

21st Annual Undergraduate Student Symposium



UNDERGRADUATE STUDENT SYMPOSIUM

April 5 and 6, 2023

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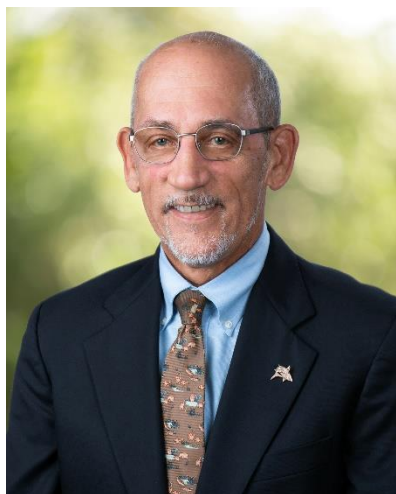
Farquhar Honors College

**NOVA SOUTHEASTERN
UNIVERSITY**

Undergraduate Student Symposium 2023

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 twenty-first annual Undergraduate Student Symposium.

USS 2023 Keynote Speaker



Peter Gannett, Ph.D., obtained his B.S. (chemistry) from the University of Missouri-Columbia and his Ph.D. (organic chemistry) from the University of Wisconsin-Madison (UWM). His post-doctoral fellowships were at the College of Pharmacy, UWM, and Eppley Cancer Institute, University of Nebraska Medical Center, Omaha, NE. He was a faculty member in the School of Pharmacy at West Virginia University (WVU) for 25 years and also served as Department Chair for Pharmaceutical Sciences for six years. While at WVU his lab studied the formation of DNA adducts and the conformational and biological consequences of adduct formation. A second area of research is the elucidation of the mechanism of P450-mediated metabolism by CYP2C9 using both experimental and computational approaches with respect to structure-activity relationships, electron transfer, and protein-protein interactions. Most recently, the lab combined its expertise in DNA, proteins, and nanotechnology to develop nanoparticle-based theranostics. He has also been involved in training undergraduate and graduate students with a focus on interdisciplinary bio-nanotechnology. He served as the PI of two major training grants (e.g., NSF IGERT), spanning 12 years, that were focused on graduate education, training, and career development. In addition, he served as a Co-I on undergraduate training programs. Finally, he has served on a range of study sections, is an ad hoc reviewer for approximately 30 journals, and serves on NIH and DoD study sections. Since 2015, he has been the Associate Dean for Research at Nova Southeastern University in Ft. Lauderdale, FL.

USS 2023 Steering Committee

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USS 2023 Logo Design Winner



Shalet James

Shalet James is a second-year student at Nova Southeastern University pursuing a degree in Neuroscience with minors in Biology, Honors Transdisciplinary Studies, and Pre-Health. She has been working as a College of Psychology Undergraduate Research Assistant, Peer Leader, IOC Chair for NSU Fitor, Director of Public Relations for Physician to Patient, HOSA-Future Health Professionals participant, and Farquhar Honors College member. Currently, she is part of the Honors in Major program and in the process of completing her Honors Thesis. Shalet can't wait to share her design and present at this year's Undergraduate Student Symposium!



UNDERGRADUATE
STUDENT SYMPOSIUM

**21st Annual
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Abstract Proceedings

**Farquhar Honors College
Nova Southeastern University**

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A Review of Healthcare-Related Decisions Faced by Women at Risk for Hereditary Breast Cancer

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Abstract

Hereditary breast cancer is defined as cancer that results from pathogenic mutations that are generationally inherited. In the U.S., hereditary cancer accounts for 5-10% of all cancer cases. Furthermore, approximately 264,000 newly diagnosed breast cancer cases are linked to pathogenic mutations. Pathogenic mutations in BRCA1, BRCA2, PALB2, and other genes are linked to a higher lifetime risk of breast cancer and ovarian cancer; women with these pathogenic mutations have lifetime risk of breast cancer up to 85% and lifetime risk of ovarian cancer up to 54%. Previvors are defined as individuals with an identified pathogenic mutation prior to a cancer diagnosis; this term is used to emphasize their unique classification and the struggles they face regarding their health. After initial genetic test results, previvors are presented with various preventative and treatment options that may be difficult to navigate. The objective of this literature review is to provide an overview of health-care decisions faced by previvors after initial genetic testing results. Multiple databases, including PubMed and Google Scholar, were utilized to identify peer-reviewed articles using key terminologies related to the objective. Previvors face several health-related decisions, including preventative mastectomy vs. enhanced screening, oophorectomy, fertility options, educating family members about genetic testing, and access to life insurance. Further research is needed to understand the factors that influence a previvor's decision regarding each of these options. In addition, evaluation studies should be conducted to measure the utilization and effectiveness of the shared-decision making process between previvors and their physicians.

A Review of Treatment options for Women Facing Hereditary Breast Cancer

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Abstract

BRCA1 and BRCA2 are tumor suppressor genes, which produce proteins that aid repair damaged DNA. Women who carry a pathogenic mutation in BRCA1/BRCA2 genes have an increased risk of developing breast cancer. Furthermore, BRCA1/BRCA2 pathogenic mutations are associated with more aggressive breast cancer types (i.e., triple negative) and higher recurrence rates (10.5%) than for breast cancer of non-carrier patients. Consequently, BRCA1+/BRCA2+ breast cancer patients require a specialized treatment approach. The objective of this literature review is to summarize the various treatment options offered to BRCA1+/BRCA2+ breast cancer patients. Peer reviewed articles were found through multiple databases such as PubMed and Medline, then reviewed and summarized in this paper. The different surgical treatments available for BRCA1+/BRCA2+ breast cancer patients included Breast-Conserving Surgery (BCS), and Mastectomy. While BCS preserves the breast, which reduces the negative impacts on the quality of life of patients, it has been shown that it is associated with a 49% rate of ipsilateral recurrence for BRCA1+/BRCA2+ breast cancer patients compared to 21% for non-carrier breast cancer patients. Additional clinical trials are being conducted to identify more effective and tailored treatment options targeted towards BRCA1+/BRCA2+ breast cancer patients. Due to the complexity, patients may require more education regarding treatment options in the shared-decision making process to ensure they adequately understand the benefits, harms, and costs of each option.

A Scoping Review of the Role of Per-and polyfluoroalkyl substances (PFAS) in Pediatric Populations

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Abstract

Per- and polyfluoroalkyl substances (PFAS) are endocrine disrupting chemicals that can have a profound and negative impact on children's growth and development, leading to a higher risk of endocrine-related diseases and disorders. PFAs can be absorbed through ingestion, inhalation, or skin contact and accumulate in the body due to resistance to degradation. Furthermore, children have been found to absorb 50% more of these chemicals compared to adults, as reported by the Centers for Disease Control and Prevention (CDC). According to the National Health and Nutrition Examination Survey (NHANES) data, widespread exposure to PFAS has been documented in the US population. The objective of this scoping review is to further explore the effects of these endocrine disruptors on childhood development and metabolic health and provide a comprehensive review of the impact of PFAS on pediatric health. Through the use of multiple databases such as Google scholar and National Center for Biotechnology Information, peer-reviewed studies that examined the negative health impacts of PFAs in children and adolescents were explored. Based on the available literature, PFAs have been linked it to various health outcomes, including increased body weight and BMI, reduced vaccine response, hormonal imbalances, adverse effects on fetal growth and development, and lower birth weight. By examining potential interventions to reduce exposure to endocrine-disrupting chemicals, a healthier future can be established for the pediatric population and generations to come, leading to a safer and healthier environment for all.

A Search for a Solution to Antibiotic-Resistance: Uncovering Phage from Soil Samples that Bind to a Type III Secretion System of *Yersinia pestis*

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Abstract

The rise of antibiotic-resistant bacteria has recently become a major global health concern, requiring new methods to successfully combat these highly resistant microbes. One promising alternative to traditional antibiotics is phage therapy, where bacteriophages (viruses that infect bacteria) are utilized to target and kill bacteria. This study primarily focuses on discovering phages that are effective against *Yersinia pestis* (*Y. pestis*), the bacteria responsible for bubonic and pneumonic plague. One distinctive aspect of *Y. pestis* is its utilization of a type III secretion system (T3SS), a needle-like structure used to inject host cells with toxins that lead to infection. The goal of this research is to identify phages that bind to the T3SS of *Y. pestis*. Soil samples were collected from various locations and analyzed for the presence of phages. The samples were mixed with BHI broth for 1 h at 37°C, filtered, and enriched by inoculation with *Y. pestis* for 48h to allow phage to replicate. Then, the enriched samples were filtered and subjected to a spot test, where each enriched phage lysate sample was plated on BHI top agar with *Y. pestis* for analysis. The findings from this study will provide invaluable information regarding the use of phage therapy and the potential of phages as an alternative treatment for antibiotic-resistant bacteria. In addition, this research lays the foundation for future treatments against other bacteria that employ T3SS.

A Simple Method to Assess Porphyrin Basicity Using Competition Studies

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Abstract

Competition studies of three freebase porphyrins (H_2OEP , H_2OETPP , and H_2TPP) were carried to assess their basicities. These porphyrins were selected because they are a good representation of natural occurring ones. In each experiment, the resultant UV-vis spectra were obtained by mixing and analyzing two porphyrins in a double-sided cuvette in which one was protonated using either trifluoroacetic acid (TFA) or hydrochloric acid (HCl) while the other was kept as a freebase. After mixing, the two porphyrins “compete” available protons, thus the most basic of them will acquire most of the protons. By adjusting the ratios of dications and freebases we concluded that the H_2TPP was preferentially protonated and hence more basic than H_2OEP and H_2OEPP . Computations studies were used to validate porphyrin basicity.

Accommodations Needed for ASD Patients During Dental Care

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Abstract

This project aimed to investigate caregiver perspective regarding dental provider care for visits for their child[ren] with autism spectrum disorder (ASD). ASD is a developmental disorder that affects communication, sensory processing, and behavior. ASD can cause problems regarding oral health care and treatments due to the overwhelming sensations experienced by the patient, resulting in refusal behaviors regarding prevention, maintenance, diagnosis, and treatment of oral health care needs (Zhou et al., 2020). Dental providers aren't extensively trained on treatment or support techniques recommended for this population, leading to a drop-off in patient care and a lack of caregiver training or support (Fenning et al., 2021; Stein Duker et al., 2019). Through findings from an anonymous caregiver survey, this study aimed to identify parental perceptions of successful dental visits. The author surveyed 30 caregivers of ASD children to find how dental providers could improve the dental experience for their child[ren]. Results from the survey showed consistency with research on sensory processing difficulties and varied suggestions for improvement. The findings also establish that there is a need for discussions between caregivers and dental providers in a comfortable and judgment-free setting to create a behavior and dental treatment plan that fits the particular child's needs and abilities. Caregivers and dental providers need to see each other as an asset in coordinating care for a child with ASD.

Keywords: Autism spectrum disorder, dental care, dental health services, pediatric dentistry, qualitative research, training

Acute Toxicity Study of Novel Melanoma Actives in Mice

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Abstract

Although there have been promising advances in melanoma drug discovery, the average overall survival of patients with late-stage metastatic melanoma is approximately 3 years, which suggests a need for identifying new melanoma targets. We previously reported a discovery of melanoma actives acting via binding and down regulating human nuclear ribonuclear protein H1/H2 (hnRNP H1/H2), which is a novel target with unknown toxicity. Therefore, the aim of this study was to study the safety of novel anti-melanoma compounds 2155-14 and 2155-18 in mice. The methodology of the study involved injecting male and female Balb/C mice three times a week for three weeks and monitoring them for signs of toxicity. At the end of the study, no signs of toxicity were found upon completion of blood and organ analysis, thereby suggesting that compounds 2155-14 and 2155-18 are safe to use for further in vivo studies.

An Applied Ergonomic Analysis and Comparison of Laparoscopic Surgical Tool Handles

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Abstract

Laparoscopic surgery is a minimally invasive surgical procedure in which surgeons operate with a camera to view the operating area and instruments inserted through minor incisions. This surgery has many benefits, including faster patient recovery, but it can also be physically demanding for surgeons. Significant muscle fatigue and cognitive effort have been observed in surgeons as they engage in prolonged use of these instruments. The handles of these instruments are not ergonomic. The purpose behind this research project is to design and test an alternative to the standard laparoscopic instrument handles. Applying human factors and ergonomics principles, we sought to make quality of life improvements and introduce designs that were based around user comfort and performance. In order to confirm whether these proposed designs lead to any reduction in overall muscle fatigue and cognitive efforts, we analyzed brain and muscle activity signals captured through surface electromyography (sEMG) and electroencephalography (EEG). The participants were tasked with performing standard suturing training tasks with each pair of instruments. The 8-channel EEG was set to capture brain signals and EMG sensors were placed in the upper trapezius muscles, commonly cited as an area of strain. As part of the analysis, the EMG data was normalized to the percentage of Maximum Voluntary Contraction, providing a reference to compare muscular effort across participants regardless of their level of strength. The EEG brainwave signals were similarly processed, prior to frequency analysis, to reduce noise and classify signal wavelengths.

An Examination of the Social Response of Children with Autism

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Abstract

Children with Autism Spectrum Disorder (ASD) lack the ability to engage with others and make correct social predictions. Therefore, they misinterpret cues and exhibit incorrect social responses. The study's aim was to compare the response of children with neurotypical development and children with ASD when presented with a friendly social interaction stimulus. Neurotypical children and children with ASD were recruited from public events and educational programs. Data were collected using Tobii Pro Nano eye-tracking device to measure eye movement while children's autism risk was assessed with the M-CHAT tool. Eye-tracking data were analyzed using Tobii Pro lab and statistical data were analyzed using IBM SPSS V 26.1. The findings from the analyses indicate that the participants with ASD responded positively to the interaction between a human and friendly dog similar to the participants with neurotypical development. This demonstrates that participants with autism understood social interaction. On average, participants with neurotypical development had $3.41 \pm .12$ fixation events on the actress' face and $8.41 \pm .20$ on the dog while participants with ASD had $2.20 \pm .15$ fixation events on the actress' face and $4.41 \pm .56$ on the dog. There were no significant differences by group ($p = 0.932$) for total fixation duration on the objects. These gaze fixation statistics suggest that the participants with ASD understood the dog's toy preference and were able to reciprocate the dog's choice. Children with ASD may be able to comprehend social interactions, but their information processing and response need to be better understood.

