enolase (NSE). Our results showed increased expression of CREB and NSE confirming the neuronal damage in BTZ treated samples. The differences in the expression pattern of these biomarkers were quantified using the ImageJ software. We will be further investigating the effects of various neuroprotective strategies such as the use of vitamin B12, gamma linolenic acid (GLA), and low level laser treatment (LLLT) to prevent or reverse the chemo-induced neuronal damage in BTZ treated PC12 cells. (This project was supported by the President's Faculty Research and Development Grant from NSU and the generous financial support from The Royal Dames of Cancer Research Inc., Ft. Lauderdale, Florida).



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## Identifying SNPs frequencies in Genetic Data of De-Identified Myalgic Encephalomyelitis/Chronic Fatigue Syndrome patients for potential diagnostic biomarker establishment

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### Abstract

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) is a debilitating disease with unknown causes. It is known that Single Nucleotide Polymorphisms (SNPs) play an important role in gene expression. Changes to that can manifest as phenotypic changes. Prior to this ongoing study, there existed no known databases of SNPs in patients diagnosed with ME/CFS. Our objectives are to create and continually update a novel database of SNPs that are specific for ME/CFS patients, and to analyze the relative frequency significance in our cohort of specific SNPs. A genetic database was created on-site through the use of a secure user-friendly online platform, REDCap®, for participants to upload their raw genetic data, acquired from 23andMe. The uploaded de-identified genetic data acquired from RedCap is modified to a suitable format for *Seattle Sequence Annotation 138*. The annotated data is then filtered to include only non-synonymous and nonsense SNPs from protein coding regions (exons), microRNAs, and SNPs that are close to splice sites. The frequencies of each SNP have been calculated within our cohort and compared to public databases. Those SNPs frequencies of differing prevalence between our database and the general public have been noted for further analysis. Further analysis will include looking for significant SNPs and the metabolic pathways they play a role in. Ongoing recruitment for submission of de-identified genetic data to our database leads to a constantly increasing sample size for continual application of the aforementioned method. Additional SNP investigation from the larger sample size allows for further validation of SNP trend significance.

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## **Impact of MDM2 Oncogene on Epithelial–Mesenchymal Transition and Metastasis of Prostate Cancer Cells**

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### **Abstract**

Murine Double Minute 2 (MDM2) gene containing E3 ubiquitin ligase is overexpressed in nearly 40-80% of late-stage metastatic cancers. MDM2 acts as a negative regulator of p53 by inhibiting its transcriptional activation and inducing proteasomal degradation by ubiquitination. Hence, MDM2 overexpression is often associated with increased Tumor Angiogenesis, Epithelial to Mesenchymal Transition (EMT), drug resistance, and aggressiveness. EMT is a morphologic cellular program simply defined as the phenotypic transition from an epithelial to a mesenchymal state, including gain of invasive and migratory properties, and thus, is critical for the conversion of early-stage tumors into metastatic malignancies. The primary focus of this study is to determine MDM2's role in inducing EMT in prostate cancer cells. Preliminary studies were performed on LNCaP and MDM2 overexpressing LNCaP-MST cell lines. As expected, LNCaP-MST, which express tenfold higher levels of MDM2 as compared to LNCaP, was mesenchymal in phenotype. On the other hand, LNCaP was more epithelial-like as evidenced by the Western Blot analysis of some key epithelial and mesenchymal markers. Further experiments are underway to determine some of the underlying mechanisms mediated by MDM2 in inducing EMT (This project was supported by the Royal Dames of Cancer Research, Ft. Lauderdale, FL).

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## **Impact of TAS2R38 Gene and Taster Status on Adiposity and Dietary Behaviors**

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### **Abstract**

Previous research has suggested that genetic variation in sensitivity towards bitterness may impact food preferences (diet) and susceptibility to certain diseases. The ability to taste bitterness has been theorized as an evolutionary advantage. Sensitivity to bitterness is thought to be influenced by a single nucleotide polymorphism (SNP) on the TAS2R38 taste receptor gene (rs713598), the number of fungiform papillae (taste buds). People can be categorized as nontasters, tasters, and supertasters based on the number of fungiform papillae which impacts their ability to taste bitterness. The aim of the current study is to examine whether the number of fungiform papillae, the TAS2R38 genotype, and one's sensitivity to bitterness may be related to one's dietary behaviors, and in turn, overall health. We hypothesized that because nontasters are less sensitive to tastes overall, and bitter specifically, they will demonstrate higher Body Mass Indices (BMI), Body Adiposity Indexes (BAI), larger waist circumferences, and consume more dietary fat than tasters and supertasters. Participants first completed a food inventory list over a one week period noting quantities and type of food consumed. Participants then came into the lab where we measured the number of fungiform papillae, their perceptions of bitterness of a PROP paper strip, the ability to taste fat in a dressing, BMI, and BAI. Participants also provided a saliva sample for gene allele testing and completed a Ten-Item Personality Inventory. Preliminary evidence suggests that dietary behavior is linked to genetic predispositions to tasting bitter substances. This information is beneficial in understanding how dietary behaviors, taste, and genetics are all connected, and will contribute to the growing notion of incorporating personalized medicinal approaches to one's health.

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## **Improvements in test-retest variability of visual field testing by censoring results with low sensitivity in retinitis pigmentosa patients**

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### **Abstract**

**Purpose:** Variability of visual field data in ocular disease patients is a significant challenge when monitoring for vision changes. Omitting points in severely damaged areas in glaucoma patients reduced test-retest variability. We tested whether this approach would yield similar findings in retinitis pigmentosa (RP) patients. **Methods:** 40 eyes of 20 RP patients with vision worse than 20/70 completed Humphrey visual fields, twice per visit, on 3 separate visits (6 fields per eye), with threshold values determined for 76 test points. 95% coefficients of repeatability (CR) were calculated for each eye for all threshold values (uncensored), and for points that only included thresholds above values of 10-20 dB (censored). **Results:** Only 33 eyes in 17 RP patients had test locations with sensitivities  $\geq 0$  dB. Uncensored results had a 95% CR of 8.66 dB across 16 test points on average, while censoring points at the lowest level of <10 dB and highest level of <20 dB resulted in 95% CRs of 7.26 dB and 4.91 dB (16% and 43% reduction) for an average of 8 and 5 test locations for 22 and 7 eyes in 12 and 5 patients, respectively. Censoring at a mid-level of <15 dB resulted in a 95% CR of 6.19 dB (29% reduction) for 18 eyes and 10 patients, as a trade-off for loss of included eyes and reduction in variability. **Conclusions:** Censoring threshold values of lower sensitivity results in significant reduction in test-retest variability, but has the risk of losing data for eyes with severe visual loss.

## **In the Wings**

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## **Abstract**

Based on a true story, “In the Wings” is a short film about a young theatre student who discovers that a fellow peer with nowhere to stay is residing in their school’s theatre. After this discovery, an unexpected companionship begins to form. The film is directed by Maha Barakat, Lucia Minniti, and Dekel Nahum. Crew members are Maha Barakat, Lucia Minniti, and Dekel Nahum. Actors are Lucia Minniti and Dekel Nahum.

