

**OURI Annual Summer Student Showcase**  
**August 18<sup>th</sup>, 2022, 9am – 10:15am**  
*Schmidt Family Complex, College of Business*

**Changes in the Gut Microbiomes of Mice Treated with Algal Toxin - Microcystin and Sulforaphane as a Potential Remedy**

Authors: Mahi **Barot**, Jean Bontemps, Krista McCoy, and Nwadiuto Esiobu

Faculty Mentor: *Dr. Nwadiuto Esiobu, Charles E. Schmidt College of Science*

According to recent developments in microbiology research, the gut microbiota is implicated in the overall wellbeing of humans. Microcystin, a cyanobacterial toxic pollutant, changes gut microbiomes rapidly which increases bacteria that mediate inflammation in the mouse model of nonalcoholic fatty liver disease. Sulforaphane, a chemical produced by broccoli and other cruciferous vegetables, helps mitigate the negative effects of several pollutants, but the mechanisms to protect gut microbiomes are very poorly defined. We hypothesize that microcystin induces gut dysbiosis, and that administration of sulforaphane restores gut homeostasis. In this study, fecal samples of mice were analyzed using metagenomics to determine the microbiome community structure of mice treated with microcystin alone and microcystin plus sulforaphane. The goal is to determine the influence of microcystin on gut community structure changes with nutritive supplement sulforaphane. Our research provides potential probiotics and better understanding of the physiological process which could be used in therapies against algal toxins.

**The Integration of Salicylic Acid into Antibacterial Cyclic Lipopeptide**

Author: Lucas **Costa**

Faculty Mentor: *Dr. Predrag Cudic, Charles E. Schmidt College of Science*

This project focuses on integration of salicylic acid into an active six-member cyclic lipopeptide, CLP-4, that is derived from the naturally occurring peptide antibiotic fusaricidin A. We have demonstrated that CLP-4 has the potential to inhibit and eradicate planktonic and biofilm bacteria. We hypothesize that incorporation of salicylic acid into CLP-4 will additionally improve its antibacterial activity, especially activity against bacterial biofilms. Our hypothesis is based on the literature reports demonstrating that salicylic acid inhibits bacterial growth and biofilm formation. An analogue of CLP-4 containing salicylic acid was synthesized using solid phase peptide synthetic approach and fully characterized using High Performance Liquid Chromatography (HPLC) and Matrix Assisted Laser Desorption Ionization (MALDI) TOF mass spectrometry. The peptide was purified using Solid-Phase Extraction (SPE) procedure and is currently undergoing evaluation for its antibacterial and antibiofilm activities.

**Assessment of Biopsychosocial Indicators Linked to Canine Intervention Treatment Response in Veterans with Post-traumatic Stress Symptoms**

Author: Alyssa **Cusumano**

Faculty Mentor: *Dr. Beth A. Pratt, Christine E. Lynn College of Nursing*

Post-traumatic stress disorder (PTSD) affects up to 30% of veterans and may result in poor biopsychosocial outcomes. Treatment for PTSD includes medication and trauma-focused therapies

which provide moderate symptom improvement. Consequently, there is a need for non-pharmacological treatment options, such as animal assisted interventions (AAI), to improve veterans' health. This study aims to understand how an AAI affects biological, psychological, and social processes and behaviors of veterans with PTSD. We will evaluate the impact of a dog adoption and training program compared to a wait list control for improving PTSD symptoms; inflammation measured by RNA gene cell expression and inflammatory markers; social bonding measured by oxytocin and oxytocin receptor gene variation; and psychosocial health measured by reliable and valid measures via a randomized control trial at three time-points. We will also evaluate feasibility of the approach by assessing participation and obtaining effect sizes for a large-scale study.

### **Using Deep Learning Techniques to Discover the Link Between Intermittency in Scalar Dissipation Rate and Energy Dissipation Rate in Turbulent Flows**

Author: Louis **Devito**

Faculty Mentor: *Dr. Siddhartha Verma, College of Engineering and Computer Science*

Turbulence is one of the most perplexing phenomenon in the natural world. There are various kinds of turbulent flows, one of which is homogeneous isotropic turbulence. Turbulent flows emulate extreme variations in the properties of a fluid; these fluctuations are referred to as intermittency. An important topic relating to turbulent flows is the intermittency of diffusive contaminants, known as passive scalars. Due to the nonlinear relationship in the velocity of the fluid in a turbulent flow, there has never been definitive evidence displaying a correlation between intermittency in the velocity field and intermittency with regard to passive scalars. To gain a better understanding regarding the intermittency present in homogeneous isotropic turbulence, a direct numerical simulation was performed utilizing an NGA computer code. Further analysis entails employing deep learning techniques, such as convolutional neural networks, to possibly discover a pattern between the velocity and passive scalar fluctuations.