An Impartial Supreme Court? Evaluating the Role of Public Opinion in Supreme Court Rulings

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Abstract

Susceptibility to public opinion is a phenomena faced by most political leaders, whether that be in City Halls or the United States' Senate. Regardless, when separation of powers was conceptualized and the Supreme Court of the United States was created, the intent was to have a particular branch that didn't make the law, but interpreted it, impartially, with a lack of partisanship opinion. In recent years, researchers have noticed a pattern of Supreme Court rulings aligning perfectly with public opinion, making field experts and citizens alike, question the integrity of the institution. The current study seeks to better understand the extent to which public opinion is reflected in Supreme Court rulings by examining some of the most controversial cases that have come before the courts. The implications of this research dictate the level of restructuring that needs to occur in the Supreme Court, and, more importantly, if the Supreme Court can be trusted as highly with ruling on cases that change millions of Americans. The integrity of the Supreme Court determines accessibility to constitutionally guaranteed rights.

An Optimal Strategy for Using Mixture-Based Combinatorial Library Data to Find T-Cell Epitopes

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Abstract

Positional scanning libraries are well established in their use for peptide sequence identification and binding site optimization. Their use in identifying T cell stimulatory peptides has also previously been explored. Here we present a retrospective analysis on the results of mixture based positional scanning libraries of T-cell stimulatory peptides done before 2019 in order to identify an optimal strategy for using mixture based combinatorial library data to find T cell epitopes. The screening of positional scanning libraries against CD4+ and CD8+ T cell clones was analyzed using biometrical analysis approaches of various kinds in order to evaluate their relative effectiveness for finding antigens of unknown specificity. We found that, in general, these multiple different methods resulted in strikingly similar success rates. Notable results include the top 25 logsum scores of CD8+ T cells have a success rate which was almost double that of the top 25 sum scores. Logsum analysis of the top 25 CD8+ T cells was identical to that of the top 50 and only slightly higher for the top 100. By determining the optimal approach, scientists can better utilize mixture-based combinatorial library data to identify optimal peptide sequences.

Analysis of Errors in ECGs Data Captured by Patients Using At-Home Device Compared to Qualified Healthcare Professionals

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Abstract

Cardiovascular Diseases (CVDs) are a leading cause of death worldwide, accounting for 17.3 million deaths per year. General at-home care has been proven to improve patient outcomes and decrease hospitalization rates. The purpose of this presentation is to present pilot data results comparing the electrocardiogram (ECG) readability from patients and their caregivers, who conducted at-home ECGs in the experimental group, versus data on ECG readability from patients at routine office visits, where a qualified healthcare professional takes the ECG readings as the control group. The pilot data involves a sample of 20 patients' 105 ECG records analyzed using SPSS with the goal of comparing the two groups and comparing patients with high versus low complexity in diagnosis. This research study will also evaluate the accuracy level in ECG data across each patient from the initial point of ECG measurement to the final point, identifying and evaluating common patient errors using the at-home ECGs, and from this information, propose targeted solutions to improve the user-friendliness of this device. With the growth of modern healthcare technology, it is now possible for patients to be more proactive in monitoring their CVD by conducting at-home ECGs with real-time feedback from their cardiologist to identify any abnormalities. At-home medical-grade ECGs can lead to early identification of heart arrhythmias and decreased hospitalization frequencies, resulting in lower costs, decreased stress, and increased quality of life. Results from this study express the need for effective coaching and training of patients and their caregivers in using at-home ECG.

Are Students in Broward County, FL, Who get Less Sleep More Likely to Experience Depressive Symptoms?

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Abstract

It is commonly known that sleep can significantly affect overall health in both physical and mental states, but can getting less sleep be an attributing factor to high school students experiencing symptoms of depression? In this study, we will determine whether less sleep is associated with feelings of sadness or hopelessness which are common symptoms of depression. Finding a link between the two could allow us to implement sleep education programs that would lower rates of depression in high school students. Using data collected from the 2019 YRBSS from Broward County, Florida, data was run comparing high school students who reported less than 8 hours of sleep per night and also had experienced feelings of sadness or hopelessness. Results were stratified by grade level (9th-12th) and for only 2019. We will compare the results of Broward County, FL, to the entire United States. Odds ratios will be used as a statistical analysis of the results. A trend in the data suggests that those who were feeling sad or hopeless were likelier to have slept less than 8 hours, proven through using an odds ratio. This was consistent throughout all grades in Broward County and the United States. In Broward County, high school students who got less than 8 hours of sleep had 3.5 times the odds of experiencing feelings of sadness or hopelessness. In the whole US, students who got 8 hours or less of sleep had 2.4 times the odds of experiencing feelings of sadness or hopelessness. If this data proves consistent when analyzing the other variables, the association between getting less than 8 hours of sleep and experiencing feelings of sadness or hopelessness can be proved. Although correlation doesn't mean particular causation, one thing teens can do to maintain mental wellness is to get more sleep.

Assessing Social Humanoid Interaction Across Levels of Trust, Persuasion, and Empathy, Expert Panel Survey Validation

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Abstract

Social humanoids present a wide range of opportunities regarding interactions with humans with the purpose of using artificial intelligence systems to aid with day-to-day activities. Humanoids can be programmed to provide high levels of intelligence for task fulfillment such as assisting caregivers/patients, washing human limbs autonomously, assisting with lift-and-transfer patients, and even delivering blood samples. Additional tasks include carrying objects, opening doors, operating telehealth consultations, providing demonstrations, coaching, and serving companionship for any patients. Researchers are assessing the interactions between social humanoids and patients across levels of trust, persuasion, and empathy. This project aims to explore such interactions in the context of promoting awareness about healthy lifestyles amongst young college students. Moreover, the topics of exercising, nutrition, sleep habits, and mindfulness will be demonstrated in a set of experiments to three groups of participants. The first group will serve as a control group, having no interventions. The second group will receive an oral presentation about areas making up healthy lifestyle behavior. The third group will receive an oral presentation and have social interactions with a humanoid in each of the areas making a healthy lifestyle. This research project will focus on validating a survey instrument utilized to assess a healthy lifestyle among college students. A team of subject-matter experts will validate the survey, including experts from the field of human coaching, nutrition, communication, technology, and exercise coaching. Following the Delphi method, several rounds of feedback will be solicited to validate the survey. Results will be shared during the poster presentation.

Assessment of Brain Function and Putting Performance of Collegiate Golfers

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Abstract

Electroencephalography (EEG) is a noninvasive method for assessing brain activity. Significant correlation has been indicated between performance outcome and brain wave measures. During a putting sequence, a golfer requires significant focus to successfully perform the skill, therefore certain brain wave frequencies are more apparent. Male and female golfers ($n = 11$) from a National Collegiate Athletic Association (NCAA) Division II Program were asked to complete 10 putts at 5 varied hole distances (total- 50 putts) on an outdoor putting surface. EEG was recorded in 4-second epochs and assessed to the extent of power spectral density (PSD). Each epoch was classified according to the golfer's performance on the putts preceding and following that epoch, resulting in each epoch falling into one of four categories: pre-success/post-success ($n=460$), pre-success/post-failure ($n=553$), pre-failure/post-success ($n=453$), pre-failure/post-failure ($n=793$). Results indicated that alpha PSD was unrelated to putting performance. However, beta and theta PSD were significantly related to putting performance, with multiple successive putting failures (pre-failure/post-failure) associated with higher beta PSD and lower theta PSD compared to multiple successive putting successes (pre-success/post-success). The purpose of this assessment was to correlate a golfer's brain wave activity to the successfulness of putting performance.

Assessment of Gopher Tortoise (*Gopherus polyphemus*) Activity and Faunal Diversity Associated with Tortoise Burrows using Trail Cameras at Three South Florida Natural Areas

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Abstract

The gopher tortoise (*Gopherus polyphemus*) is a protected keystone species found in our area. The excavated burrows they create are shelter for hundreds of commensal species during wildfires and extreme heat. Nine motion-activated trail cameras (three at each site) were mounted outside burrows in three local natural areas (Fern Forest (FF), Military Trail (MT), and Deerfield Island Park (DI)). Pictures and videos of animals were recorded at burrow entrances intermittently over an 11-month period between January 2022 and November 2022. Cameras were left in the field between 15-30 days at a time before retrieval and exchange of SD cards took place. Fern Forest had the highest total species richness with eighteen, despite having half the number (123) of camera days (cd), followed by MT with 14 species (245 cd) and DI with nine species (242 cd). Gopher tortoises were captured in a total of 12.7%, 18.0% and 18.3% of photos at FF, MT, and DI, respectively. Mating was captured at all three sites, but at different times. Deerfield Island mating was observed in March, MT in April and May, and FF in September. This study provides insight into the activity and use of dens by the protected gopher tortoise and associated commensals.

Association Between School Mental Health and Suicide Prevention Education Policies and Adolescent Suicide Attempts

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Abstract

In the past ten years, the intensity and complexity of declining mental health has been on the rise among high school students. This increasing trend may impact the rates at which students consider or even attempt suicide. In 2019, 10,520 of high school students in the United States reported attempting suicide out of which 8,749 (83.2%) needed medical attention. The current ecological study investigates the association between state-level mental and emotional health education and suicide prevention education policies to suicide attempts among high school students. Secondary data collected from the CDC's Youth Behavior Risk Surveillance System (YRBSS) and National Association of State Boards of Education (NASBE) will be used in this analysis. Data from 2019 included state-level rates for self-reported suicide attempts. State-level education policies will be coded as "policy addressed" or "policy not addressed" for mental and emotional health education as well as suicide prevention education. Three sets of odds ratios will be calculated to measure the strength of association between suicide attempt (yes/no) and presence/ absence of 1) mental and emotional health education, 2) suicide prevention education, or 3) both. The anticipated results of this study have implications on the effectiveness of suicide prevention policies and may help us gain a deeper understanding of how school policies impact student behavior.

Associations Between Minority Status, Culture, and Mental Health Help-Seeking Behaviors

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Abstract

Many cultural attitudes foster a stigma towards mental health. Mental health stigma within minority cultures often leads to limited mental health-related conversations within households, due to the “taboo” nature of the topic. Lack of familial openness can influence an individual’s attitudes and behaviors toward mental health care. This study aims to investigate whether differences exist between minority and White students and mental health help-seeking behaviors and perceived cultural openness to mental health.

A cross-sectional study was conducted as part of a mental health literacy project at a private university in South Florida. We examine the relationship of cultural and familial openness to discussions about mental health and help-seeking attributes among minority participants and will compare the results to those of White participants. Perceived openness variables include family (“Were your family members open to talking about mental health-related issues with you?”) and culture (“Do you feel your cultural traditions encourage discussions about mental-health related issues?”). Help-seeking attributes included attitudes (“I would use mental health services available on campus;” “Confident attending face-to-face appointments to seek information;” “If I had a mental illness I would not tell anyone”) and behaviors (“Previously/currently sought help from a mental health professional”). Odds ratios will examine associates between perceived openness and help-seeking attitudes and behaviors. T-tests will be used to compare differences between groups.

We anticipate that participants of minority status will have less familial and cultural openness toward mental health compared to their white peers and, in turn, have less mental health help-seeking attitudes and behaviors. Results from this study can be used to better inform public health approaches to mental health help-seeking among minority groups. There is an opportunity in public health to help families foster more open communication regarding mental health-related struggles in the household, in order to promote greater confidence in seeking mental health help.

Associations Between Parent Country of Origin and Mental Health Help-Seeking

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Abstract

Mental health stigma is a barrier to help-seeking behaviors. Cultural attitudes and beliefs and about mental health can both influence and perpetuate that stigma. Research suggests that a family ethnic origin may contribute to mental health stigma. This study aims to investigate the relationship between parent country of origin and mental health help-seeking knowledge, attitudes, skills, and behavior.

A cross-sectional study was conducted as part of a mental health literacy pilot project at private university in South Florida. Parent country of origin (U.S. vs. non-U.S.) was used to examine the likelihood of participants (n=246) to report on seven attributes related to help-seeking: knowledge (“Know where to seek information about mental illness”), skills (“Confident using technology to seek information;” “Confident attending face-to-face appointments to seek information”), attitudes (“If I had a mental illness, I would not seek help from a mental health professional;” “If I had a mental illness I would not tell anyone”), and behaviors (“Searched for information about mental health on my own;” “Previously/currently sought help from a mental health professional”).

We anticipate that participants of non-U.S. parents will have a lower mental health literacy across these variables compared to individuals with parents born in the U.S. Results from this study can be used to inform public health approaches to mental health literacy in targeting second generation individuals to improve knowledge, skills, and attitudes about help-seeking behaviors.

Associations Between Religion, Perceived Family Openness to Mental Health, and Mental Health Help-Seeking Among South Asians

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Abstract

Comfortability in discussing mental health within families is a key determinant of help-seeking behaviors. This comfortability can be attributed to or dissociated from mental health stigma stemming from deep-rooted cultural and religious barriers. Research suggests that youth of South Asian descent, in particular, have one of the lowest rates of utilization of mental health resources. This study aims to investigate the relationship between both religious affiliation and family openness to conversations about mental health and help-seeking knowledge, attitudes, skills, and behavior among South Asians.

A cross-sectional study was conducted as part of a mental health literacy pilot project at a private university in South Florida. Participants who reported South Asian ethnicity and either Christian, Hindu, or Muslim religion were included in this sample (n=42). A mental health help-seeking score will be calculated from variables about knowledge, skills, attitudes, and behaviors. Odds ratios will be calculated to measure the strength of association between the mental health help-seeking score and 1) religion, perceived family openness to mental health discussions during 2) childhood and 3) adulthood.