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## **Investigating the anti-parasitic veterinary drug, Imizol, and its potential use for treatment of bacterial infections**

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### **Abstract**

Imizol is a veterinary drug used to treat protozoan, mainly *Babesia* spp., parasitic infections found in both horses and dogs. The active ingredient in this medicine is imidocarb dipropionate. This compound has traditionally been used in the veterinary field for treating parasitic infections; however, it has also been shown to inhibit the *Yersinia pestis* type III secretion system (T3SS) and therefore may have a dual-purpose as an antibacterial drug. T3SSs are found in several pathogenic bacteria and function as a defense against the host's immune response. Although dipropionate is a known T3SS inhibitor, the exact mechanism it uses to inhibit the T3SS is unknown. Therefore, the goal of this project is to determine how imidocarb dipropionate inhibits the *Y. pestis* T3SS. This will be accomplished by testing the ability, or inability, of dipropionate to inhibit secretion of various *Y. pestis* T3SS mutant strains. The mutant strains of *Y. pestis* will be plated on Magnesium Oxalate Agar and a disk containing the compound will then be placed onto the agar and allowed to incubate at 37°C for 48h. The inhibition of the T3SS is shown by large growth of *Y. pestis* around the disk, which would indicate that the mutation had no effect on the dipropionate activity. Conversely, the lack of inhibition of the T3SS is shown by little growth of the *Y. pestis* around the disk which would indicate that the mutation blocked the function of dipropionate and therefore may be the molecular target of the drug.

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## **Investigating the Microbiota of Stormwater Treatment Areas**

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### **Abstract**

One of the negative impacts of agriculture is the imbalance of nutrients in the environment. Such an imbalance of nutrients allows nonnative species of plants and organisms to thrive and native species become out-competed in their natural ecosystem. In an effort to maintain and protect the natural ecosystem the South Florida Water Management District has constructed Stormwater Treatment Areas (STAs). STAs are artificial wetlands that remove nutrients that are foreign to the natural ecosystem from water before the water is returned to the ecosystem by utilizing aquatic plants to cleanse contaminants from water. Microorganisms certainly play a role in the filtration of the water as it flows through the STAs. However, this role is not well known as little study has been done on the microorganism populations in these areas. As nutrients flowing to the STAs change during seasons, it is hypothesized that the presence of microorganisms will change with the concentrations of nutrients found in the soil or interstitial water in soils and the filtering efficiency will change as the presence of microorganisms change. To test this hypothesis, we screen for bacteria in soil and water samples from the STAs. This study aims to discover the relationship of the microbiota of STAs to the presence of the nutrients of the water flow.

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## **Investigation and Characterization of Metabolic Rates of Angiotensin II and Associated Bioactive Derivatives in the Renin-Angiotensin System**

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**Widelyne Dorsainval**

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### **Abstract**

To maintain homeostasis, the renin-angiotensin system (RAS) works to regulate the cardiovascular, renal, respiratory, and neurological systems of the body through activation of both the vasoconstrictive and proliferative arm of ACE/Ang II/AT1R and the vasodilative and antiproliferative arm of ACE-2/Ang(1-7)/Mas axis. To better understand their interaction, the components of the alternate RAS and the classical RAS in the homeostatic systems of the body are researched and analyzed. One of the significant constituents of the classical pathway is the octapeptide hormone angiotensin II (Ang II). It is a major contributor to vasoconstriction and peripheral vascular resistance through the activation of AT1R especially with its large amount of associated bioactive peptides such as Ang III (angiotensin-(2-8)), the less common Ang IV (angiotensin-(3-8)), and Ang V (angiotensin-(4-8)). The project aims to highlight the metabolism of Ang II and its derivatives, which were extracted from blood of Wistar rats, separated by paper chromatography, and measured by high performance liquid chromatography (HPLC) while in the presence of various concentrations of ACE-2. The results are among the first of numerous studies to measure and compare the rate of enzymatic activity of ACE-2 in the conversion of Ang II metabolites to a more active conformation state that plays a beneficial role in the alternative axis of the RAS. These results would essentially allow for optimization of new treatments through control of angiotensinase activity to prevent the onset of diseases caused by the overexpression of the classical axis of the RAS.



## **Just Like You: The Reality of Arab American Stereotypes**

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### **Abstract**

This is a documentary short film which focuses on stereotypes surrounding the Arab community. Three different interviewees express their feelings and experiences on the matter. Popular opinions on topics such as religious terrorism, home life, and more are touched upon in this piece. In addition, the subjects go into detail on their personal beliefs and practices when it comes to their culture and religion. Home videos and candid shots are strung together to form an in-depth view of what it is really like to be a part of the Arab community.

## **Masterpiece**

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### **Abstract**

This film is about a spoken word poem by Sarah Goltsman titled "Masterpiece." The poem itself deals with the themes of women's rights and suffrage as well as the too-common occurrence of sexual harassment and abuse. The central concept is that a woman's body often stops being her own, especially on college campuses. Throughout the reading of this piece, artwork and voices of other women of Nova Southeastern University are shown to promote the idea that women are more than just their bodies. They are their minds, and that is not shaken by the hands of other people. With the current rate of 1 in 5 college women experiencing sexual assault, this message of togetherness and overcoming through artwork and unity is incredibly relevant, especially in current times.

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## **MDM2 Inhibitors as Potential Anti-Cancer Agents for Treating Osteosarcoma**

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Faculty Sponsor: **Dr. Appu Rathinavelu**  
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### **Abstract**

Osteosarcoma (OS) is the most common type of bone cancer that affects thousands of young adults every year and requires immediate attention. One major regulatory pathway that is activated in cancer cells is the inhibitory interaction between Murine Double Minute 2 (MDM2)-p53 tumor suppressor gene. Hence, blocking the MDM2-p53 interaction has long been considered to offer a broad range of cancer therapeutic strategy. In this study, we determined the differential mechanism of apoptosis induced by the two small-molecule inhibitors of MDM2, RG-7388, and Nutlin-3, in SJSA-1 Osteosarcoma cells. Interestingly, RG-7388 was able to enhance the phosphorylation of anti-apoptotic protein Mcl-1 at Ser-159 that significantly enhanced the degradation of this protein. Degradation of Mcl-1 relieved the pro-apoptotic protein, Bak and thus initiated the process of apoptosis. On the other hand, Nutlin-3 caused the release of Bax from the Bcl-2/Bax complex, which led to the inactivation of Bcl-2, and subsequently loss of mitochondrial membrane potential. The above mentioned intrinsic pathway events seems to cause the release of cyt-C and Apaf-1, and thereby triggering apoptosis. The results of our study demonstrate that MDM2 inhibitors could become valuable drugs to treat osteosarcoma. (This project was supported by the Royal dames of Cancer Research, Ft. Lauderdale, FL).