### **Surveying Antibiotic Resistance of Gram-Negative Bacteria Isolated from Green Sea Turtles (*Chelonia mydas*) and Loggerhead Sea Turtles (*Caretta caretta*) of Florida**

Author: Isabella **Donadio Pizzolato**

Faculty Mentor: *Dr. Sarah Milton, Charles E. Schmidt College of Science*

Given the number of anthropogenic threats facing marine turtle species, management of wild turtles in rehabilitation facilities is a prominent issue. Studying antibiotic-resistant bacteria profiles found in marine turtles around Florida will aid in understanding the types of pollutants facing marine turtles and ensure rehabilitation facilities do not contribute to antibiotic resistance by treating turtles with antibiotics they are increasingly resistant to. Furthermore, proliferation of pathogenic antibiotic-resistant bacteria could cause an increased spread of untreatable diseases in wild turtles. Preliminary studies analyzing antibiotic resistance in marine turtles have been conducted in other regions, such as the Mediterranean, and with Loggerhead Sea Turtles (*Caretta caretta*), but have not yet been conducted with Green Sea Turtles (*Chelonia mydas*) or around Florida. This project intends to survey marine turtles around Florida to examine the antibiotic resistance profile in gut microbiome and identify trends between overall turtle health and the presence of antibiotic-resistant bacteria.

### **Sulindac Enhances the killing of Pancreatic Cancer cells by Doxorubicin**

Authors: Michelle **Gras**, Nadia Sifuentes, Shailaja Allani, and Herbert Weissbach  
Faculty Mentor: *Dr. Shailaja Allani, Charles E. Schmidt College of Science*

Chemotherapeutics have long been an accepted form of cancer treatment, and their use in the medical field has become more widespread as newer versions have been developed. Doxorubicin (Dox) is often used to treat cancer despite its feared toxicity, resulting in cardiac dysfunction and causing increased toxicity in normal cells. Sulindac, an FDA-approved NSAID, is often used as a pain reliever to treat various diseases. Research done by our lab concludes that sulindac enhances the killing of cancer cells when combined with an oxidative stressor while also protecting normal cells from damage or cellular death. We studied the combination of sulindac and Dox on a pancreatic adenocarcinoma cell line (BxPC-3) to model one of the deadliest cancers. We observed that the combination of Dox and sulindac is more effective at lower doses than just Dox alone, suggesting that this combination may be a more efficient cancer treatment.

### **Quantitative Extracellular and Intracellular MMP-14 Expression in Primary and Metastatic Pancreatic Cancers Under Hypoxic Influence**

Authors: Nihasika **Gopi**, Kathryn Martin, Jessica Frank, Lillian Onwuha-Ekpete, and Gregg B. Fields  
Faculty Mentor: *Dr. Gregg B. Fields, Charles E. Schmidt College of Science*

Pancreatic cancers are among the most difficult cancers to treat with a median 5-year survival rate of 9%. Disease etiology correlates with the expression of matrix metalloproteinase-14 (MMP-14). This proteolytic enzyme contributes to cancer proliferation, migration, and angiogenesis, as well as collagen turnover, all associated with a malignant profile. Much of these known characteristics of MMP-14 are affiliated with its extracellular expression; however, recent studies have suggested a non-proteolytic intracellular role that has yet to be fully characterized. One such function not involving proteolytic processing is cellular oxygenation levels. Pancreatic cancers are well known to have hypoxic niches; these niches can lead to inflammation resulting in angiogenesis. In this study, we quantitatively delineate the expression of extracellular/intracellular MMP-14 on two human pancreatic cell lines, BxPC-3 and HPAF-II, using flow cytometry. Our data suggest that high MMP-14 expression is associated with increased sensitivity to hypoxia.

### **Sustainability of ESG Designated Private Equity Funds**

Authors: Daniel **Hric** and Sofia Johan  
Faculty Mentor: *Dr. Sofia Johan, College of Business*

Our research focuses on analyzing Private Equity funds that have been designated as ESG. ESG is a rating that companies can acquire if they are making a positive impact in the Environmental, Social, or Governance fields. Private Equity funds that have acquired the ESG designation claim to invest solely in ESG companies. Portfolio companies of PE funds are not required to file public filings, so investors are unable to reliably check the activity of the portfolio companies that the ESG funds have invested in. As a result, research is needed to evaluate if the PE funds that claim to be ESG, do in fact invest in ESG companies.