We anticipate a negative association between participants of South-Asian descent who are from Hindu and Muslim religions and help-seeking. We also anticipate a negative association between a perceived lack of family openness about mental health and help-seeking. Results from this study can be used to devise interventions targeting South Asian youth with specific religions and cultures in order to equip them with knowledge, skills, and positive attitudes about mental health help-seeking.

Awareness of Autism in Black and Brown Communities

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Abstract

Autism Spectrum Disorder (ASD) affects a multitude of races and ethnicities as its impact varies from person to person. ASD is typically diagnosed around the age of two to three years old since signs and symptoms of Autism become clinically apparent at that time. Increased reporting of Autism in local communities has surged from diagnostic tools and criteria. However, even with these advancements, the African American community suffers a delayed diagnosis of ASD. This issue poses problems for both the parents and children with Autism and has broader implications for the South Florida community; opportunities are limited for developmental services by a delayed diagnosis. This project is an ongoing Honors thesis, and a thorough literature review was conducted to identify this issue in South Florida. The research presented useful information at the state and regional level, not specific to local south Florida communities. Based on this lack of information critical to the problem, research was conducted using a survey instrument to collect and analyze the data. Initial analysis reveals two specific themes: lack of identifiable local resources and understanding of Autism. The results of this study will be disseminated to community partners in the following communities using an infographic to be shared with the at-risk population. The thesis has focused on building connections with local community partners in Broward, Miami, and Monroe County. Overall, the project identified criteria that caused a delayed diagnosis of autism, understood current community resources, and is developing an intervention to showcase a pathway for care.

Behavioral Responses of *Aplysia californica* to Three Amino Acids

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Abstract

For the sea slug *Aplysia californica*, chemical detection allows the location of food, avoidance of predators, and ability to encounter potential mates. This is an important sensory modality because other sensory structures (optical and acoustic) are limited. It is hypothesized that food is detected via concentration gradients of specific food-derived amino acids in the water column. This study examines the behavioral reactions of *Aplysia* to L-alanine, L-serine, and L-methionine at a concentration of 20 mM in contrast to a food stimulus. Test subjects were placed in an aquarium and 50 mL of the amino acid was added near the source of inflow over the course of five minutes; the slug's path, displacement, and behavior were observed. *Aplysia* had distinct responses to each stimulus. All sea slugs (n=8) moved towards the food stimulus (a positive reaction) and displayed head turns. Head turns are indicative of the slug orienting itself to a chemical gradient. In contrast, only 40% (n=10) reacted positively to serine. For alanine, 40% (n=10) of the sea slugs also reacted positively. However, 90% exhibited head turns compared to 20% in the serine-exposed group, demonstrating that alanine was more stimulating than serine. Only 17% (n=6) of them reacted positively to methionine; all slugs displayed head turns, documenting that it was more stimulating than alanine and serine, but orientation was compromised. This suggests that *Aplysia* uses isolated amino acids to detect and orient to the presence of food and that serine and alanine elicit a better directed search response than methionine.

Biopiracy: The Exploitation of Medicinal Plants from Countries and Communities

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Abstract

Biopiracy is the appropriation of knowledge and biological resources of medicinal plants from indigenous communities. In addition, researchers and organizations secure patents over medicinal plants resulting in a monopoly over the use of them. This has caused local communities where the plant originated from to be excluded from proper financial compensation. Many people are unaware of what biopiracy is and how it may negatively impact communities. The goal of this project is to raise awareness about biopiracy and its harmful effects on indigenous communities. I will discuss two plant species widely known for their medicinal capabilities in the local communities before becoming patented by pharmaceutical companies, rosy periwinkle and hoodia in order to demonstrate the process and consequences of biopiracy. I will also review different models of prevention and regulation of biopiracy, including current practices as the Nagoya Protocol and various national legislations along with plans to compensate communities who have been impacted by acts of biopiracy.

Body Composition Metrics in Offensive and Defensive Football Players Training for the NFL Combine

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Abstract

Previous research has examined body composition in football players. However, there is minimal research comparing body composition differences in offensive (O) and defensive (D) football players training for the NFL Combine. Therefore, the purpose of this study is to compare body composition in O and D football players. 28 football players (O n=13; D n = 15) were used for this study. Body composition testing was conducted using a non- invasive InBody (InBody770) scan as football players followed the manufacturer's testing protocol. An independent samples T-Test was used to examine group differences. All statistics were analyzed using statistical analysis software (SPSS, Version 22.0, IBM INC., Armonk, NY) and significance was set at $P \leq 0.05$. T-Tests demonstrated a non-significant difference ($P > .05$) between O and D for height (H) ($P = .548$), weight (W) ($P = .603$), total body water (TBW) ($P = .673$), dry lean mass (DLM) ($P = .703$), body fat mass (BFM) ($P = .625$), lean body mass (LBM) ($P = .680$), skeletal muscle mass (SMM) ($P = .636$), right arm lean mass (RALM) ($P = .711$), left arm lean mass (LALM) ($P = .673$), trunk lean mass (TLM) ($P = .722$), right leg lean mass (RLLM) ($P = .322$), and left leg lean mass (LLLM) ($P = .468$) in football players training for the NFL Combine. Based on the results above, it appears that O and D players training for the NFL Combine do not demonstrate different body composition metrics.

Boldness and Endurance in Wild and Domesticated Sailfin Mollies

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Abstract

Environment is known to influence physiological and behavioral differences, even within the same species. We compared the boldness and endurance levels of sailfin mollies (*Poecilia latipinna*) from domestic environments (pet stores) and wild habitats. We caught wild sailfin mollies from several freshwater sites in the South Florida area and purchased sailfin mollies from pet stores. We then used a boldness testing apparatus with a shelter and obstacles, recording each trial in a series of images. The time fish spent in latency (within the shelter while doors were open) was recorded and the recording of movement around the tank was analyzed for percent of tank used. Each fish was then run through a swim tunnel with increasing current strength to test endurance. Average latency for wild-caught fish was 525 seconds. Average latency for domestic fish was 142 seconds, ($p < 0.001$). From these results, it can be concluded that domestic sailfin mollies have higher boldness levels than wild sailfin mollies.

Characterization of Marine Communities Associated with Peanut Island Boulder Reefs: An Educational Outreach Project

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Abstract

Peanut Island attracts thousands of Florida residents and out of state visitors annually to enjoy the beaches and snorkel the nearshore marine habitat. The island was created from spoil dredged during the creation of Lake Worth Inlet. The periphery of the island was designated as a county park and includes a manmade boulder reef easily accessible from shore. Few resources are available for visitors to identify the various marine creatures. Surveys using Go Pro camera videos and photos were conducted monthly during high tide between August and November 2022. The data was used to identify and enumerate the fishes and invertebrates associated with nine boulder patch reefs in shallow water (~1-2m depth). Total abundance was categorized into four groups: abundant (100+), common (50-100), occasional (25-50), and rare (<25). The two goals for this research were to create an inventory of organisms associated with the boulder reef and increase the public's environmental awareness and understanding of the local marine environment. This will be accomplished by creating a brochure and poster for the parks naturalists to use. They will contain a QR code that can be accessed by phone and will provide pictures to help identify the various fishes and invertebrates which frequent this area. Additionally, information on the ecology of these organisms will be provided. This project is ongoing and we plan on continuing surveys from February to April 2023, with plans to make seasonal comparisons to the previously collected data from the fall term.

Characterizing the Types of Representations Subject to Research Studies and Interventions Centered Around the Representational Competence Framework within Chemistry Education

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Abstract

Since its introduction, the Representational Competence Framework by Kozma and Russell has captured the attention of many researchers and practitioners in science education. According to this framework, representational competence is a set of skills and practices that allow a person to reflectively use representations, singly or together, to think about, communicate and act on chemical phenomena. Furthermore, developing representations has been suggested to be essential for developing expertise in subjects like Chemistry. Thus, as part of a large collaborative project among three universities, we have been working on reviewing the literature on the use and incorporation of the Representational Competence Framework within undergraduate chemistry education research and practices. As part of this large project, our institution has been focused on characterizing the types of representations used as part of our literature sample of 242 peer-reviewed articles, including research and practice-focused articles. Our analysis includes identifying the number of representations used as part of the scholarly work, the type of representations (i.e. Lewis structure, Potential energy diagram, etc.) and the classification of representation as symbolic, sub-microscopic, or macroscopic guided by Chemistry's Triplet (i.e., Johnstone's Triplet). Our review of the literature holds implications for chemistry instruction, which could give insight into how the framework has been used with the chemistry education community and potential areas where more work is warranted. During the presentation, preliminary results from this project will be presented.

Closing the Racial Academic Achievement Gap in the United States through Culturally Responsive/Relevant and Social Justice Pedagogical Practices in Mathematics Education

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Abstract

Due to the lingering effects of the United States' centuries-long state-sanctioned oppression and segregation of African Americans, African Americans and other minorities have consistently underperformed academically compared to white students, also known as the “racial academic achievement gap.” Research suggests that culturally relevant pedagogy (CRP), a relatively new theory in education, has been known to increase participation, engagement, and academic achievement in classrooms, especially in mathematics classrooms. The purpose of this literature review is to synthesize connections between CRP and the racial academic achievement gap to discover whether utilizing CRP in the classroom on a nationwide basis is a viable reform to close the racial academic achievement gap, especially in mathematics. This literature review explores the root causes of the racial academic achievement gap, the intricacies of student identity in mathematics classrooms, and the multidimensionality of CRP. Employing CRP in classrooms nationwide is a great starting point reform for closing the gap yet does not fully address and tackle this pressing national educational problem.

Cocaine use Among White Pregnant Women with Unmet Clinical Depression in the U.S

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Abstract

Unmet clinical depression during pregnancy could lead women to have an increased risk and prevalence of misusing substances, including cocaine. This is significant in public health because cocaine misuse among pregnant women has been linked to extremely negative health consequences for women and their babies. The objective of this study is to interpret how unmet mental health needs, such as clinical depression, could lead to white pregnant women in the U.S. using cocaine during their pregnancy. It is hypothesized that cocaine misuse during pregnancy could be caused by increased pre-existing symptoms of depression before pregnancy, which then affects their emotional state during pregnancy, leading them to cocaine misuse. Treatment Episode Data Set -- Discharges (TEDS-D), was used to analyze the data for cocaine use among white pregnant women in the United States with co-occurring mental health disorders, such as depression. Individuals with missing/unknown responses were excluded from this analysis. The odds ratio for cocaine use was 1.1016: greater odds of white pregnant women being exposed to using cocaine. Furthermore, the odds ratio for mental health disorders was 1.0548: greater odds of white pregnant women with co-occurring mental health disorders being more exposed to cocaine. There are greater odds among white pregnant women in the U.S with co-occurring mental illnesses, including clinical depression, being exposed to cocaine use among. Effective public health strategies could include improving multidisciplinary state learning communities, quality improvement collaboratives, and consumer awareness.

Comparing Effectiveness of Aducanumab and Gantenerumab on Reducing Amyloid-Beta Plaques

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Abstract

Alzheimer's disease (AD) is a degenerative neurological disorder that destroys memory and other important cognitive functions. As time progresses, brain cell connections, as well as the brain cells themselves, atrophy and die. AD is caused by a missense mutation in the amyloid-beta peptide within the amyloid precursor protein (APP). The mutation results in glutamine being replaced with glutamic acid. Previously conducted studies showed that mutated forms of the amyloid-beta peptide fragment have a greater tendency to stick together and form protein clumps or aggregates. The abnormal build-up of aggregates in and around the brain cells has been found to be strongly associated with the development of Alzheimer's disease, therefore, it appeared crucial to study the methods that reduce these build-ups.

Attempts to treat this disease have produced antibodies that bind to the mutated amyloid-beta peptide and clear the aggregated amyloid precursor protein out of the brain. The overall goal of this project is to use 3D printed protein models to show interactions leading to a clearer explanation of the efficacy variations between antibodies. One antibody, Aducanumab, is currently in Phase 3 clinical trials and has been fast-tracked by the U.S. Food and Drug Administration. Aducanumab functions by specifically binding to the mutated amyloid-beta peptide and clearing aggregates out of the brain. This antibody binds to a smaller linear epitope formed by amino acids 3-7 of the amyloid-beta peptide. Using Jmol, protein visualization software, the Aducanumab (6CO3) PDB was manipulated to highlight multiple hydrophobic interactions, shown in a dark salmon color, and 2 hydrogen bonds, shown in white. The small binding location, flexibility provided by fewer strong interactions, and high affinity for aggregates at a high density make the antibody ideal for clearing out large aggregates.

Another antibody, Gantenerumab, is still undergoing testing in order to ensure safety and efficacy. This antibody functions by binding to a longer linear epitope formed by amino acids 3-11 of the amyloid-beta peptide. Unlike Aducanumab, Gantenerumab interacts with peptides through 2 salt bridges in addition to 3 hydrogen bonds and multiple hydrophobic interactions. Along with hydrogen bonds in white and hydrophobic interactions in dark salmon, the Gantenerumab (5CSZ) PDB was manipulated to show negative side chains of the salt bridge, labeled in red, while the positive side chains were labeled in blue. The increased number and strength of interactions reduces the flexibility of this antibody, thus making it difficult to easily bind and clear aggregated peptides. While both antibodies bind to a similar region of the amyloid-beta peptide and function to remove aggregates, they vary in the amount and type of interactions made with the amyloid-beta peptide.

Comparison of Behavior of Mangrove Mosquitofish Across Their Range and Identification of their Hybridization with Eastern Mosquitofish using Genital Morphology

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Abstract

The Mangrove Mosquitofish is found in many brackish and freshwater ecosystems surrounding southeast Florida and Cuba. Historical range distribution in Florida has found these fish solely in the Florida Keys and parts of Miami. This research provides an update to the northernmost range that Mangrove Mosquitofish have been observed. As the name implies, Mangrove Mosquitofish reside in areas of critical habitat: Mangrove Forests. These forests are constantly battling habitat loss and reduction due to increased urbanization in native areas. Mangrove Mosquitofish are poeciliid fish species with a modified anal fin called a “gonopodium” that allows for internal fertilization. This research found novel hybrids of the Mangrove and Eastern Mosquitofish as well as a new discovery into the mangrove mosquitofish range expansion. Geometric morphometric analysis of hybrid gonopodiums (Eastern Mosquitofish x Mangrove Mosquitofish) reveals an intermediate shape and shows the potential for genetic introgression between species. Hybridization may further threaten Mangrove Mosquitofish populations as they are more vulnerable than the Eastern Mosquitofish due to their use of threatened habitat and range limitation. The morphometric analysis between the two species and hybrids does confirm there is significant difference ($p < 0.05$) between the two species, and among sites. Boldness behavior trials of both male and female mangrove mosquitofish show slight differences in risk tolerance and exploration between the two sexes. The observations have important implications for the future of Mangrove Mosquitofish in the face of climate change and other anthropogenic habitat alterations.