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## **Modeling the Conversion of Normal Protein PrP<sup>C</sup> into the Mutated PrP<sup>SC</sup> in a Prion Disease**

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### **Abstract**

Gerstmann-Straussler-Scheinker (GSS) is a rare, genetically inherited prion disease caused by a mutation in the prion gene (PRNP). Carriers begin to experience GSS symptoms (similar to Parkinson's and Alzheimer's) during their 30s and 40s. While molecular details concerning the progression of GSS remain largely unknown, the altered conformation of the prion could be directly involved in the aggregation of plaques contributing to progression of the disease. In collaboration with the Milwaukee School of Engineering (MSOE) Center for Biomolecular Modeling - Students Modeling A Research Topic (CBM-SMART) program, we used 3-D modeling and printing technology to examine relationships between this normal and mutated prion. Details of the normal GSS prion structure (PrP<sup>C</sup>) from the Protein Data Bank (PDB) File, 3HAK, were imported into Jmol, a protein visualization software. The molecular changes in the prion protein that were highlighted include a mutation in which phenylalanine becomes serine at position 198, a loop from residues 193-197 which becomes absent, and the alpha helix structure at residues 164 - 170 which becomes malformed due to the formation of a salt bridge between arginine 164 and aspartic acid 167. The N- and C- termini of the prion were also highlighted. This model can be used by genetic counselors, physicians, and researchers to educate the public on the molecular changes associated with prion diseases like GSS.

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## **Multi-Decadal Assessment of Heavy Metals in Body Tissue and Vibrissae of Select North Pacific Marine Mammals**

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### **Abstract**

Since the 1970s, marine mammal populations, including harbor seals (*Phoca vitulina*), northern fur seals (*Callorhinus ursinus*), Steller sea lions (*Eumetopias jubatus*) and northern sea otters (*Enhydra lutris*) in the northwest Pacific Ocean have undergone significant population changes. The effects of environmental contamination on marine mammal health are of concern related to population dynamics, yet limited information is available on heavy metal concentrations for these species. Archived vibrissae (whiskers) and body tissues from these four species were collected from the Bering Sea and throughout the Gulf of Alaska from 1990 to 2013. The concentrations of heavy metals (As, Cd, Cr, Co, Cu, Hg, Mn, Ni, Pb, Se, V, Zn) within the various body tissues and vibrissae of these four species were determined via atomic absorption spectrophotometry. Among all tissues, Zn and Cr frequently had the greatest concentrations. There were also significant concentration differences among vibrissae from all species for Cd ( $p < 0.0001$ ), Cu ( $p = 0.0367$ ), Pb ( $p = 0.0844$ ), V ( $p = 0.0065$ ) and Zn ( $p = 0.0054$ ), yet no significant metal concentration differences were observed for the body tissues of harbor seals and Steller sea lions. Heavy metal analysis of vibrissae may provide a less invasive procedure to determine total body metal concentration through comparison of keratinized and non-keratinized tissues. Data from this study contribute to a larger baseline study of heavy metals in marine mammals.

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## **On Stigmatizing the Sick: Susan Sontag**

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### **Abstract**

This oral presentation applies Susan Sontag's ideas to sick population stigmatization. Building on Sontag's *Illness as a Metaphor* and *AIDS and Its Metaphors*, the presenter evaluates Sontag's claims that language and metaphors individuals use to describe ill populations often lend an otherwise hidden hand to our damaging views of them. In her essays, Sontag has drawn on a personal battle with cancer, the views on the AIDS epidemic of the 1980s, and the cultural and societal ramifications growing out of that panic that still perpetuate in modern day. While such medieval concepts still have their grasp on global public health, Sontag argues this is a detrimental component to society's view of how the sick become sick. The presenter seeks to flesh out Sontag's logic, but also apply that logic to a more current stigmatized label: mental health disorders. Those with mental health disorders are viewed as a burden, different, and unaligned with norms and expectations in society. It can be difficult to separate a mental health disorder from a person's display of maladaptive behaviors. As this group has become more visible, that same stigmatization has shifted to the world of mental health. Conversational language such as calling a friend "crazy" or "bipolar", has made it acceptable to negatively view those with mental health disorders. The presenter argues that the general population, from medical professionals to families and friends, stigmatize mental health today in a manner predictably similar to attitudes towards ill groups of the past.

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## **Performance Evaluation of Inferior Vena Cava Filters**

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### **Abstract**

Pulmonary embolism (PE) is a major cause of death and morbidity in the world. Conventional treatments for embolisms include anti-coagulant drugs (Warfarin<sup>®</sup> or Heparin<sup>®</sup>), clot anti-thrombotic therapy (streptokinase<sup>®</sup>), bypass surgery, and thrombo-aspiration. In cases where the patient shows contraindication, failure or complication to anticoagulation drugs, the patient usually receives an inferior vena cava filter (IVCF). Despite its increase in popularity, complete and exhaustive blood flow analysis need to be performed for scenarios that can lead to IVCFs failure. Such scenarios include basket over-filling and filter tilting, among others. This study was conducted to analyze the average blood flow velocity, pressure, and wall shear stresses of the IVCFs at different occlusion levels and determine best and worst case scenarios. All simulations were performed using ANSYS CFX. The inlet's normal velocity was set to 5 cm/s. For the outlet, zero relative pressure was prescribed. The walls of the vessel were constrained to no-slip conditions. A viscosity of 3.5 centipoise and density of 1125 kg/m<sup>3</sup> were utilized for the blood's properties. All solutions were set to converge at 10<sup>-4</sup> error margin for the momentum and continuity equations. The results showed higher flow velocity, a higher force magnitude as a result of increased occlusion on the filter and vessel walls. Similar findings were observed in the case of wall shear and pressure. In the case of the second degree filter, the peak velocity occurred where there is less distance from parts of the filter to the wall. This can lead to rupture of the vessel, along with the potential dislodging or fracturing of the filter causing sharp debris to apply further damage to the body and potentially resulting in fatality. These studies will help design IVCFs with superior performance.

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## **Porphyrin Tautomerization for the 5,15-dibromo-10,20-diphenylporphine and 5 bromo-10,15,20-triphenylporphine using VT H<sup>1</sup>NMR**

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### **Abstract**

Variable-temperature proton NMR spectroscopy, as well as theoretical studies, will be used to compare the reported free energy of activation value of the tetra phenyl porphyrin (12.2 kcal/mol), the 5, 15 phenyls substituted porphyrin with an in-plane distortion (11.6 kcal/mol) with the 5,15-dibromo-10,20-diphenylporphine and 5 bromo-10,15,20-triphenylporphine. The experimental determination of tautomerization using VT H<sup>1</sup>NMR of both porphyrins is to be compared to the molecular modeling analysis of the porphyrin structure using MM+.