### **The Missing Connections: Shared Evaluation Compared with Case Coordination Among Organizations in Child Welfare Practice**

Author: Joyce **Omoruyi**

Faculty Mentor: *Dr. Marianna Colvin, College of Social Work and Criminal Justice*

Numerous organizations and community programs coordinate efforts to support children and families with child welfare system involvement, but little is understood about network functioning in local service settings. This analysis examines differences in network structure for case coordination activity compared with joint evaluation activity among the same organizations serving children and families in a county service delivery setting ( $n=105$ ). Results reveal that when the networks are filtered to their sole symmetric and simmelian components, 50 fully interconnected triads are observed in the case coordination network compared with only 2 subgroups in the evaluation network. This difference suggests a stark deficiency in collective evaluation efforts relative to the degree of shared clients in a county service setting. The lack of joint structure around evaluation is recommended as a high stakes area for targeted development to match the existing strength of case coordination relationships and bolster the development of evidence-based practice.

### **Language Frequency: Computer-mediated Trials to Criteria of Spanish Syntax**

Author: Ciara **O'Neill**

Faculty Mentor: *Dr. Justin P. White, Dorothy F. Schmidt College of Arts and Letters*

Second Language Acquisition is a subfield of linguistics that focuses on how second language learners process, store, and access language. The proposed research aimed to discover how many exposures to a certain grammatical form are necessary in order for learners to consistently provide the correct response. Referencing previous research, several Spanish sentences using direct object pronouns were generated across five sentence types. A preliminary program design was also developed for a web application to track the behavior of participants as they are exposed to the language materials. A pilot study using these resources will be administered in the near future. The web application will also be made open source to allow for community use and development. The findings from this research will help shape language-learning activities integrated into face-to-face and online learning environments and contribute to the understanding of underlying processes involved in language acquisition.

### **Overworked and Underpaid: The Experiences of Secretaries in Higher Education Institutions**

Author: Tamara **Penna**

Faculty Mentor: *Dr. Cristobal Salinas, Jr., College of Education*

While most of the published literature in higher education in the United States has explored the experiences of students, faculty, and administrators, some staff members have not been centered in higher education research. This qualitative study aims to elevate the critical voices that are often forgotten in higher education published literature. Therefore, the purpose of this study aims to explore how 11 secretaries in higher education experience institutional support and validation and how their experiences influence their administrative role. The findings of this study reveal that secretaries in higher education 1) lack of training and mentorship, 2) absence of validation due to their low salary, and 3) beyond describing their job responsibilities, they all explained how they enjoy building relationships with students.

### **Demographic Profile of the FAU Gopher Tortoise Preserve - 11 years later**

Author: Rachel **Starck**

Faculty Mentor: *Dr. Evelyn Frazier, Charles E. Schmidt College of Science*

Gopher tortoises (*Gopherus Polyphemus*) are a keystone species that play a large role in their ecosystem. FAU has a gopher tortoise population that inhabits approximately 90 acres of grassy and disturbed scrub habitats. The gopher tortoise population was assessed in 2011 when approximately 250 burrows were measured. The habitat has undergone management by FAU to improve the habitat quality for the burrowing owls and gopher tortoises. This study consists of a reassessment of the gopher tortoise population 11 years later to evaluate whether this population is growing. We can compare this to the data that was collected 11 years ago and conclude if the population is healthy and reproducing or not. It is very important to make sure the population is healthy and reproducing because gopher tortoises are ecosystem engineers and act as a framework for many other species that live in or around the burrows.

### **Using Traditional Machine Learning to Identify Important COVID-19 Patient Characteristics to Help Predict Disease Outcome in South Florida**

Author: Megan **Thurlow**

Faculty Mentors: *Dr. Safiya George, Dr. Debarshi Datta, and Dr. Laurie Martinez, Christine E. Lynn College of Nursing*

Since the start of the COVID-19 pandemic, approximately 6.8 million people in Florida have tested positive and 77,000 people have died<sup>1</sup>. The pandemic has put extreme stress on health care workers and hospital systems. Using machine learning and predictive models, researchers are working to determine which patients with COVID-19 are at high risk for severe disease symptomology and poor outcomes. For this project, retrospective data on 5,371 patients who tested positive and were hospitalized for COVID-19 related symptomology was collected and is currently being analyzed from a large healthcare system in South Florida. Traditional machine learning is being used to analyze patient characteristics and pre-existing health conditions to predict patient outcomes. Upon completion of the model, such predictions can provide healthcare workers the ability to identify patients at high risk of developing severe symptomology and develop patient-focused care plans that optimize outcomes.