Comparison of Two Methods of Post-activation Performance Enhancement on Symmetry and Power Output in Elite American Football Players

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Abstract

Post-activation potentiation performance enhancement (PAPE) refers to acute power increases after near maximal load exercise (e.g., jumps after heavy squats). Maximum effort (ME; low volume, slow bar speeds, high loads) and dynamic effort (DE; high volume, fast bar speeds, moderate loads) are two PAPE training methods. We sought to determine the influence of training method across sets in peak power (PP; W/kg), reactive strength (RS; m/s), jump height (JH; in.), and interlimb asymmetry in eccentric (EIA; %) and concentric (CIA; %) jump phases. Twenty-eight players training for the National Football League draft were separated into ME (n=13, age, 22.9 ±0.9 yrs, height, 1.88±0.06 m; mass, 100.6±15.6 kg) and DE (n=15; age, 23.1 ±0.8 yrs; height, 1.89±0.06 m; mass, 115.8±21.9 kg). Participants performed baseline jumps on force plates then 4 sets of a paired exercise and 2 jumps. 2 x 5 mixed-model ANOVAs demonstrated significant method x set interactions for PP ($F_{(2,6,68.4)}=2.99$, $p=0.043$) and RS ($F_{(2,7,69.1)}=5.17$, $p=0.004$). Method influenced PP baseline to set 1 and sets 1-2 where ME changed 68.7±9.9 to 71.8±10.4 to 73.5±8.9 W/kg but DE was stable. RS was influenced by method from baseline to set 1 and sets 1-2; ME changed 0.60±0.17 to 0.68±0.17 to 0.74±0.17; DE changed 0.59±0.10 to 0.65±0.11 to 0.64±0.10 m/s. JH increased across all sets for both methods. There were no significant interactions for EIA ($F_{(4,104)}=0.715$, $p=0.583$) or CIA ($F_{(4,104)}=2.04$, $p=0.094$). Main effects were also not significant ($p>0.05$) indicating symmetry is not influenced by method or set. ME was superior at inducing PAPE.

Countermovement Jump Strategy and Performance Persist During an In-season Training Mesocycle in NCAA Division II Women's Soccer Players

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Abstract

Neuromuscular status (NS) may be impaired by training and competition and assessment informs coaches and sports medicine professionals. The purpose of this study was to evaluate neuromuscular status during an in-season training block (mesocycle) in university women's soccer players. Sixteen players (age, 20.3 ± 1.3 yrs; height, 167.6 ± 7.4 cm; mass, 65.6 ± 8.8 kg) performed 3 maximal effort CMJs on dual uniaxial force plates at pre-season and mid-season (after 10 matches). ForceDecks software was used to calculate jump height (JH), reactive strength (RS), peak power for eccentric (EPP) and concentric (CPP) phases, and impulse asymmetry for eccentric (EIA) and concentric (CIA) phases. Paired t-tests showed no differences between pre-season and mid-season for JH ($p=0.168$), RS ($p=0.075$), EPP ($p=0.128$), CPP ($p=0.167$), EIA ($p=0.162$) or CIA ($p=0.268$). Team NS as measured by CMJ performance and strategy was maintained for the mesocycle indicating optimal training. However, there were individuals who had lower NS and may require monitoring.

COVID-19 Vaccine Hesitancy in Pregnant Women from Marginalized Communities

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Abstract

Vaccination is known to be one of the most successful public health measures currently available that decreases numbers of mortality and morbidity of various diseases across the globe. Despite the success that has been found in controlling infectious disease through herd immunity from vaccinations, a study published in 2021 in *Nature Medicine* shows willingness to get a COVID-19 vaccine is higher in developing countries (80% of respondents) than in the US (65% of respondents). This demonstrates a rising problem especially prevalent among developed countries of a voluntarily under vaccinated population that do not believe vaccination is a method that is safe or successful.

This delay in acceptance or refusal of vaccines despite availability of services is known as vaccine hesitancy. The COVID-19 pandemic sparked vaccine hesitancy throughout the United States, with an overabundance of vaccines and greater populations with added mistrust. General vaccine hesitancy related to the misinformation spread both among media and political groups as vaccination became a political issue with protests arising following mandates of vaccination for travel or work. Under the category of the unvaccinated population of the United States is pregnant women. This systematic review of updated qualitative research intends to define vaccine hesitancy as it pertains to the COVID-19 vaccine and the attitudes of pregnant women among marginalized populations. The study identifies the potential determinants of the increase in vaccine hesitancy among marginalized populations especially among highly developed nations. This review explores how this may be combatted with methods that have proven effective in combating vaccine hesitancy.

Decoding Phages: Complete Genome Sequence Analysis of Two Novel Bacteriophages, Alyssamiracle and Fribs8

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Abstract

Bacteriophages (phage) are viruses that infect bacteria and are considered the most abundant biological entity in the world. Recently, phage has been utilized in biotechnological applications including their use as biocontrol agents in food preservation, sanitizers, wastewater treatment, bioremediation of oil spills, and combating antibiotic resistance. Therefore, decoding and analyzing the genetic composition of novel bacteriophages is critical to their potential use in these emerging applications. Through the SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) program at NSU, our goal was to analyze the genomes of two recently discovered bacteriophages, Alyssamiracle and Fribs8. These phages infect *Gordonia rubripertincta* NRRL B-16540, a gram positive soil bacteria that can breakdown hydrocarbons and is an opportunistic pathogen in catheter infections. The genomes were sequenced using Illumina Next-Generation Sequencing, auto-annotated using DNA Master, and manually refined with GeneMark, Glimmer, Phamerator, NCBI BLAST, and HHPred. Sequencing data revealed that Alyssamiracle has circularly permuted genome ends with a total genome length of 65,525 bp and belongs to cluster DV. Alyssamiracle contains ~92 predicted genes and all were transcribed rightward. In contrast, Fribs8 has 3' sticky overhang genome ends with a total genome length of 45,985 bp and belongs to cluster CT. Fribs8 contains ~66 predicted genes and a third of the genome is transcribed leftward. Collectively, our results provide bioinformatic evidence that Alyssamiracle and Fribs8 are two novel phages that infect *G. rubripertincta*. These phages will be included in the SEA-PHAGES database and could possibly be prioritized for a specific use.

Differentiation of Stress Response in Children with Autism

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Abstract

Children with Autism Spectrum Disorder (ASD) process stressors differently than children with neurotypical development and have a poor response to stress. Furthermore, it is not clear if children with ASD are able to regulate appropriately in order to bounce back from a stressful experience. As such this study appraised results from big data in order to examine the stress response of children with neurotypical development compared to children with ASD. Data from a previous study in which neurotypical children and children with ASD were recruited from public events and from educational programs were analyzed using machine learning methods as a foundation to design this study. The study design incorporated eye-tracking data collected on a group of children with ASD and a control group. The pilot testing of this study design reveals that children with ASD may have poorer stress response and this response can be captured using eye-tracking measures. Observations of imaging and video data point to a clear distinction in facial expression, eye-movement, and body language between children with ASD compared to the control group. It is therefore important for researchers to consider the implications of robust study designs with the appropriate instruments applicable to that population.

Do intruders behave differently when encountering an experienced winner vs a naïve fighter?

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Abstract

Competing is an inherently risky endeavor, but it is a ubiquitous behavior throughout the animal kingdom and beyond. Aside from the factors that motivate competition (e.g. territory and other resources) there are many behavioral and physiological effects of winning and losing. Some of these effects are easily observed, while others require careful histological analyses. Still others are more obvious to the competitors than to any external observers. The Winner Effect is a common phenomenon that posits that experiencing victory increases the odds of winning future competitions. By testing experienced winners (females with three previous victories) and naïve residents with naïve male intruders, we recently demonstrated that winning increased aggression in postpartum female rats. This is a common feature of the Winner Effect, but this was the first demonstration of its kind in nonhuman females. We are currently analyzing intruder behaviors in the video recordings of those tests. Intruders are able to perceive characteristics of the residents that we could not or did not measure – for example, olfactory and vocal communication of dominance—and if they behave more submissively in the presence of winners than of naïve postpartum females, this will provide confirmatory evidence that winning affected the postpartum females in perceptible ways that increase her ability to win future conflicts (perhaps even without fighting). Moreover, male intruders (losers) experience social stress during this test that could have lasting effects. In a linked experiment, we tested whether losing impacted behavioral and neurological TBI outcomes.

Does Exercise Reduce Mind Wandering: The role of mood and exercise frequency

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Abstract

Chronic exercise provides various physical health benefits (Penedo & Dahn, 2005) but also results in a variety of benefits to cognitive functioning including improving working memory (Padilla, Perez, & Andres, 2014) and attention (de Sousa et al., 2019). Exercise also releases various endorphin hormones that contribute to increased positive mood (Rokade, 2011). However, less is known about how chronic exercise influences frequency of mind wandering. Mind wandering, defined as experiencing an off-task thought, has been linked to mood such that negative mood predicts higher rates of mind wandering (Smallwood & O'Connor, 2011). The current study examined the relationship between exercise frequency, mood, and mind wandering. Two-hundred and nineteen undergraduates completed measures of working memory, attention control, mind wandering, and self-reported current mood and exercise frequency and intensity. The results replicate prior work showing that more negative mood is positively correlated with greater rates of mind wandering. Further, exercise frequency was negatively related to current mood, such that individuals that exercised more frequently experienced less mind wandering during attention tasks. While exercise frequency was not directly related to mind wandering rates, a significant mediation was found such that exercise frequency predicted more positive mood, which in turn predicted less mind wandering. These results suggest that the benefits of exercise on some cognitive phenomenon (e.g. mind wandering) may be due to the influence of exercise on mood.

Does Football Player Position and Number of Sets Influence Response to Post-activation Performance Enhancement?

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Abstract

Post-activation potentiation enhancement (PAPE) describes the acute increases in explosiveness (e.g., jump power) from pre-loading muscles with high loads in an exercise of similar biomechanics (e.g., squat). Player position and repetitive sets may affect PAPE response. The purpose of this study was to determine the influence of position and time on power during a PAPE session. Twenty-nine football players training for the NFL draft representing three position groups, Big, Big-skill, and Skill performed two baseline jumps then four alternating trials of squatting-jumping. Jumps were performed on uniaxial dual force platforms and variables for jump height (JH), peak power, and reactive strength (RS) were calculated using ForceDecks software. We used 3 x 5 mixed-design ANOVAs to evaluate the interaction between position and trials on power, $p < 0.05$. There were no significant interactions between group and trial for JH ($F_{(5.09,66.16)} = 1.20, p = 0.319$) peak power ($F_{(5.43,70.58)} = 1.11, p = 0.365$), or reactive strength ($F_{(5.17,67.18)} = 1.05, p = 0.399$). For JH, there were significant main effects for group ($F_{(2,26)} = 4.72, p = 0.18$) and trial ($F_{(2.55,66.16)} = 4.75, p = 0.007$). For peak power, there were significant main effects for group ($F_{(2,26)} = 4.89, p = 0.16$) and trial ($F_{(2.72,70.58)} = 6.13, p = .001$). For RS, there was a significant main effect for trial ($F_{(2.58, 67.18)} = 14.10, p < 0.001$, but not for group ($F_{(2,26)} = 2.27, p = 0.123$). JH, peak power, and RS were not influenced by the interaction of player position and trial. Skill players jumped higher and expressed greater power than Big-skill and Big. JH, peak power, and RS increased across trials for all groups. Skill players appear to benefit more from PAPE training than Big-Skill and Big players.

Effect of Animal-Assisted Prison Programs on Incarcerated Juveniles

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Abstract

The psychological effect of canine-human bonding has been vastly studied due to the synergetic relationship both species offer to one another. The symbiotic relationship between canines and humans has been prevalent throughout history and is still shown in programs such as Animal Assisted Therapy where the dog and people interspecies dyads prosper. Using qualitative and quantitative data analyses, we expect to examine the symbiotic relationship between dogs and people and its ability to affect recidivism rates in incarcerated humans. This could be studied through canine-based prison programs in which incarcerated humans help train canines for future lives as companions or service animals. With the focus on incarcerated juveniles specifically in Florida, it is evident that both the incarcerated humans and orphaned/stray dogs within such programs have been deprived of otherwise ubiquitous opportunities to bond with their own kind. We predict that dog-human dyads will therefore show pronounced benefits of interspecies bonding that can be measured at physiological and behavioral levels. These levels can be conspicuous by their impact on the reincarceration rates of these incarcerated humans. It is evident to focus on juveniles as they have the opportunity to make different choices in life rather than get stuck in the system. The establishment of these programs can therefore enhance the welfare of both the incarcerated juveniles and these canines. It is hoped that in this study that the continuation of bolstering support for these animal-assisted prison programs in Florida's juvenile correctional facilities ability to aid in the decrease of recidivism.