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## Power Profiles of Vertical and Drop Jumps in Elite American Football Players by Position

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### Abstract

Athletes seeking to be drafted by the NFL must demonstrate peak performance on a test battery that includes jumping. Jumping is modulated by rate of force development, air-time, and time from initiating the jump to take-off, and indicates an athlete's ability to produce power. Despite providing insight allowing for diagnosing jumping inefficiencies and/or to monitor training progressions, published data from NFL combine hopefuls is rare. Therefore, this descriptive study aims to present power components of selected jumping tasks in elite American football players training for the NFL combine. Thirty-one males (age,  $22.5 \pm 0.8$  yrs; ht,  $1.86 \pm 0.08$ m; mass,  $100.81 \pm 14.04$ kg) performed the following tests in a laboratory setting: 4-jump drop jump (DJ) onto a timing mat, and vertical jump (VJ) from a force plate. DJ and VJ height, DJ contact time, DJ reactive strength index ( $RSI = \text{jump height} / \text{contact time}$ ) and VJ take-off force were calculated and stratified by player position group [Skill players (SP: i.e. wide receivers, defensive backs,  $n=13$ ), Big Skill players (BSP: i.e. linebackers, tight ends,  $n=14$ ), Big players (BP: i.e. offensive/defensive linemen,  $n=4$ )]. DJ height for SP, BSP and BP was  $0.52 \pm 0.09$ m,  $0.47 \pm 0.06$ m, and  $0.43 \pm 0.07$ m, respectively. DJ contact time was  $0.40 \pm 0.15$ s,  $0.41 \pm 0.12$ s, and  $0.49 \pm 0.14$ s, respectively. DJ RSI was  $1.41 \pm 0.39$ ,  $1.22 \pm 0.33$ , and  $0.94 \pm 0.40$ , respectively. VJ height was  $0.79 \pm 0.08$ m,  $0.72 \pm 0.06$ m, and  $0.60 \pm 0.06$ m, respectively. VJ force was  $710.36 \pm 91.21$ N,  $766.21 \pm 96.62$ N, and  $678.25 \pm 186.55$ N, respectively. SP was superior in all components of power in the DJ and VJ, except VJ take-off force; SB produced the highest force. Player position requirements may influence components of jumping power.

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## Predicting Individual Differences in Thought Suppression

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### Abstract

Thought suppression is the cognitive act of earnestly attempting to block out involuntary thoughts. Previous research has indicated that thought suppression is counterproductive and has negative mental and physical associations. The present research sought to examine the variables that may predict individual differences in trait levels of thought suppression. Specifically, we investigated whether trait level thought suppression could be predicted by mind wandering, religious faith (versus atheism/agnosticism), self-esteem, sex (male/female), socioeconomic status, and affect (positive/negative emotions). Participants included 203 NSU undergraduates (139 female), from 18 to 52 years of age ( $M = 19.9$ ,  $SD = 4.42$ ), who completed an online survey assessing the relevant individual difference variables. Multiple regression analysis indicates that trait level thought suppression can indeed be predicted from this collection of individual difference variables ( $\text{Adj. } R^2 = .26$ ,  $p < .001$ ). Additionally, three variables emerged as unique predictors of thought suppression: mind wandering ( $\beta = .27$ ), religious faith ( $\beta = .23$ ), and self-esteem ( $\beta = -.33$ ). These results suggest that, at the trait level, thought suppression is more likely to occur in individuals who score high on a trait-level mind wandering and who report being a person of faith (as opposed to being atheist or agnostic). Conversely, thought suppression is less likely to occur in individuals with high self-esteem. Discussion addresses these results in the context of (1) existing literature on thought suppression and (2) potential implications for mental health and wellbeing.

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## **Pufferfish Corallivory on the Massive Coral *Porites lobata* in the Galápagos Islands**

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### **Abstract**

*Arothron meleagris* is an obligate corallivorous pufferfish that scrapes tissue off the coral skeleton with its parrot-like beak. It is a common member of coral communities in the Galápagos Islands where it predominantly feeds on zooxanthellate scleractinian corals. The purpose of this study was to determine if there is a relationship between frequency of *Arothron meleagris* bite marks and location on ridged vs. smooth portions of massive *Porites lobata* colonies. Differences may then be related to greater feeding efficiency. Images of coral colonies that have *A. meleagris* bites were taken off of Darwin Island, Galápagos, Ecuador in 2012. These images were analyzed using image analysis software (CPCE) in two ways: 1) bite frequency as it relates to overall colony morphology (ridged vs. smooth colonies), 2) and bite frequency as it relates to morphology within a colony (ridged vs. smooth areas of ridged colonies). There was a significant difference (t-Test,  $p = 0.02$ ) in average bite frequencies between ridged and smooth colonies. There was also a significant difference between ridged and smooth areas within a ridged colony (t-Test,  $p = 0.01$ ), suggesting that ridged areas are more frequently targeted by *Arothron meleagris* within ridged colonies. This may be due to ridged areas being more accessible, requiring less energy consumption to obtain necessary nutrients. This is consistent with expectations of optimal foraging strategy, especially considering the difficulties in processing carbonates along with gelatinous tissues.

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## **Pulmonary Embolism: Flow Analysis of One-Degree Inferior Vena Cava Filters**

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### **Abstract**

An estimated 200,000 deaths stem from pulmonary embolism (PE) annually, with most cases being caused by a condition known as deep vein thrombosis. Inferior Vena Cava Filters (IVCFs) were designed to reduce the risk of PE by hooking onto the IVC walls via surgical insertion and capturing the clot. In this project, we simulated and analyzed the average blood flow velocity of the IVCF containing a filter at different occlusion levels to determine any possible dangers and solutions associated with these levels. All simulations were performed using ANSYS CFX. The inlet's normal velocity was set to 5 cm/s. For the outlet, zero relative pressure was prescribed. The walls of the vessel were constrained to no-slip conditions. A viscosity of 3.5 centipoise and density of 1125 kg/m<sup>3</sup> were utilized for the blood's properties. All solutions were set to converge at 10<sup>-4</sup> error margin for the momentum and continuity equations. The results showed higher flow velocity, a higher force magnitude as a result of increased occlusion on the filter and vessel walls. This can lead to rupture of the vessel, along with the potential dislodging or fracturing of the filter causing sharp debris to apply further damage to the body and potentially resulting in fatality. Several measures can be taken in preventative response to these flaws, including close observations of the filter occlusion through follow-ups after the initial procedure, as well as through possible dissolution techniques to eliminate the original clot and remove the filter from the body safely and in one piece.

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## **Quantitative measurement of aversive learning and intoxication rates in *Caenorhabditis elegans* in response to an engineered nematicidal bacterium**

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### **Abstract**

Despite their global prevalence, there are very few strategies to prevent infections due to parasitic nematodes. Recent studies have shown that bacteria engineered using the principles of synthetic biology may serve as an alternative approach to intoxicating nematodes. While these engineered bacteria were initially shown to be relatively efficacious in intoxicating the model nematode *Caenorhabditis elegans*, the nematodes quickly learned to avoid the engineered bacteria through aversive associative learning. In this study, we sought to understand how associative aversive learning affects intoxication of *C. elegans* using our engineered nematicidal bacteria. Towards this end, we tuned the rate of attractant production and measured aversive learning through learning assays. We observed that, for a given attractant production rate, a minimal time was required in order for the worms to avoid our engineered bacteria. Moreover, fine tuning the attractant production rate led to a biphasic relationship between attractant production and *C. elegans* intoxication, where the percentage of intoxicated worms was highest at intermediate attractant production rates. Our results are among the first comprehensive studies of learning in *C. elegans* in response to a nematicidal protein, and may allow for optimization of treatment regimens when using nematicidal bacteria as a biocontrol or therapeutic agent.