<sup>1</sup>Florida - Covid-19 Overview - Johns Hopkins. Johns Hopkins Coronavirus Resource Center. (n.d.). Retrieved July 29, 2022, from <https://coronavirus.jhu.edu/region/us/florida>

### **Vertebral Morphology and Mechanical Properties of *Isurus oxyrinchus*, the Shortfin Mako, Cartilaginous Vertebrae**

Authors: Maria **Uribe Mejia**, Delaney Frazier, Aubrey Clark, Jamie Knaub, and Marianne Porter  
Faculty Mentor: *Dr. Marianne E. Porter, Charles E. Schmidt College of Science*

The vertebral columns of elasmobranchs (sharks, skates, and rays) are made of mineralized cartilage that experience compression and tension while swimming. Makos are considered the fastest-swimming shark and their vertebrae have mineralized radiating structures called lamellae, and nodes occur where lamellae branch. We ct-scanned mako vertebrae to quantify the mineral structure, and we examined mechanical properties: stiffness (the ability to withstand compression) and toughness

(the ability to absorb energy), across three regions of the vertebral column (anterior, middle, and posterior). We hypothesized stiffness and toughness would increase as lamellae and node counts increased to support the forces required for fast swimming. We found no significant difference, but trends showed that stiffness decreases as the number of nodes increases. We aim to increase our sample sizes to further investigate the relationship between the number of lamellae and nodes and mechanical properties of mineralized cartilaginous vertebrae.

### **Analysis of Novel Interleukin-1 Induced Astrocyte Modulation of Neuronal Activity**

Authors: Christopher Vargas, Daniel Nemeth, and Ning Quan

Faculty Mentors: *Dr. Daniel Nemeth and Dr. Ning Quan, Charles E. Schmidt College of Medicine*

Interleukin-1 (IL-1) is a cytokine that is responsible for nearly all inflammatory immune response. Within the central nervous system (CNS), IL-1 is thought to modulate neuronal activity which can result in changes in behavior; however, how this happens is still largely unknown. To understand this, we used the FOS-TRAP mouse line which is a reporter mouse model of cell activity marker, cFos, temporally restricted via tamoxifen-inducible, Cre recombinase. In this model, cell which expresses cFOS in the presence of tamoxifen will permanently express tdTomato fluorescence. To identify which cells respond to IL-1 stimulation, via expression of cFOS, mice were given an intracerebroventricular infusion of PBS, IL-1a, or IL-1b and tdTomato+ cells were visualized and quantified. Triple immunofluorescent labeling of cFOS, neurons and astrocytes reveal neuronal activity in the hippocampus does not significantly change. Interestingly, we did see an increase of GFAP+/cFOS+ cells suggesting astrocytes can produce cFOS in response to IL-1.

### **Stereotypes and (Mis)Representation of Spanish Gypsies in Spain's Film Industry (1960-1980)**

Author: Warren Yee

Faculty Mentor: *Dr. Carmen Cañete Quesada, Harriet L. Wilkes Honors College*

The Romani people's enriching culture has heavily influenced Spanish society. However, since the first settlement of this ethnic group in the Iberian Peninsula during the XV century, political authorities have placed significant strains on the *gitanos* ("Spanish Gypsies"), and other related ethnic groups. This project explores how Spain's film industry has perpetuated the stereotype of this collectivity as lackadaisical criminals consumed by violence and marginality. More specifically, this poster focuses on two Spanish movies: *Con el Viento Solano* (1966), by Mario Camus, which represents the *nuevo cine español* (the "new Spanish cinema"), and Vicente Aranda's *El Lute: Camina o Revienta* (1987), a movie from the *cine quinqué* or "delinquency cinema." Although these two films attempt to use social realism to dismantle common stereotypes of *gitanos* and *quincalleros* or *mercheros* ("tinkers"), their stereotypical images persist in the films. In *Con el Viento Solano*, the *gitano* is depicted as an unintentional criminal, while *El Lute* portrays a *merchero* seeking freedom under the oppressive Francoist society.