Effect of Methylphenidate on Alzheimer's and Dementia

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Abstract

Alzheimer's disease (AD), the most common form of dementia, is a neurodegenerative disorder that causes impairments in cognitive abilities, behavior, and personality. AD is distinguished by extracellular plaques containing beta-amyloid proteins and intracellular neurofibrillary tangles containing hyperphosphorylated tau proteins. Current FDA-approved drugs for AD have questionable efficacy and carry potential risks. Methylphenidate (Ritalin), a stimulant drug currently used to treat ADHD and narcolepsy, has been used off-label to treat AD patients, primarily for relieving the symptom of apathy. While our literature review suggests that relatively short-term (< 6 weeks) use in patients with AD and related diseases is safe and effective in clinical trials, little is known about the longer-term effects of the drug in this population. More work is needed, as there is also a paucity of animal research investigating chronic effects of methylphenidate in rodent models of AD and related disorders. Findings from animal studies in wild-type rodents on chronic use of methylphenidate, as well as cell culture studies, have reported adverse effects of methylphenidate, including increases in neuroinflammation and oxidative stress, neurodegeneration, vascular impairments (e.g. blood brain barrier dysfunction), and altered cognitive-behavioral performance. While the clinical significance of methylphenidate treatment in AD patients may be unclear, studies over longer periods of time including testing on animal models will help us understand how methylphenidate treatment can affect our brain activity in the long term and how it can be administered more safely and effectively.

Effect of Oral Microbiome Components on SARS-CoV-2 Infection

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Abstract

Using an in vitro infection model of SARS-CoV-2 infection utilizing pseudotype lentivirus, we aim to study the effects of the oral microbiome in COVID-19 infection. The model is based on the production of pseudotype lentivirus targeting 293 cell lines expressing the viral receptor Ace 2. Looking at extrinsic factors, it has been observed that bacteria exert an effect on viral infection. Common bacteria species found composing the oral microbiome include *S. mitis*, *C. Gingivalis*, *A.a. 29523*, *A.a. Y4*, *S. gordonii*, *S. gordonii*, *Pi*, and *A. Odontitis* were screened. Preliminary data shows that the oral microbiota has the potential to facilitate or inhibit SARS-CoV-2 infection. The experiments include preparing plates with 293T-Ace 2+ cells, pretreating the cells in triplicates, and pretreating the virus with the same factors prior to infection. These experiments will shed light on the extent to which the oral microbiome affects SARS-CoV-2 infection as well as identify groups that have enhancing, inhibiting, or no effect on infection. Considering the bacterial factors analyzed in these experiments are common to the oral microbiome they have the potential to serve as therapeutics for a preventative treatment against SARS-CoV-2 infection. The high rates of transmission and high mortality rate of SARS-CoV-2 make this project crucial. Identifying therapeutics for a preventative treatment that is native to the human body can aid in providing a preventative measure to immunocompromised populations, as well as those with vaccine hesitancy.

Effects of Altered TPP-1 Expression in Human Neural Progenitor Cells

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Abstract

Batten's Disease or neuronal ceroid lipofuscinosis type 2 (CLN2) is a pediatric autosomal recessive, neurodegenerative lysosomal storage disorder due to a deficit of the lysosomal protease tripeptidyl peptidase (TPP-1). The lack of TPP-1 leads to an accumulation of lysosomal waste and cell death. The disease is characterized by language delays, seizures, cognitive and motor decline, blindness, as well as early death. Currently, a clinical trial of the experimental treatment Brineura® (Cerilponase Alfa) is the only approved treatment for CLN2. The clinical trial involves infusion of human recombinant TPP-1 (rhTPP-1) into the ventricles of the brain. Diffusion models suggest the protein will spread along a concentration gradient through the brain. However, it is unclear how altered concentrations of TPP-1 will affect ongoing neurogenesis in the subventricular zone. The goal of this study is to examine proliferation, cell cycle kinetics, differentiation, and cell death in cultured human neural progenitor cells (hNPCs) following exposure to rhTPP-1. Altered levels of TPP-1 will be assessed using western blot analysis. Proliferation and differentiation will be assessed using immunostaining, fluorescent microscopy, and CellProfiler™ analysis. Cell cycle kinetics will be assessed using EdU-incorporation assays. Induced cell death indicated by apoptosis was assessed using ApopTag (TUNEL) assay. Preliminary results suggest that increased levels of rhTPP-1 induced a significantly higher rate of cell death in healthy hNPCs. These results may have implications in clinical trials using intracerebroventricular infusion for enzyme replacement therapies.

Effects of Sports Outcomes on Student-Athletes' Stress Biomarkers and Scholastic Performance

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Abstract

The winner effect occurs when the probability of continuing to win increases after winning one game; it has also been shown to involve changes in the hormones and behaviors of winners and losers. Our poster outlines a new research program that we predict will test how winner effects influence stress and academic performance in student-athletes. We present lab validation of qPCR assays of a stress-associated biomarker (mitochondrial DNA copy number; mtDNA-CN), alongside a qualitative survey we developed to give athletes before and after each game. We predict that mtDNA-CN will covary with the recent game outcome(s), and that wins will be associated with higher self-reported scholastic confidence and satisfaction among focal studentathletes. The intended subjects of this study would include Division II collegiate athletes from a university in South Florida, with our initial validation focused on test material from members of our research team. The goals of this study are to understand and increase synergy between competitive sports participation and scholarship within student-athletes, while developing novel biomolecular tools for more general use in studying undergraduate populations.

Effects on High Fat and Ketogenic Diet on Non-Alcoholic Fatty Liver Disease Pathology in Male and Female Mice

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Abstract

Nonalcoholic fatty liver disease (NAFLD) is a condition where excess fat builds up in the liver, affecting 25% of Americans. Interestingly, NAFLD is associated with neurological symptoms, including anxiety, depression, cognitive dysfunction/dementia. Given the high rates of these diseases, understanding risk and protective factors for NAFLD is crucial. Individuals with obesity, Type 2 Diabetes and related conditions are prone to NAFLD. While consumption of high fat/Western diet increases risk, there is evidence to suggest that ketogenic diet, which is high in fat but low in carbohydrates, may protect against NAFLD. Biological sex may influence NAFLD, but the evidence is conflicting as some report males to be more susceptible, while others report the opposite. Therefore, the goal of this project is to determine the effects of long-term consumption of a high fat (HF) or ketogenic diet (KETO) vs. a low fat (LF) diet on NAFLD in male and female mice. Fixed livers will be stained with hematoxylin and eosin for assessment of steatosis (microvesicular fat), ballooning (macrovesicular fat) and leukocyte infiltration (inflammation), as well as Sirius Red staining for fibrosis. Given our preliminary data that: HF diet increases weight gain and liver mass to a greater degree than LF and KETO, and HF diet increases liver mass in males to a greater degree than females; we expect that HF, but not KETO diet will result in NAFLD pathology, and to a greater degree in males. We will also explore how measures of NAFLD relate to metabolic outcomes and cognitive-behavioral performance.

Egg laying preference, larval survival, and maturation of Zebra Longwing, *Heliconius charithonia*, on native and exotic *Passiflora* species in South Florida

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Abstract

In this study, three species of passion vine: bluecrown (*Passiflora caerulea*, exotic), corky (*Passiflora suberosa*, native), and maypop (*Passiflora incarnata*, native) were used as host plants to determine egg laying preference, larval survival, and maturation of zebra longwing (*Heliconius charithonia*), Florida's state butterfly. The plants were left outdoors for several days to allow butterflies to lay eggs. The plants were then placed inside netted enclosures. The number of eggs, caterpillars, chrysalises, and adult butterflies were counted and recorded. After three trials, a total of 56 (bluecrown), 63 (corky), and 14 (maypop) eggs were laid, and of those, 14%, 33%, and 34% hatched into caterpillars, respectively. However, only corky had caterpillars survive to the chrysalis stage (100%) and of those an average of 95% emerged as adult butterflies (24 total). Butterflies had a mean forewing length of 46.3 +/- 2.8 mm and sex determination revealed 42% were females and 58% were males. There were no significant differences in forewing length between the sexes ($p \geq 0.05$). Increased knowledge of butterfly survival on different host plant species can benefit butterfly gardens, landscaping companies, or people looking to promote butterfly growth in their own backyards. Our results clearly indicate corky passionvines should be planted if the goal is a butterfly garden or enhancement of zebra longwings. Previous research conducted here at NSU also demonstrated corky was preferred, however in contrast to our results, butterflies had successfully been grown on maypop as well, providing support for selecting native host plants to enhance butterfly populations.

Endoparasites in Family Caprimulgidae Birds from Southeastern Florida (USA)

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Abstract

The Caprimulgidae are nocturnal birds that mainly prey on insects, which serve as intermediate hosts to several terrestrial parasite life cycles. Information on parasitism in this family remains scarce, and endoparasite community composition and structure have never fully been surveyed. To address this knowledge gap, 68 caprimulgid birds from southeastern Florida (USA) were examined for endoparasites, including Chuck Will's Widow (*Antrostomus carolinensis*, n = 44), Eastern Whip-Poor-Will (*A. vociferus*, n = 5), Common Nighthawk (*Chordeiles minor*, n = 16), and Lesser Nighthawk (*C. acutipennis*, n = 1). Frozen post-mortem at collaborating wildlife rescue centers, individuals were thawed and examined for parasites in the gastrointestinal tract. The esophagus, proventriculus, intestines, and cloaca were dissected, with the proventriculus and intestine contents further examined in washes. Parasites were stained and mounted prior to identification using standard taxonomic keys. Caprimugids hosted a diverse community of endoparasites including members of Digenea, Cestoda and Nematoda. Community composition varied among host species; Common Nighthawk were infected with mainly cestodes, Chuck-Will's-Widow communities were largely dominated by cestodes and nematodes, whereas Eastern Whip-Poor-Wills hosted more digeneans. Infection rates varied among hosts as well with Common Nighthawks having the highest infection rate at 63%. Eastern Whip-Poor-Wills have a 40% infection rate. These results may provide insight on the differing feeding ecologies and trophic dynamics of caprimulgids in South Florida.

Establishing the Microbial Volatile Organic Compound (mVOC) Profile of *Enterococcus faecalis*, a Causative Agent of Infective Endocarditis, Using Headspace-Solid Phase Microextraction-Gas Chromatography-Mass Spectrometry (HS-SPME-GC-MS)

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Abstract

Infective endocarditis (IE) is a life-threatening infection of the heart which is usually bacterial in nature. The treatment of this disease relies greatly on its early diagnosis, which typically utilizes a blood culture to confirm the presence and identity of the bacteria. However, during the early stages of the disease, a patient's blood culture may test negative despite having the disease, a phenomenon known as Blood Culture Negative Endocarditis (BCNE). Thus, alternative diagnostic routes must be considered, such as by utilizing the microbial volatile organic compound (mVOC) profile of bacteria that commonly cause IE, such as *Enterococcus faecalis* (*E. faecalis*). Therefore, the aim of this project was to determine the mVOC profile of *E. faecalis*, one of the most common agents of IE using headspace solid-phase microextraction-gas chromatography-mass spectrometry (HS-SPME-GC-MS). The first step in creating this new method involved optimizing SPME extraction conditions, such as extraction time and fiber type. Once completed, the mVOC profile of *E. faecalis* (in broth culture) was determined using the optimized conditions. This same approach can be utilized for other bacteria that cause IE, leading to the creation of a database of mVOC profiles. Eventually, these results could be applied to a clinical setting in order to develop alternative diagnostic routes.

Evaluation of MDM2 Regulation on AURKB Expression and Cell Death in Lung Cancer

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Abstract

This research examines the molecular mechanisms by which MDM2 regulates AURKB in lung cancer cells. In the United States alone nearly 238,340 people will be diagnosed with lung cancer in 2023. Hence, the need for new anti-cancer drugs and treatment methods is still persisting to fight against this deadly disease. This study explores the intracellular link between MDM2 and AURKB, to determine how manipulating this molecular mechanism can lead to cell cycle arrest and cancer cell death.

Lung cancer cells were treated with RG7388, an MDM2 inhibitor, and Barasertib, an AURKB inhibitor. Following treatments, the cells were lysed, and western blot analyses were carried out to determine the expression levels of MDM2, AURKB, FOXO3a, p53, p21, and Cyclin D. The lung cancer cells treated with the MDM2 inhibitors showed an increase in the levels of tumor suppressor genes. Additionally, drug-treated cancer cells also displayed an increase in the levels of genes that are known to cause cell death. According to the results obtained, RG7388 mediated inhibition of MDM2 results in a down-regulation of AURKB expression. Additionally, downregulating AURKB seems to cause cancer cell death during our experiments. To better assess how RG3788 treatment affects lung cancer cells, more experiments will be done utilizing H460 and H446 [OB]lung [OB] cancer cells to determine how each cell line is affected by MDM2 and AURKB inhibitors.

Exercise as a Natural Kappa Opioid Receptor Antagonist to Treat Binge Drinking Withdrawal

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Abstract

Binge drinking is a serious public health problem in the United States that is especially prevalent among college students. The results of a national survey reported 33% of full-time college students aged 18-22 engaged in binge drinking during the previous month. Positive results have been demonstrated in clinical trials that treated alcohol abuse with aerobic exercise. Research in animal models aims to answer remaining questions regarding implementation across sexes and age groups by studying underlying neurobiological mechanisms. One such mechanism is the kappa opioid receptor (KOR) of the endogenous brain opioid system. In animal models, administration of a KOR antagonist reduces preference for alcohol in chronic drinking models with conflicting results in binge drinking models. These KOR antagonists have also been shown to reduce anxiety and depressive symptoms associated with ethanol withdrawal. Chronic treadmill exercise reduces KOR binding and G-protein activation in rodents, suggesting exercise could have a similar effect on alcohol preference as KOR antagonists. Exercise treatment concurrent with ethanol exposure attenuated an ethanol associated increase in KOR receptor density; however, exercise during withdrawal from binge drinking remains unexplored but is important for translational relevance to clinical use. The aim of the present study is to determine the effect of exercise on anxiety behaviors associated with withdrawal from adolescent binge drinking, as well as changes in brain KOR binding in mice. Sex differences in these outcomes will also be determined with the goal of improving the clinical use of exercise to effectively treat binge drinking.