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## Relationship of Reactive Strength to Body Composition Measures in Elite American Football Players

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### Abstract

Reactive strength (RS) represents function of a muscle's stretch shortening cycle, or the ability to rapidly change from an eccentric contraction to a concentric contraction. RS is important in sports requiring explosive movements such as cutting, jumping, sprinting, and is commonly a focus of strength and conditioning programs. RS may be influenced by body composition as lighter mass basketball players have shown superior RS over higher mass players. This relationship in elite American football players is unknown. Therefore, the purpose of the study was to determine if body mass (BM), lean body mass percent (LBM), or fat mass percent (FM) were associated with RS during a drop jump (DJ) in elite American football players. Twenty-five males (age,  $22.3 \pm 0.09$  yrs; ht,  $186.02 \pm 8.54$  cm) undergoing training for the National Football League's combine draft volunteered for this study. Body composition variables were obtained via BodPod, and RS was calculated using the RS index ( $RSI = \text{jump ht} / \text{contact time}$ ) using a timing mat during a 60 cm DJ. Pearson Correlation Coefficients were used to determine three associations; (a) RSI and BM, (b) RSI and LBM, and (c) RSI and FM,  $p < 0.05$ . Results showed significant negative correlations between RSI ( $1.26 \pm 0.40$ ) and BM ( $100.81 \pm 14.04$  kg), and LBM ( $85.32 \pm 8.24$  %),  $r = -0.397$ ,  $p = 0.050$  and  $r = -0.565$ ,  $p = 0.003$ , respectively. RSI was not significantly associated with FM ( $15.72 \pm 4.97$  %;  $r = -0.248$ ,  $p = 0.231$ ). Players who were heavier and players who possessed a greater amount of LBM had lower RS than lighter players and those with less LBM. Explosiveness appears to be related to heaviness.

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## Screening for Type III Secretion System Inhibitors

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### Abstract

Commonly used antibiotics are becoming less effective since overuse creates a selective pressure for bacteria to become resistant, leading to the formation of “super bugs”. Some of these pathogenic bacteria include *E. coli*, *Salmonella*, *Chlamydia* and *Yersinia* species. These species utilize a type III secretion system (T3SS), which are needle-like structures on their surface used to inject host cells with toxins to evade our immune system and cause infection. The goal of this research was to screen for antimicrobials produced by soil bacteria that may target T3SSs. Many species of bacteria found in soil produce antimicrobials to compete for nutrients and space. Serial dilution plating was used to isolate soil bacteria and each isolate was patched onto MOX agar plates pre-inoculated with *Y. pestis*. After incubation, the areas around each soil isolate were analyzed for the *Y. pestis* growth characteristics associated with blocked T3S or growth inhibition. The soil bacteria that exhibited positive results were tested against ESKAPE pathogen alternatives and identified using 16S rDNA sequencing. *Bacillus cereus* strain JEM-2, *Bacillus amyloliquefaciens* strain SSH100-3 and *Pseudomonas aeruginosa* strain NBAII AFP-7 were soil isolates identified to have antibacterial activity against *Y. pestis* and at least one ESKAPE pathogen. Compounds from these organisms will be extracted using ethyl acetate and further characterized.

## **SNAP**

### **Aidan Rivas**

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### **Abstract**

The short film we are producing will be a narrative short film. The film follows the story of college student whose life deteriorates rapidly over the course of a week. The culmination of multiple conflicts causes prospective fear, anxiety, and despair. This leads him down a path of self-destruction, causing him to have epiphanies of what could have been had he corrected his course earlier. These bring about the anticipation of life change, but the end result is left to interpretation.

An inspiration for this project was the film *The Graduate* (1967) - The ending scene from this movie is the type of ending that we'd like to go for, and what is meant when we say it is left up to interpretation. The idea that a perceived victory is not necessarily the best course of action is attractive to us. Another was *Mr. Nobody* (2009) - This movie is the inspiration for reflecting on past mistakes and what might have been.

Each production we've worked on (individually and together) has been steeped in comedy, and we wanted to take a departure from the regularly scheduled programming. We've decided to tackle the "man vs. self" issue, as well as "man vs. the world" - more specifically the world of conflicts that arises for college students, particularly those who don't exactly put their best foot forward.



---

## **Stability Studies of F16 and JFD in Lipophilic and PBS Formulations in Different Storage Conditions**

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Faculty Sponsor: **Dr. Appu Rathinavelu**

Rumbaugh-Goodwin Institute for Cancer Research

### **Abstract**

The term “Angiogenesis” implies the formation of new blood vessels. In cancer cells, angiogenesis plays a critical role in the cell growth and in the spread of cancer. F16 and JFD, two drugs patented by Dr. Appu Rathinavelu, specifically inhibit vascular endothelial growth factor receptors (VEGFRs). These drugs are going to be tested in clinical trials but first must undergo drug stability testing of the existing formulations. Therefore, the purpose of this study was to investigate the stability of F16 and JFD in order to determine the storage conditions in which the therapeutic activity of the drugs will be maintained. Two different formulations were prepared for F16, JFD and JFD-WS: solubilizing the drugs in Lipophilic and PBS. The samples were kept at 25°C and 5°C, and the degradation of the drugs was determined by drawing the samples after initial (0), 1, 7, 14, 30 and 60 days interval using the HPLC method. The results showed that the concentration of the drugs remained constant in Lipophilic formulations after sampling intervals of 60 and 14 days respectively. However, the percent content of JFD in PBS formulation was reduced at day 14 compared to initial day (0) due to the recrystallization of JFD in the buffer formulation during storage. The preliminary data of this study shows the potential of creating a stable formulation for the clinical use of both novel drugs, F16 and JFD. This project was supported by The Royal Dames of Cancer Research Inc., Fort Lauderdale, Florida.

---

## Synthesis of MOF-Templated Mixed-Metal Oxides for Catalytic Carbon Monoxide Oxidation

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### Abstract

Metal Organic Frameworks (MOF) are highly crystalline, porous coordination polymers formed from metal nodes connected by organic bridging ligands. Recently, a cerium-based MOF, UiO-67, was utilized as a sacrificial template for synthesizing novel CuO/CeO<sub>2</sub> catalysts through pyrolysis under air, as the support in a metal oxide catalyst is known to dramatically influence the performance. In this work, we attempted the solvothermal synthesis of a mixed-metal hafnium/cerium UiO-67 to create mixed hafnium-oxide/cerium-oxide materials as a metal oxide support for catalytic carbon monoxide oxidation. X-Ray powder diffraction (XRPD) patterns support that (Hf) UiO-67 was synthesized with phase purity. XRPD patterns of the mixed metal system (90:10,75:25,66:33, Hf:Ce) were indexed to the UiO-67 phase, but no peak shifts or intensity changes were observed. Pyrolysis of the products at 600 °C for one hour yielded hafnium oxide, according to XRPD. Products were further characterized using thermal gravimetric analysis (TGA) and Energy-Dispersive Spectroscopy (EDS).

---

## **The Balance of Public and Private Benefits Determines Sensitivity to Catastrophic Population Collapse in a Microbial Volunteer's Dilemma**

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### **Abstract**

Cooperation plays important roles in bacteria, plant, animal, and human ecosystems. Cheaters, who garner public benefits without paying the associated costs, often outcompete cooperators. One mechanism of cooperation is the production of a public good. This seems evolutionarily unstable, because cooperation tends to decrease the fitness of the individual, while promoting the fitness of cheaters. However, cooperation can persist even in the presence of cheaters, as long as a private benefit is retained by the cooperator. While theoretical and experimental studies have examined the use of public goods in cooperation, research has yet to determine how the ratio of public and private benefit affects the growth and survival of populations consisting of cooperators and cheaters. To address this question, we used a mathematical simulation alongside a microbial cooperator-cheater system to demonstrate that the balance between the public and private benefit of a public good determines the sensitivity of the population to catastrophic population collapse in a well-mixed environment. Populations consisting of both cooperators and cheaters are most sensitive to collapse at intermediate initial percentages of cheaters. This sensitivity increases as the ratio of public to private good decreases. Furthermore, if the public good provides a sufficiently large private benefit and a weak public benefit, we find that increasing the amount of a stressor can counterintuitively increase total population growth. Overall our results contribute to our understanding of the principles that guide the maintenance and stability of cooperation, and may have implications for infectious diseases.

---

## **The Clinical and Economic Costs and Benefits of Continuous Glucose Monitoring**

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### **Abstract**

The purpose of this study is to investigate the economic and clinical costs and benefits of continuous glucose monitoring (CGM) for type 1 and type 2 diabetic patients based on current literature. Continuous glucose monitoring is a new technology that allows patients to measure glucose levels in real-time throughout the day and night. A tiny electrode, called a glucose sensor, is inserted under the skin to measure glucose levels in tissue fluid; this sensor is connected to a transmitter that wirelessly sends blood glucose information to a monitoring device. Unlike a typical blood glucose monitor (BGM) which provides just a single glucose reading, CGM systems provide real-time, dynamic glucose information every five minutes—up to 288 readings in a 24-hour period, which allows individuals to gain valuable insight to proactively manage their diabetes. Continuous glucose monitoring has been shown to improve glycemic control and/or reduce the frequency of hypoglycemic episodes in diabetic patients. Cost-effectiveness analyses have shown that CGM systems could result in quality of life benefits within the range of what is deemed to be cost-effective. The goal of this paper is to determine if continuous glucose monitoring is a cost and clinically effective disease management option for people with diabetes.

---

## **The Effects of a Pre-Workout Supplement on Strength, Endurance and Mood**

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### **Abstract**

The purpose of this study was to assess the acute effects of consuming a pre-workout supplement on indices of muscular strength, endurance and mood states. Background. Earlier research has shown that various pre-workout supplements may aid exercise performance; however, when the placebo is matched for caffeine content with a supplement, it is not known if an ergogenic effect may occur. Methods. Fourteen exercise-trained subjects (7 female, 7 male) participated in this investigation. Subjects came to the lab twice with at least 7 days between testing sessions. The consumption of product or placebo was randomized. They arrived at the lab 3 hours fasted with no prior exercise that day. Subsequently, they consumed the supplement or placebo (mixed with 8-12 ounces of water) 30 minutes prior to testing. Participants' mood was also assessed via a profile mood states questionnaire (POMS) 30 minutes after product or placebo was consumed. After taking the POMS questionnaire, subjects had their exercise performance assessed via the 1-RM bench press followed by bench press repetitions to failure at 60% of 1-RM with 30 seconds rest between sets (3 total sets). Results. There were significant differences ( $p < 0.05$ ) between the supplement and placebo for the number of repetitions to failure as well as total weight lifted. However, there were no differences for any of the other parameters measured. Conclusion. The results demonstrated that the acute consumption of a pre-workout supplement can enhance muscular endurance; however, it has no effect on strength or mood states.

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## **The Effects of Growth Rate on Antibiotic Resistance in *Pseudomonas aeruginosa***

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### **Abstract**

Antibiotic resistance is a global health crisis. The overuse of antibiotics to treat bacterial infections has led to rapid pathogen adaptation, which has resulted in reduced treatment efficacy. This, in turn, can lead to adverse consequences such as prolonging the duration and expense of a patient's hospital stay, infecting immunocompromised individuals leading to further health complications, and increasing the occurrence and severity of side effects due to necessitated use of higher doses of medications. One opportunistic pathogen that has shown increased resistance to several antibiotics is the biofilm forming bacteria *Pseudomonas aeruginosa*. In order to grow, and resist antibiotics, *P. aeruginosa* engages in cooperative behaviors, including the release of pyoverdine, a siderophore that promotes growth. Recent findings have suggested that the growth rates of some bacteria are directly linked to antibiotic resistance. Higher growth rates facilitate resistance; however, this has yet to be shown for *P. aeruginosa*. To address this open question, we used microplate reader assays to examine the effect of growth rate on minimum inhibitory concentrations (MIC) of ampicillin and kanamycin. Furthermore, we used a series of serial dilutions to demonstrate that, not only does growth impact MIC, but MIC is intrinsically tied to initial bacterial density. Overall, our results suggest that manipulating the growth rate of *P. aeruginosa* can influence its ability to be killed by antibiotics.

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## The Effects of Pre- and Post-Exercise Cooling on Performance

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Athletics

### **Abstract**

Background: The purpose of this study was to assess the effects of post-exercise Cold Water Immersion (CWI) on muscle performance. Methods: Participants (N = 20) underwent baseline measurement and intervention administration. In 24-hours participants repeated measurements, performed High-Intensity Interval Training (HIIT), and receiving the intervention. In 48-hours participants retook measurements. The CWI group was immersed in an ice tub for 15 minutes, while the control group received nothing. The Likert scale measured muscle soreness, while the Sit-n-Reach, Vertical Jump, Squat 1-Repetition Maximum (1RM), 5-10-5 shuttle, and 10-yard dash measured muscle performance. Results: A significant difference was found in agility, strength, and muscle soreness between the CWI and control groups ( $p < 0.05$ ). There was a decrease in 5-10-5 shuttle times (in seconds) for the CWI group (CWI – Pre ( $6.25 \pm 0.85$ ); 48-hours ( $6.17 \pm 0.84$ )), while the control group increased times (Control – Pre ( $6.11 \pm 0.54$ ); 48-hours ( $6.16 \pm 0.70$ )). The squat 1-RM increased in the CWI group (CWI – Pre ( $173.4 \pm 90.48$ ); 48-hours ( $183.0 \pm 92.78$ )), and decreased in the control group (Control – Pre ( $186.1 \pm 75.52$ ); 48-hours ( $174.5 \pm 64.76$ )). The Likert scale measurements slightly increased in the CWI group (CWI – Pre ( $1.0 \pm 1.63$ ); 48-hours ( $3.35 \pm 1.73$ )), but increased drastically in the control group (Control – Pre ( $0.2 \pm 0.63$ ); 48-hours ( $5.1 \pm 1.68$ )). Conclusions: The use of CWI post-exercise significantly decreased muscle soreness, increased squat 1-RM, and improved 5-10-5 shuttle times. Therefore, using CWI post-exercise to improve performance 24 hours later is supported by this study.

## **The Hottest Fashion to Conquer College**

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### **Abstract**

“The Hottest Fashion to Conquer College” is a short film in which the protagonist gets ready for his first day of class and doesn’t know what to wear. He wishes he had a fashion “guru” to help find the perfect outfit. Out of nowhere, two fashion “gurus” come out and help him pick outfits. However, instead of serious outfits for the occasion, they tell the protagonist crazy/dumb outfit tips for the situation (e.g., wearing a sports jacket with a shirt cut in half and calling it business casual). However, they realize that they did not make any fashion choices for women, after being called out on it. The film concludes with the “gurus” delivering a message of, “If we can wear any outfits and still look good, you can too. Love your body and what you are wearing.” The film is directed by Anthony Laboriel and David Naranjo. This film was inspired by the Youtube video, “4 Looks You Need This Summer,” by h3h3 Productions.