Faulty Hip and Pelvis Biomechanics Do Not Differentiate between 5k Performance in NCAA Division II Cross-Country Runners

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Abstract

Excessive hip adduction (HADD) and contralateral pelvis drop (CPD) angles during running are associated with running-related injuries. Their influence on performance is less known. Therefore, we aimed to determine if HADD and CPD could differentiate between high and low race performers, and if there were relationships between CPD, HADD and race performance. 26 healthy male and female NCAA Division II cross-country runners participated in this prospective study. They underwent 3D motion analysis of their HADD and CPD during pre-participation physical examinations. Times from the first race of the season were converted to International Association of Athletics Federation (IAAF) points and high and low performance groups were created. Pearson correlation coefficients were used to examine the associations between HADD, CPD and IAAF points, and Independent Samples T-tests were used to determine differences in HADD and CPD between high and low performance groups, $p < .05$. There were no significant relationships between IAAF points and left HADD ($r = 0.11$, $p = 0.59$), right HADD ($r = 0.19$, $p = 0.35$), left CPD ($r = -0.06$, $p = 0.79$), or right CPD ($r = -0.06$, $p = 0.76$). There were no significant differences between high and low performance groups in left HADD ($t(24) = 0.48$, $p = 0.64$), right HADD ($t(24) = 0.45$, $p = 0.33$), left CPD ($t(24) = 0.62$, $p = 0.27$), or right CPD ($t(24) = 0.53$, $p = 0.30$). The RRI biomechanics of excessive CPD and HADD do not influence 5k race performance in collegiate distance runners.

Geographically based risk evaluation of disease states and sleep disorders impacting readiness across active-duty army installations from military medical databases in fiscal year 2021

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Abstract

The impact of sleep disorders and disease states on active-duty soldiers' readiness is a clinically relevant and significant topic. This is due to the high comorbidity of sleep disorders and a wide variety of other condition, ranging from substance abuse to obesity. Patient data collected from military health databases can be used to establish possible relationships. The current study performed a risk assessment of sleep disorders, obesity, tobacco use, and general substance abuse based on geographical distribution of active-duty Army installations through a comprehensive analysis of the Office of the Army Surgeon General Health of the Force (HoF) report, specifically for Fiscal Year 2021, which summarized data collected during 2020. Based on previous analysis done in 2017 that found that large training installations in the Southern United States were at a greater risk for sleep disorders than others we predict that similar results will be present in the current HoF report leading to strong geographical influences on readiness in active-duty soldiers comparable to civilian sectors.

HIPAA and Security Compliance During Telehealth Consultations

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Abstract

Telehealth utilization trend has been estimated to rise by 70 percent according to a report by the American Medical Association. During pre-pandemic times, only five percent of patients utilized telehealth, compared to 25 percent of patients during 2020. According to the Health Resources and Services Administration (HRSA), telehealth refers to the utilization of electronic information and telecommunication technologies to support and promote long-distance clinical and administrative health care services. Moreover, the Health Insurance Portability and Accountability Act (HIPAA) requires healthcare provider entities to observe patients' data privacy, and security while providing telehealth services. This research in progress aims to investigate the utilization of privacy and security consent protocols, awareness, and healthcare employees' training as evidence for HIPAA security and privacy compliance during telehealth consultations. The results of this investigation will highlight the challenges to healthcare providers, as well as report the results of feedback obtained from a 30-member expert panel that validated a survey developed in this study. The validation process is critical to ensure internal validity of the survey prior to administering it to study participants. Moreover, the validation process includes a quantitative survey gathering feedback about the survey items as well as a small team of qualitative method gathering feedback about the survey and research protocol. Subsequently, the validated survey will be provided to small and midsize healthcare clinics in South Florida. Results of this research effort will aid healthcare providers to increase their familiarity with HIPAA privacy and security compliance.

How the Molecular Vibrations of Water may Prevent Skin Cancer

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Abstract

Studies have shown that when DNA absorbs ultraviolet light it can become structurally damaged leading to a mutation and possibly skin cancer. However, exposing skin to sunlight rarely leads to a mutation. This indicates that after the ultraviolet light is absorbed by the DNA the energy from the light can either cause a structural change to the DNA (a mutation) or be dissipated in a way that does not damage the DNA. Absorption of ultraviolet light causes molecular vibrations in DNA and these vibrations are what likely leads to structural changes in the DNA. One way the structural changes could be avoided is by vibrational energy transfer from DNA to nearby water molecules. To investigate this potential mechanism, molecular dynamics simulations and electronic structure calculations have been performed on model systems for DNA base pairs. These calculations have given insight into if vibrational energy transfer between DNA and nearby water molecules is feasible, which in turn has provided a greater understanding of a potential mechanism by which skin cancer is avoided.

Identification of Bacteria and its Secondary Metabolites from Unique Paleosol

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Abstract

The ‘Golden Age of Antibiotics’ is coming to an end due to chronic misuse and abuse of antibiotics. Bacteria produce novel chemical compounds as a means of defense against other competing bacteria in their natural soil environments. Humans can utilize these compounds as novel antibiotics, as a means of combating pathogens that developed mechanisms to oppose these commonly used antibiotics. Scientists have decided that exploring regions of the earth that have been minimally impacted by human interference may contain answers that the medical field has been after in terms of solving the antibiotic crisis. The answers may exist in soil from these unique landscape regions, in particular from ancient soils that date back thousands of years. Our team worked with soil from South Dakota, deemed Paleosol, that has been determined to be from a period approximately 13,000 years ago. During the Bølling Allerød, a unique period of warmer climate conditions fell between two historical ice ages. Given the changes in the environment, it is believed to be soil minimally affected by humans. Based on the unique properties and content of Paleosol, we aim to discover bacteria from this soil and identify any chemical compounds that exhibit antibiotic properties. Furthermore, we aim to perform chemical analysis of these compounds to compare them with the compounds made by bacteria obtained from soil in present time.

Impacts of Social Enrichment on Shelter Operations and Canine Welfare

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Abstract

~2,000,000 dogs are adopted from shelters each year; many have long and stressful residencies and ~10% are returned after adoptions for behavioral or other complications. Social enrichment programs aim to reduce shelter residencies and improve adoption placement success by providing stress-reducing social enrichment to resident animals. In this study, we test whether these programs measurably impact stress biomarkers in dogs, and whether they result in more rapid or successful adoption outcomes. We will use public data from Broward County Shelter (including the focal dogs' in-shelter enrichment regimes), to test our hypothesis that enrichment expedites adoption and/or increases the likelihood of successful placements in adoptive homes. Additionally, mtDNA copy number relative to nuclear DNA copy number (mtDNAcn) will be used to measure stress levels in shelter dogs that receive varying levels of social enrichment (vs. 'no-enrichment' controls). To facilitate mtDNAcn quantification, we have reviewed the literature and public genomic datasets to 1) identify and develop primers for evolutionarily-conserved, single-copy loci within the canine mitochondrial genome (MT-ND5) and nuclear genome (PDK1) for qPCR quantification at NSU, and 2) develop non-invasive protocols for sampling oral mtDNAcn from focal animals at the Broward County Shelter. Pending ICAUC approval, we will also present validation of our method for quantifying mtDNAcn and estimate within- and between-animal variance in this emerging stress biomarker. Our studies will provide insight to the potential benefits of expanding enrichment programs in shelters, and also the first-ever evaluation of mtDNAcn as a prospective stress biomarker in domesticated dogs.

Implications of COVID-19 in Global Anatomy and Physiology Education: A Comprehensive Analysis

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Abstract

Owing to the Coronavirus Infectious Disease 2019 (COVID-19), the higher education sector worldwide saw a significant disruption in several disciplines – especially the ones in STEM and healthcare sciences that require active, experiential learning via practical application of concepts centering around Anatomy and Physiology. Dynamic instructional and technological interventions took place rapidly in an effort to minimize the adverse repercussions of moving away from traditional means of education in these critical scientific fields. COVID-19 necessitated administrators, faculty, students, and interns at colleges, universities, medical/healthcare science programs and residencies to pursue teaching, learning, and assessment of Anatomy and Physiology courses/curricula through innovative strategies without compromising the quality or rigor of education. Adaptation and integration of remote/hybrid learning and teaching methodologies were essential, along with governmental as well as organizational interventions. Alternative synchronous and asynchronous approaches of e-pedagogy were implemented through simulation labs, virtual cadaver dissections and histological examinations, recorded video-lectures, online meeting platforms, and cutting-edge technological software and tools to maintain the quality of education while prioritizing everyone's health and safety. Based on varying economic stability, countries and regions dealt with the ramifications of COVID-19 on Anatomy and Physiology education differently. Our review encapsulates, for the first time, original reports published around the world from the past three years on such key implications of COVID-19 in Anatomy and Physiology higher studies, combined with relevant recommendations. This comprehensive analysis would help improve the content, delivery, and efficacy of education in these clinically important disciplines to facilitate better preparation for pandemics in the future.

Influence of Parental Voice Across Modalities in the Neonatal Intensive Care Unit

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Abstract

Premature infants are at risk for developing delays including impaired social language, linguistics, and cognitive competencies compared to infants who were born full term. This is primarily due to necessary medical and environmental factors. Premature infants can experience long periods of early separation from their parents and exposed to unnatural noxious auditory stimuli (i.e. machine alarms). The purpose of this scoping review of the literature, is to determine if early consistent exposure to the parental voice in any communication capacity, including reading, singing, or speaking tasks, decrease developmental delays in infants.

Scoping review revealed that early exposure to parental voice improved motoric and sensory development in premature infants as well as weight gain, sleep and feeding milestones. Early and consistent parental voice exposure can directly impact the premature infant's motoric and sensory development. Practical suggestions are provided to promote the utilization of parental voicing in multi-modal capacities in the neonatal intensive care unit (NICU). This scoping review revealed that there needs to be continued clinical research and application to determine long-term effects.

Investigating structural alterations in antagonistic peptides for the development of orally bioavailable PCSK9 inhibitors

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Abstract

Familial Hypercholesterolemia (FH) is an autosomal genetic disease that causes elevated blood levels of low-density lipoprotein (LDL). One of the leading causes of FH is gain-of-function mutations in the gene coding for proprotein convertase subtilisin/kexin type 9 (PCSK9). The PCSK9 protein binds to LDL receptors (LDLR) on the surface of hepatocytes and promotes their degradation, preventing the recycling of LDLRs and thus increasing LDL blood levels. Monoclonal antibody therapies that bind to PCSK9 inhibiting LDLR binding are currently only available as an injection. However, several orally bioavailable PCSK9 inhibitors have been formulated and are undergoing clinical trials. One such therapy contains small-molecule-peptide inhibitors that bind to a cryptic site (N-terminal groove) adjacent to the LDLR binding site located in the catalytic domain. The peptide must consist of two components: a helical peptide with a high binding affinity to PCSK9 and an appended extension with antagonistic properties to inhibit LDLR binding. Using two known PDB structures containing two unique, theorized removable peptides (A - 5VLP and B - 6U3I) in the N-terminal groove, a three-dimensional printed model was created to demonstrate the interactions and proximity to a hydrophobic pocket. Through the 3D model, it was visualized that Peptide A had a beta-turn that precluded further extension into the target site, limiting its antagonistic ability. On the other hand, Peptide B's attached organic moiety reached the hydrophobic pocket in the proximal LDLR binding region thereby increasing the binding affinity by >100 fold with reduced overall mass leading to an improved oral therapeutic.

Investigating The Mechanisms of Active Site Mutations to the 1T9G WT MCAD Protein to Better Understand Medium Chain Acyl-CoA Dehydrogenase Deficiency (MCADD)

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Abstract

The human disorder Medium-Chain Acyl-CoA Dehydrogenase Deficiency (MCADD) hinders β -oxidation (catabolizing one's fats for energy), affecting approximately 1 in 17,000 people in the United States. Once mutated, the Acyl-CoA Dehydrogenase Medium-Chain (ACADM) gene, which is solely responsible for MCADD, is unable to produce enough MCAD enzymes to metabolize medium-chain fatty acids, causing fats to not catabolize, resulting in symptoms of lethargy and hypoglycemia, as well as damage to the brain and liver due to buildups of unused fatty tissue. The purpose of this project was to investigate the possible and known effects of different amino acid mutations on the human Medium-Chain Acyl-CoA Dehydrogenase (MCAD) protein and, utilizing bioinformatics software (PyMOL for modification, PyRx for computerized docking, LigPlot+ for active site identification, & Jmol for 3D printing), produce a color-coded 3D-printed model based on each mutation's K_M value to explain the molecular story and individual mutation effects of MCADD. This model builds on previous bioinformatics and in vivo experiments aimed at revealing the underlying enzymatic mechanisms of MCADD. The use of the 3D model was beneficial, enabling model viewers to locate, determine, and hypothesize the mutations and their effects on MCAD, in addition to providing a visual and physical learning aid for researchers, professors, students, and other biomedical professionals. Furthermore, the clarity produced by a physical model ultimately enables further research for MCADD and may assist in the development of a cure for those who unfortunately suffer from this rare condition.

Investigating the Metal-Binding Properties of Chitosan and Bisphosphonate Functionalized Chitosan

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Abstract

Functionalized polymers can be used as chelating agents to remove heavy metal contaminants from water. Chitosan is a biologically derived and commercially available polymer with a wide variety of clinical and industrial applications. The primary amine pendant group on the repeat unit of chitosan has the potential to act as a metal binding site due to the presence of a lone pair on the nitrogen atom. The purpose of this study was to functionalize deacetylated chitosan with a tridentate group to enhance its metal binding potential through the addition of more ligand binding sites. Specifically, a multicomponent Moedritzer-Irani reaction was utilized to transform the primary amine into an aminobisphosphonate group, which serves as a tridentate ligand. Functionalization reactions were conducted with deacetylated chitosan, phosphoric acid, hydrochloric acid, and paraformaldehyde under reflux or microwave irradiation. The degree of functionalization was varied by controlling the reaction stoichiometry and reaction time and measured through infrared spectroscopy (IR) and nuclear magnetic resonance spectroscopy (NMR). Functionalization ranged from 10% to over 90%, depending on the chosen conditions. The metal binding properties of the functionalized chitosan derivatives with varying degrees of functionalization will be compared to determine the effect of adding a tridentate bisphosphonate group on binding efficiency.

Kinematic Analysis of the Golf Swing in Collegiate Golfers using Titleist Performance Institute (TPI) screen and motion capture K-Vest system.