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## **The Relationship between the ACTN3 Genotype and Measures of Stress, Exercise Performance and Body Composition**

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### **Abstract**

The purpose of this study was to assess the relationship between the expression of the ACTN3 gene (RR homozygous or RX heterozygous) and measures of stress, performance (i.e., bench press strength and endurance), and body composition. Strength was determined via a 1-RM (one-repetition maximum) for the bench press, and muscular endurance was determined by the number of repetitions to failure that were performed on the bench press at 60% of 1-RM. Body composition was assessed via a dual-energy X-ray absorptiometry (DXA). One hundred and five subjects completed the study ([mean  $\pm$  SEM]: body weight: R/- group:  $73.8 \pm 1.7$  kg vs. XX group:  $66.6 \pm 2.8$  kg). There were no significant differences between XX and R/- (carriers of ACTN3) for fat mass, lean body mass, % fat or body weight. However, R/- demonstrated significantly greater bone mineral content (mean  $\pm$  SEM: R/- =  $2951 \pm 70$  g, XX =  $2622 \pm 73$  g) and density (R/- =  $1.35 \pm 0.02$ , XX =  $1.28 \pm 0.03$  g/cm<sup>2</sup>). No differences were found for any of the other parameters. In exercise-trained individuals, carriers of the gene (R/-) demonstrated greater bone mineral content and density.

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## **The Shortage of Affordable Workforce Housing**

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### **Abstract**

This research involves an investigation into the shortage of affordable workforce housing in the United States. While the workforce continues to grow, housing development has not kept up for households in the middle quintiles of their area's median income, or AMI. Affordability and distance from work are the main factors the workforce considers important in deciding where to live. The affordable workforce housing shortage is clearly an economic and political issue. Supply and demand dynamics drive up the price of land where it is most sought after, and yet creative solutions exist to offset the increased demand of the workforce. Various government organizations provide housing assistance programs, but may be limited to investment in housing designed for the lower quintiles, leaving the middle quintiles in need. Experts and legislators have proposed policy change on this issue. Essentially, affordable workforce housing is elemental for cities to maintain because it helps attract and retain a talented workforce while enabling metropolitan areas to develop economically.

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## **The True Green Lantern: Algae and its Ability to Remove Heavy Metals from Polluted Waters**

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### **Abstract**

A growing issue in our society is the contamination of our fresh water sources from pollutants such as heavy metals. Algae have recently been examined as a cost effective method to remove these metals from solution, when compared to the various methods that are used by waste removal facilities. This presentation will focus on the biosorption of lead (Pb), zinc (Zn), and nickel (Ni) by two species of algae, *Neochloris minuta* and *Neochloris alveolaris*. Each species was grown in two separate environments, one with nitrate as the nitrogen source (+N) and another without it (-N); the algae grown without nitrogen had higher amounts of lipids and lower amounts of proteins. Using the four types of algae, the results indicated that all algae adsorb best in low concentrations and adsorbed the greatest amount of lead compared to the other metals.

## **Undetected Exoplanet Populations in the Galaxy**

**Alisha Rickman**

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### **Abstract**

The observation of stars and their planets in our galaxy have been made significantly easier with the advent of more efficient telescopes in ideal locations lacking light pollution. Exoplanets, however, are still difficult to identify because of the limitations of technology. Thus, a large fraction of exoplanets has not been detected. In this poster, we explore the populations of exoplanets that slip through current observations. We discuss what exoplanets will be discovered by more sensitive telescopes and advances in observation technologies. We describe the properties of these populations and ultimately show how common these exoplanets are.

---

## **Walkabout Cognition**

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### **Abstract**

Previous research has shown the benefits of exercise. The neurophysiological effects of exercise include angiogenesis, neurogenesis, and synaptogenesis in the brain. Exercise can also reduce anxiety and improve cognitive functioning. The aim of the current study was to determine the effects of exercising indoors or outdoors on one's anxiety and cognitive processing. We hypothesized that exercising leads to greater inhibitory control, especially when done outside. We also hypothesized that personality dimensions would impact measures of impulsivity. Participants either walked or sat (exercise condition) for twenty minutes. A stop-signal task used to measure inhibitory control allowed for the measurement of both stopping and going behavior. Here we measured the time it took to both begin and stop a response. We also administered the State-Trait Anxiety Inventory to measure anxiety levels and the Newcastle Personality Assessor to assess dimensions of personality. Two-way ANOVAs revealed no main effects of exercise or location on going or stopping reaction times. There were main effects of both exercise and location on anxiety scores. Participants were less anxious after not exercising, as well as less anxious after being outside. We also found a correlation between reaction time and the number hours of sleep. Participants with more sleep responded faster on stop-signal trials. In sum, we found no effect of exercise, location, or personality on inhibitory control. Subsequent studies may consider using a more powerful within-subjects design or a more intense exercise to determine what, if any, the effect of exercise has on inhibitory control.

## **Women – Filmed, Rarely Filming**

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### **Abstract**

Behind the camera, the Hollywood of today is predominantly male, despite a growing number of women filmmakers in all aspects of the industry. Many capable women filmmakers are marginalized and often confined to making independent films and working in television and streaming media. This sexist bias limits creativity, and the variety of stories that could come out of Hollywood, which in turns robs viewers of varied and fresh storytelling on film.

By exploring the role of women in the Hollywood film industry from its infancy to the present, and highlighting the work of three contemporary directors—Kathryn Bigelow, Sofia Coppola, and Ava DuVernay—this study examines the nature and causes of sex discrimination in Hollywood. It explains why women filmmakers, in spite of their remarkable talent and contributions, do not have as strong a presence today as they did in the industry’s infancy, and how feminist efforts are working to address this imbalance and achieve gender parity.

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## **X-ray Crystallography of $\beta$ -Peptide Foldamers**

**Kian Memari**

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### **Abstract**

This research project explores theoretical and practical aspects of X-ray crystallography in the context of an ongoing international collaboration with the Pohang Accelerator Laboratory. By utilizing symmetry elements and computational techniques of X-ray crystallography, I am attempting to determine the solid-state structure of a  $\beta$ -amino acid oligomer foldamer from an incomplete data set. The goal of this research project is to obtain an accurate and precise final structure for this amino acid foldamer. Through elaborate computational analysis, a preliminary single crystal X-ray diffraction structure has been solved as isopropylNH-(ACPC-Aib)<sub>3</sub>-OBn and is currently under crystallographic refinement. Once future refinement has been completed, the three-dimensional crystallographic structure and intramolecular forces of the final structure will be obtained and further analyzed, including but not limited to observing the self-assembling properties of this organic material.