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Abstract

Back pain has become a common injury in today's society. Not only does it affect the general population, but it has been found to largely affect golfers, greatly affecting their performance and ultimately their career. However, screenings such as the Titleist Performance Institute (TPI) screen and motion capture systems, K-Vest, have been developed to test golfers for certain postures to prevent injury from occurring. The purpose of this project was to assess the physical and kinematic sequence of the golf swing in male and female collegiate athletes as an injury prevention method. 10 male and 9 female collegiate golfers were tested during pre, mid and post season with the Titleist Performance Institute (TPI) screen, as well as 6 male and 4 female collegiate golfers with the K-vest system for injury prone movements during the golf swing. S-posture, loss of posture and early extension were found to obtain the highest values in both collegiate male and female golfers for the TPI screen, while lower speeds in male and female pelvis and torso led to inconsistent upper arm and hand speeds in the K-Vest system test. Improper golf posture such as S-posture, loss of posture and early extension can have negative impacts on a golfer's performance by further exposing the player to the risk of injury while playing. Additionally, lower kinematic speeds in the pelvis and torso during the golf swing will cause the player to have slower arm and hand speeds, further limiting peak sports performance.

Mastering AES: A Deep Dive Into the Advanced Encryption Standard

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Abstract

AES stands for Advanced Encryption Standard, and it serves as the most popular symmetric encryption algorithm to date. The term ‘symmetric’ implies that the same key encrypts and decrypts; this is an important detail for the design and implementation of the algorithm. Encryption is crucial in today’s world since it plays an essential role in everyday life. Wi-Fi, Online Banking, and many more, all rely on encryption to keep them secure. Some of the more technical processes that AES typically works with include HTTPS and SSL/TLS protocols, since they handle the authenticity and data integrity part of digital certificates and signatures, as well as IPSEC and secure wireless protocols. In general, AES is known as a block cipher, ‘cipher’ meaning the algorithm used to encrypt or decrypt a given message, since it takes in blocks of 16 bytes and encrypts each block. For this project, we consider the famous Advanced Encryption Standard (AES) and analyze its fundamental structure and the properties that make it work, which borrow from various theoretical Mathematical concepts such as Galois Fields, Prime Factorization, and Matrix Theory. Moreover, we go further in our approach by trying to implement the encryption scheme ourselves using the programming languages C and C++. We extend our analysis to the decryption process of AES, as well as the technical design and attributes such as the padding, key length, and number of rounds. Alongside our analysis, we also compare AES to other popular encryption schemes such as the RSA Algorithm and DES.

Mathematics Models for Aedes Albopictus Population Pattern in Miami-Dade

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Abstract

Miami-Dade's humid tropical climate is conducive to an outbreak of vector transmission diseases. To protect their residents, cities in those areas enforce spraying schemes to keep the mosquito population under control. However, collecting data from mosquito traps alone cannot provide sufficient information for an effective and efficient spraying system. Hence, this research seeks to find mathematical models that reflect a dominant mosquito Aedes Albopictus population in South Florida's areas. We determined the parameter of life span, oviposition, juvenile survival, and development rate models driven by the temperature using computer simulation. For further study, we compared Aedes Albopictus and Aedes Aegypti. Then, we will apply the Markov Chain Monte Carlo algorithm to fit the Aedes Albopictus population model in an annual cycle.

Minimum Blockers of 123-Avoiding Permutation Matrices

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Abstract

A blocker of $n \times n$ permutation matrices is a set of positions in an $n \times n$ matrix that intersects each permutation matrix at least once. A blocker is minimum if removing any position makes it no longer a blocker. The Hankel cyclic decomposition implies that each minimum blocker of 123-avoiding permutation matrices must have a cardinality of at least n , and minimum blockers containing exactly n positions are called minimal blockers. The well-known Frobenius-König theorem characterizes the minimal blockers of permutation matrices: any $r \times s$ submatrix is a minimal blocker of all permutation matrices if and only if $r + s = n + 1$.

Recently, Brualdi and Cao characterized the minimal blockers of 123-avoiding permutation matrices, focusing on L -shaped blockers. We continue their study by defining minimum flag-shaped blockers, which we show are generalizations of L -shaped blockers. We investigate the upper and lower bounds of the dimensions of faces, determined by the minimum blockers, of the polytope generated by 123-avoiding permutation matrices.

Mother-Calf Contact Exchanges in Bottlenose Dolphins

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Abstract

The relationship between a dolphin mother and her calf has been well studied, but details regarding tactile exchanges within these dyads are limited. Contacts between five adult female bottlenose dolphins (*Tursiops truncatus*) and their calves were examined from video collected in October 2017, 2018, 2019, and January 2018. Of the 312 contact events documented, 289 had a clearly initiating dolphin, who started the behavior. Calves initiated 65.7% of contacts, with 82.6% categorized as affiliative, initiating with body parts besides rostrum or fluke, while 77.8% of mother-initiated contacts were affiliative. Therefore, the overall trend for mother-calf contacts was affiliative. Agonistic contact from mothers increased slightly as calves aged from one (C1) to three (C3) years. Mothers rarely used the dorsal fin to contact their calves, rather initiating mostly with their body; no pattern in body part use existed in relation to calf age. Four mothers consistently used the fluke for agonistic contact while the other additionally used her rostrum with her C3 calf. All three calf ages used affiliative body contacts though C3 calves used these most often. C1 calves also initiated contact with the dorsal fin and pectoral fins, which might be an artifact of echelon and/or infant swim positions. Calves initiated agonistic exchanges predominantly with the fluke, though one C1 calf initiated most of these. These results support the notion that mother-calf dyads share more affiliative than agonistic contacts, expanding our knowledge on tactile mother-calf relationships.

MunkgeeRoachy: A *Gordonia rubripertincta* Bacteriophage Isolated from Soil

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Abstract

There are many bacteria that are growing resistant to antibiotics. Therefore, there is an urgent need for alternative therapies. Bacteriophage therapy, the use of viruses to treat bacterial infections, is a promising alternative. The goal of this project was to isolate and identify phages from soil samples that infect *Gordonia rubripertincta*. *G. rubripertincta* is a gram-positive bacterium that is typically found in soil and aquatic habitats. *Gordonia* species are rapidly becoming associated with human and animal diseases. Infections of *G. rubripertincta* have typically been found after various surgical procedures such as the applications of catheters, or the use of heart-lung machines. In this experiment, a soil sample was collected at Wolf Lake Park in Davie, Florida to isolate bacteriophage that eliminate *G. rubripertincta*. The phage was isolated from the soil sample using a direct isolation method. Phage purification was conducted to ensure that unique phage was present in the sample. To purify the phage, isolated plaques were picked, diluted, and subjected to additional plaque assays. The phage (MungkeeRoachy) was successfully isolated after three rounds of purification. To produce a high concentration of phage, plaque assays were repeated, and the phage lysate was collected. Once the high-titer lysate was obtained, the phage was characterized by its genome. The DNA was extracted and then sent for sequencing. The phage sample of MunkgeeRoachy was imaged with Cryo-EM. Based on morphology, they were classified as being siphoviridae. Future applications can entail using the phages found as an advantage for bacteriophage therapy.

NFL Draft Trainee Performance Profiling by Position

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Abstract

The purpose of this study was to profile NFL draft trainees on physical and performance characteristics. Fifty-four players were categorized into Big, Big-skill, and Skill groups. We measured body fat (BF%), lean body mass (LBM), total mass, sprinting forces and ground contact time (GCT), jump height (JH), jump absolute (AJP) and relative (RJP) power, and reactive strength (RS). ANOVA determined between-group differences. Profiles were viewed via Z-score radar plots. There was a significant between-group difference in characteristics, $F(24,76)=5.18$, $p<0.001$; Wilk's Λ , partial $\eta^2=0.621$. Post-hocs showed Skill had greater JH ($p<0.001$), RJP ($p<0.001$), and RSI ($p=0.005$) versus Big. Big had greater values versus Skill and Big-Skill in BF% ($p<0.001$), total mass ($p<0.001$), LBM, ($p<0.001$), AJP ($p<0.001$). GCT was longer in Big versus Skill ($p<0.001$) and versus Big-skill ($p=0.007$). Sprinting force was not different, $p>0.025$. Body composition and jump performance differences are pronounced between Skill and Big. Big-skill possess characteristics from both groups.

No Evidence of Recovery After the DWHOS in the Abundance of the Five Dominant Families of Micronektonic Crustaceans in the Gulf of Mexico

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Abstract

Micronektonic crustaceans are an essential element of the global marine food web. A number of studies conducted between 2011 and 2015 indicated that there was a significant decrease in all families of micronektonic crustaceans sampled on these cruises. The sampling was in the vicinity of the *Deepwater Horizon* oil spill, which may have contributed to the die-off. Two datasets from 2021 and 2022 were analyzed in the current study to determine if there have been any signs of recovery. Statistical analysis determined that there was no significant difference between the 2021 and 2022 datasets, even though the abundances for three families were still declining, indicating that there are no signs of recovery in this ecosystem.

Nutraceutical Supplementation Effects on Perceptive Fatigue Symptoms in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: A Systemic Review

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Abstract

Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) is a seriously debilitating disease characterized by long lasting fatigue and exhaustion that does not improve with rest. ME/CFS is reported in individuals of all ages and various racial, socioeconomic, and ethnic groups. This condition has no standard treatment but supplementation with vitamins and other nutraceuticals have been recommended by clinicians to manage the patient symptoms. The evidence of efficacy of these nutraceuticals or diet strategies are however absent from the current literature. The intent of this systematic review is to evaluate the ClinicalTrials.gov, a registry of clinical trials run by the United States National Library of Medicine at the National Institutes of Health, for the most recent nutrient supplementation and diet-based interventions on patients with ME/CFS. Registries improve the quality, integrity, and transparency of clinical trials by providing a standardized platform for reporting study design and results, and thus reducing the biases related to selective reporting practices. Systematic reviews using these registries therefore are an efficient pathway to acquire current medical evidence for use in clinical decision-making and development of practice guidance in various fields. The results of this review showed several supplements that improved symptoms of fatigue in ME/CFS patients. However, many of these registered clinical trials did not employ NINDS suggested common data elements (CDE). These standardized outcome measuring tools allows generalization and true comparison of the patient reported outcomes.

Photodynamic Inactivation (PDI) of Microorganisms with Nitrogen Substituted Meso-Pyridyl Porphyrin Structures

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Abstract

Photodynamic Inactivation (PDI) is an antimicrobial approach targeting pathogens independent of antibiotic resistance. The growing international concern for the rise in drug resistant microorganisms has driven for research in approaches that will keep these microbes from developing any immunological adaptations. Photosensitizers are molecules activated by light that produce reactive oxygen species (ROS) lysing and causing cell death in structures of microbes and in diseased mammalian cells. The photosensitizers applied in this experiment are meso-Tetra(N-methyl-pyridyl)porphine tetrachloride structures. Three variations of the nitrogen placement were used to understand the interactions between such and the bacterial cell wall of *Escherichia coli*. These compounds were selected for their reactivity, allowing for multiple interactions to be observed between each porphyrin and the gram-negative *E. coli*. Minimum inhibitory concentration (MIC) tests were conducted to determine at what concentration will each porphyrin work most efficiently in eliminating microorganisms. In determining its efficiency, the primary objective of this experiment is to advance photodynamic inactivation techniques to be applied to microorganisms eliminating any form of resistance.

Pilot Study of A375 Melanoma Xenograft in Nu/Nu Mice

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Abstract

Pilot studies play an important role prior to conducting a full-scale research study as they determine crucial components of the study, such as sample size and whether or not randomized control trials (RCTs) will be feasible. In this pilot study, 5 male and 5 female Nu/Nu mice that were approximately 25 grams and 7 weeks old were injected with 2 million A375 cells in 0.2 mL of the right flanks of the mice. Once the tumors became palpable, their volumes were measured three times per week using a caliper. Upon completion of the study, average tumor volumes and standard deviations were tabulated and used to estimate sample size for future xenograft studies. As a result, the IACUC protocol was updated to use 14 mice per group based on the pilot study. Based on our findings, plans were made to start studies on the drug-resistant A375 melanoma xenograft efficacy model of the compounds 2155-14 and 2155-18.

Postpartum Depression: The Effects of Misdiagnosis on Maternal and Infant Health

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Abstract

Postpartum depression is a psychiatric disorder that has been recognized since 460 B.C., thousands of years before it was officially classified in 1926. Although awareness of postpartum depression, its signs, and treatment of women affected by the disorder has been increasing throughout the century, around 66% of postpartum depression cases are often undiagnosed or misdiagnosed. Postpartum depression negatively impacts the development of mothers and optimal development of a child as it fosters an unhealthy environment. Detecting postpartum depression at an early stage, such as the postnatal period, allows for it to be treated as soon as possible to minimize the harmful long-term consequences. The content will be sourced from studies measuring how PPD affects members of the family behaviorally, cognitively, emotionally and psycho-socially. With extensive research, consideration of both environmental and social factors, the development of a new, extensive PPD risk assessment will be developed. Expecting mothers and fathers will be screened for possible risk for development of postpartum depression, with questions that analyze home environment, intimate partner relationships, and the feelings of the expectant parents regarding the birth of the child. There will be a reduced risk of mis-diagnosis as the implementation of early-stage interventions are beneficial to both mother and child.

Reassessing taxonomic classification of the zoanthidean *Epizoanthus giveni* using marginal musculature as a defining character

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Abstract

The ability to identify species as individual units of evolution determines our capacity to link individuals to all knowledge of structure, function, and evolution of biological systems. Species that are misclassified will be linked to the wrong catalog of knowledge, errors which may propagate through the literature in unpredictable ways. Zoanthidean taxonomic classifications are commonly determined using histological sections of the marginal musculature, which is responsible for polyp retraction and has diverse structural components unique to different taxa. Although classification defined by marginal musculature has been used over time, publications since 2015 have increasingly expanded the working knowledge of this character and its importance in determining evolutionary relationships. *Epizoanthus giveni* was described as a new species of zoanthidean from Southern California in 2009 by Philipp and Fautin. This species was assigned to genus *Epizoanthus* due to the “macrocnemic mesenterial arrangement and mesogleal marginal sphincter muscle,” (Philipp and Fautin, 2009). However the images published in the original species description did not reflect this assessment and revisiting the histological slides prepared by the original authors did not improve this incongruency. By preparing new serial sections from the type specimen and integrating recent knowledge about the marginal musculature, we will reassess the validity of this species. Photographs of the marginal musculature and actinopharynx were taken from these slides and measurements of taxonomically important characters were collected and documented within Morphobank.