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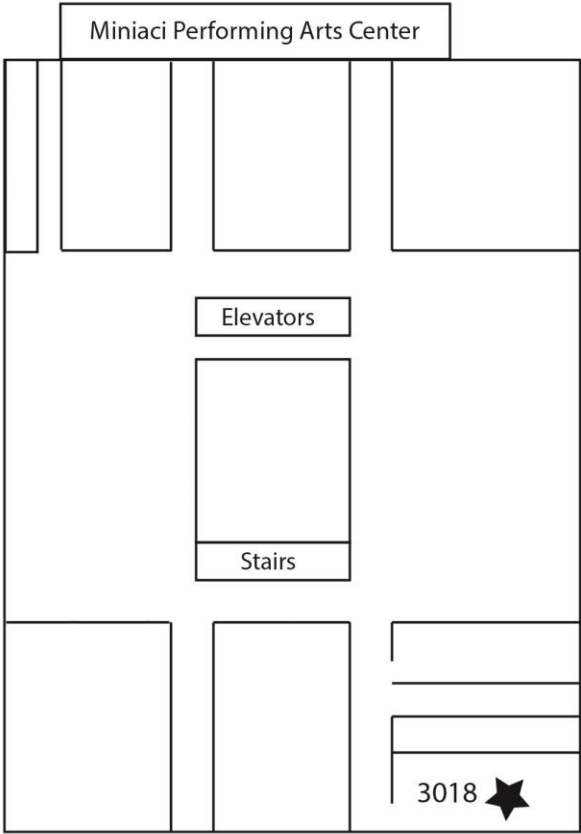
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Kathleen Waites

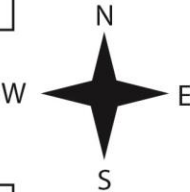
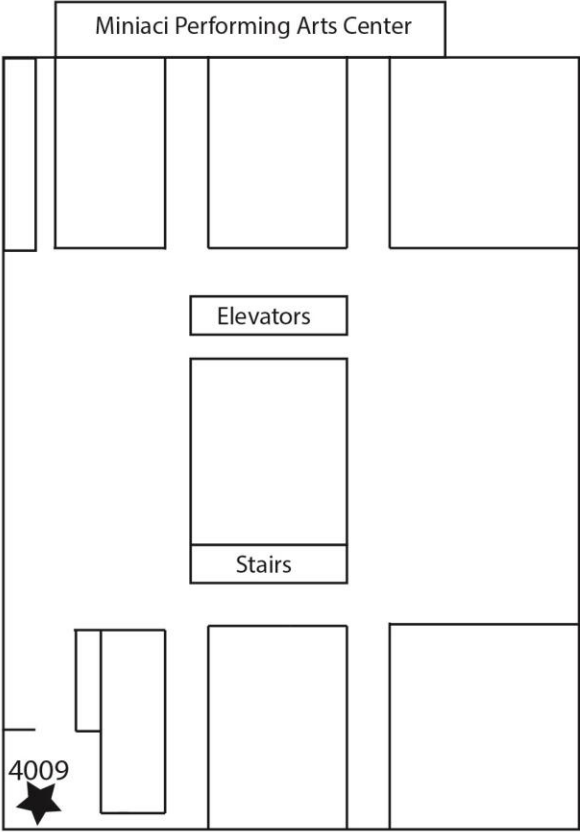


# Alvin Sherman Library, Research, and Information Technology Center

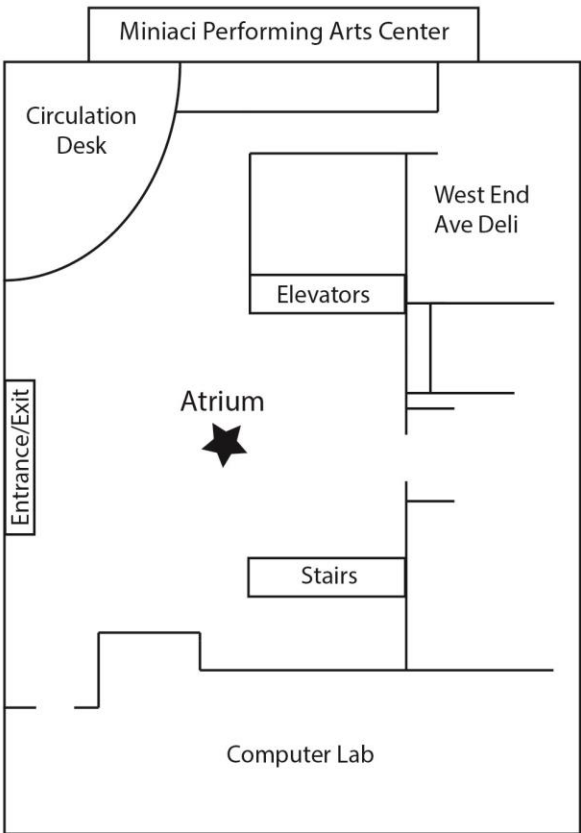
3rd Floor



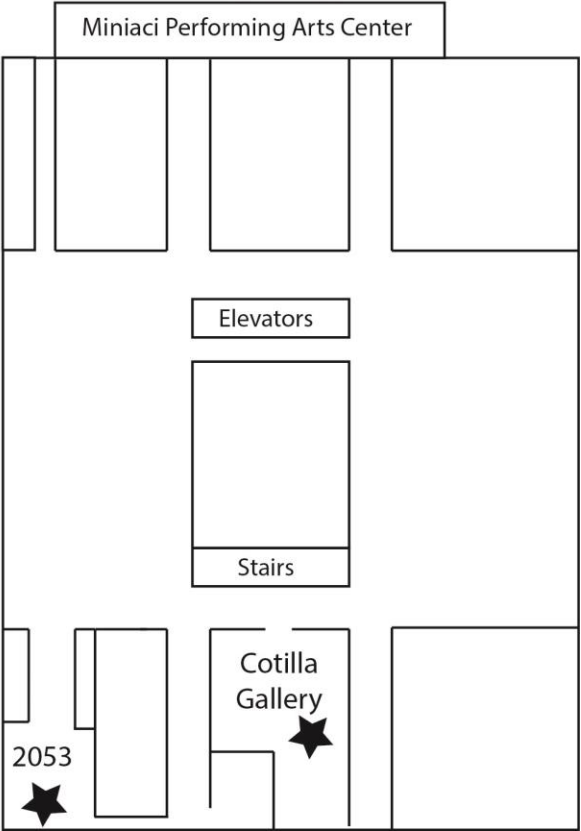
4th Floor



1st Floor



2nd Floor



**UNDERGRADUATE STUDENT SYMPOSIUM**  
**2018 Program Schedule**

TIME	EVENT AND LOCATION		
1:00–1:45 p.m.	<b>Welcome and Introduction</b> Don Rosenblum, Ph.D. Dean, Farquhar Honors College  <b>Keynote Speaker</b> Daniel Dawes, J.D.		
	Performance Theatre	Don Taft University Center	
1:45–3:15 p.m.*	Poster Presentations	First Floor Atrium	Alvin Sherman Library
1:45–4:00 p.m.*	Film Presentations	Cotilla Gallery	Alvin Sherman Library
2:45–4:00 p.m.*	Oral Presentations	Room 2053	Alvin Sherman Library
	Oral Presentations	Room 3018	Alvin Sherman Library
	Oral Presentations	Room 4009	Alvin Sherman Library
4:30–5:30 p.m.	Awards Ceremony	Performance Theatre	Don Taft University Center

\*See separate detailed schedule for poster easel numbers, specific film showing times, and oral presentation room assignments.