Red Dog Loess, A Last Glacial Dust Deposit, White River Badlands, S.D.

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Abstract

Understanding the detrimental effects of prehistoric climate change is essential to understanding our potential for future global climate disasters. During the Last Glacial Period (LGP) beginning around 70 thousand years ago, as Earth's temperature dropped, the midcontinent grew increasingly dry, resulting in the ecological collapse of the Great Plains grassland ecosystems. Due to the breakdown of the grasslands, wind eroded the Great Plains, depositing vast amounts of windblown dust (loess). These loess deposits form valuable midcontinental agricultural deposits in Nebraska and Iowa. This study aims to identify the origin of the loess found on mesas in the White River Badlands (WRB) of South Dakota, which is called the Red Dog Loess. If the composition of the Red Dog Loess is similar to the composition of sediments from other environments in the WRB, then this supports a local source. To test this hypothesis, we analyzed the geochemical composition and particle size distribution of sediments from various environments (streams, floodplains, bedrock) in the WRB and compared these results to the composition of the Red Dog Loess. Preliminary results show compositional similarities between stream deposits and the Red Dog Loess, supporting the hypothesis of a local source. We believe that local ecological collapse in the WRB correlates to global climate events including the LGP, as well as more recent Holocene (last 12,000 years) climate shifts such as the Medieval Climate Anomaly, and the Little Ice Age. Understanding the effects of these climate events could help predict future catastrophic events across the Great Plains.

Reducing Inoculum Effect by Modulating Growth Productivity through the Superpathway of Purine, Pyrimidine and Histidine Synthesis in *Escherichia coli*

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Abstract

It is estimated that by 2050, 10 million people will die annually due to infections caused by antibiotic resistant bacteria. An understanding of the mechanisms that bacteria use to resist antibiotics is essential for extending the usefulness of our existing antibiotics. One mechanism that bacteria use to resist antibiotics is the inoculum effect (IE). During IE, high-density bacterial populations require higher concentrations of antibiotics to be killed compared to low-density bacterial populations. Recently, it has been discovered that growth productivity, defined as the relationship between ATP and growth rate, can explain IE for multiple antibiotics. If growth productivity is sufficiently high, IE is abolished. However, the underlying mechanisms and pathways that are critical in determining growth productivity are yet to be fully understood. Accordingly, we sought to identify pathway(s) critical in determining growth productivity and thus IE. We first used flux balance analysis coupled with whole-genome modeling and OPTKNOCK to computationally quantify changes in growth productivity as a result of single gene mutations. We found that many genes linked to increased growth productivity are concentrated in the super pathway of pyrimidine, purine, and histidine synthesis. To potentiate activity through this pathway, and rationally manipulate growth productivity, we measured IE of carbenicillin and streptomycin in the presence of exogenously added nucleotides. We found that supplementation of cultures with select nucleotides could increase growth productivity and reduce IE. Overall, our results suggest that flux through the super pathway of pyrimidine, purine, and histidine synthesis is critical in determining IE.

Regulatory Roles for Stress Responsive Transposable Elements in Rice

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Abstract

Transposable elements, or mobile DNA sequences, are known for their structural and functional roles in the rice genome. As sources of genetic variation and drivers of evolution, transposable elements have been extensively studied for their regulation of gene expression and alteration of phenotypic traits. In addition, transposable elements are shown to be activated in response to various biotic and abiotic stresses. As the global temperature rises, heat stress threatens crop production worldwide. Research has shown that heat stress hinders optimal rice growth, development, and yield. Concern for food security amidst a growing population calls for development of novel methods to study regulation of gene expression in response to heat stress. The stress-induced activity of transposable elements can possibly serve as a contributor to heat stress adaptation in rice by modifying the expression of genes. Two rice varieties, Cypress and LaGrue, are known to perform well and poorly, respectively, under high night temperatures (HNT) based on their ability to withstand heat stress during growth and development. Using these two contrasting genotypes and their varied response to HNT conditions in terms of differentially expressed genes and transposable elements, we will explore the role of stress-induced transposable elements in regulating gene expression under heat stress. This information will be fed into Machine Learning algorithms to create predictive models of genes that can be used to manipulate rice plants to withstand high night temperatures resulting in improved grain quality and yield.

Repeated Mild Traumatic Brain Injuries and Increased Dementia Risk: A Pilot Study Investigating Cerebral Amyloid Angiopathy as a Mechanistic Link

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Abstract

Traumatic brain injury (TBI) is estimated to affect ~69 million people worldwide each year. Mild TBI's are the most common form of brain injury, characterized by little-to-no time unconscious and minimal observable deficits immediately post-injury. Mild brain injuries are commonly attributed to participation in contact sports and military service. Even mild TBIs, especially repeated injuries, have devastating long-term consequences, including an increased risk of stroke and dementia. Therefore, it is of great interest to determine the mechanisms that drive the relationship between different types of TBIs and various aspects of dementia-associated neuropathology, so that targets for intervention may be identified. Repetitive mild TBIs are most notably associated with chronic traumatic encephalopathy (CTE; a tauopathy), though some evidence suggests they may also contribute to Alzheimer's disease and other neurodegenerative conditions. On the other hand, less is known about whether cerebral amyloid angiopathy (CAA) may also be a mechanism linking TBI to dementia. CAA is the accumulation of amyloid protein (most commonly beta-amyloid, associated with Alzheimer's disease) within the cerebral vasculature, contributing to increased risk of dementia [both vascular contributions to cognitive impairment and dementia (VCID) and Alzheimer's disease], as well as ischemic and hemorrhagic stroke. Increased levels of CAA are observed in former athletes, who tend to have a history of repetitive mild brain injuries; however, animal studies are needed to experimentally determine whether and how repetitive mild TBIs influence the initiation and progression of CAA and related pathologies. Current work will be investigating this link between repetitive mild TBI and CAA progression in mice. Our long-term goal is to identify mechanisms linking TBI and increased dementia risk, which may in turn reveal novel targets for treatment.

Research in Anatomy and Physiology During COVID-19: Global Lessons Learnt and Future Recommendations

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Abstract

The persistent Coronavirus Infectious Disease 2019 (COVID-19) pandemic caused significant disruptions of research studies within the fields of Anatomy and Physiology. As the pandemic resulted in many governmental and institutional restrictions, it became increasingly challenging to pursue research in general. Disciplines like Anatomy and Physiology that require kinesthetic/tactile application of concepts or testing hypotheses through hands-on active engagement were either halted or slowed down, as the new social guidelines and risks to certain groups of people hindered up-to-date research-data collection. This called for the design and adoption of innovative scientific and technological research tools and protocols. An effort to help students, scholars, and scientists perform research better remotely has integrated alternative strategies that may not effectively replace but complement or supplement physical means of experimentation; for instance, anatomical and physiological investigations on cadavers or volunteer subjects, development of vaccines, etc. Our study presents a systematic analysis of reports published globally from last three years on the key lessons learnt about navigating Anatomy and Physiology research amidst COVID-19, along with pertinent recommendations reported to potentially aid in preparing these scholarly areas for future pandemics. The COVID-19 pandemic has revolutionized the ways of developing and conducting research worldwide in Anatomy and Physiology. Therefore, a comprehensive understanding of such interventions around the world would foster these critical research disciplines in healthcare and STEM.

***Sargassum* Accumulation at Von D. Mizell-Eula Johnson State Park**

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Abstract

Sargassum is a typically floating phaeophyte (brown alga) with important ecosystem functions. It is a producer, generating biomass via photosynthesis, and providing habitat for small epipelagic organisms in the open ocean. In August 2022, large amounts of *Sargassum* were seen on the beach at the northern end of Von D. Mizell-Eula Johnson State Park (VDMEJSP), Dania Beach, Florida, up to 152cm thick. This disturbs the intertidal environment, which is typically composed of carbonate sands, and smothers infauna. Furthermore, this creates ephemeral habitats for species not typically associated here. The extent of *Sargassum* deposits was measured from 7 September through 25 October 2022. We measured thickness and extent of deposits using probes for *Sargassum* depth and GPS coordinates combined with GIS tools. In September, the deposit extended over 7,475m² and by October 6th was reduced to 307.23m² and on 25 October none was observed. Outer wind bands (40-53kph) of Hurricane Ian were primarily directed offshore on 28 September 2022, removing most *Sargassum* deposits. In the future, there will be increasing concern of beach smothering by *Sargassum* since productivity is enhanced by warming and nutrification from the Sahara dust associated with global climate change. In 2022 unprecedented beach accumulations were reported from many Caribbean Islands and Florida. The shoreline topography at the northern end of VDMEJSP increases *Sargassum* deposition due to the presence of artificial jetties that trap eastward transported algae. This study documents extensive accumulations of *Sargassum* at this location and discusses impacts on local environments and associated organisms.

Semantic Priming Across Many Languages

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Abstract

The Psychological Science Accelerator (PSA) is a globally distributed network of labs that conducts studies with the goals of inclusion and transparency. Crowdsourcing data worldwide enables research to be generalized through diverse participants with unique language backgrounds providing worldwide multilingual data. The PSA makes opportunities available for researchers to network and replicate studies. We have been collecting data on a study organized by the PSA. In addition to data collection, we helped to verify translations of the consent form and protocol information from English to different languages. The study examines semantic priming, which occurs when a semantically related prime (e.g. cat) speeds responding to a target (e.g. dog), across multiple languages. In our study, participants viewed English unrelated and related word pairs and decided whether they were words or non-words. We hypothesized that the response to a word would be faster when it is preceded by a semantically related word, rather than an unrelated word. We found that the reaction times were more accurate and faster in related conditions, supporting the idea of semantic priming. Overall, this study improves understanding of word recognition processes and will help create word norm databases in many languages by using a large and diverse participant pool across many countries.

Sex-Specific Differences Resulting from High Fat Diet Observed in Microglial Responses Across Varying Brain Regions

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Abstract

Microglia are the resident immune cells in the nervous system, as they activate and release cytokines in response to immune challenges and maintain brain homeostasis. Consumption of a high fat diet and resulting metabolic disease (e.g. obesity and type 2 diabetes) alters microglial activity; however, studies have yet to explore sex differences in the effects of high fat diet/metabolic disease on microglia across several brain areas concurrently. This is vital given the heterogeneity of microglial distribution, morphology, and function across various pathological states. Male and female C57Bl/6J mice were fed either a low fat (LF; 10% fat) or high fat (HF; 60% fat) diet from 2-6 months of age. Body weight was measured weekly, and glucose tolerance testing was performed to assess diabetic status. Immunofluorescence was performed to quantify markers of microglia (Iba1) and phagocytosis (CD68) across subregions of the cortex, hippocampus, striatum, substantia nigra, amygdala, and hypothalamus, as well as white matter areas, such as the corpus callosum and fimbria. HF diet resulted in significantly increased weight gain and glucose intolerance (prediabetes) compared to LF diet to a similar degree in males and females. HF diet increased microglial activity in males but decreased it in females. Metabolic outcomes were associated in a sex-specific manner (positive correlation in males and negative correlation in females). These findings demonstrate the contrast of microglial responses in males and females following chronic consumption of a HF diet, which may contribute to the different rates of neurodegenerative and psychiatric diseases observed in men and women.

Sex-Specific Effects of High-Fat and Ketogenic Diets on Cognition and Hippocampal Neurogenesis in C57Bl6/J Mice

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Abstract

Poor diet and metabolic diseases (obesity, Type 2 diabetes), are associated with increased risk of neurodegenerative and neuropsychiatric disorders, including Alzheimer's disease, anxiety, and depression. Previous studies suggest that high-fat diet results in sex-specific effects in mice, including adult hippocampal neurogenesis, neuroinflammation, and performance on cognitive-behavioral tasks. The ketogenic diet, a popular weight loss regimen, is characterized by a low-carbohydrate, high-fat, and moderate-protein diet. Under carbohydrate restriction, the body enters ketosis, producing ketones bodies as a source of energy. While the ketogenic diet is very high in fat content, it may also possess neuroprotective properties against brain aging and neurodegenerative disorders, as well as boost mood and cognitive function in young individuals. Further research on the effects of the ketogenic diet remains to be explored in a sex-specific manner. Additionally, most recent research using animal models has generally used a rigorous ketogenic diet, not translationally relevant (nearly 0% carbohydrates). Therefore, the aim of this study is to compare the effects of both a high-fat and a translationally relevant ketogenic diet to a low-fat control diet in adult male and female mice. Evidence from data collected thus far suggests that high fat diet results in significant weight gain and pre-diabetes, impaired spatial memory, and attenuated hippocampal neurogenesis. Conversely, ketogenic diet improved long-term spatial memory particularly in males. These findings demonstrate the relative safety of ketogenic diet compared to high fat diet with some benefits of keto diet being sex-specific.

Sleep Health Matters for All: Wellness Intervention for the Pediatric Down Syndrome Population

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Abstract

Down syndrome (DS) is the most prevalent chromosomal disorder in which an extra copy of chromosome-21 disrupts the development of intellectual abilities. Unique physical manifestations places children with DS at high risk for obstructive sleep apnea (OSA) in which repeated blockages of the upper airway cause difficulty breathing during sleep. 80% of children with DS are afflicted with OSA, and this increases incidences of nocturnal sudden cardiac arrest by 2.57-fold compared to the general population. Manifestations of OSA, such as cognitive impairment and cardiovascular disease, are common in the DS population. However, this often obscures the diagnosis. During May 2021, focus group discussions were facilitated with caregivers to assess current understandings about the severity of OSA. A series of interviews were conducted with pediatric healthcare providers to understand OSA education strategies. By synthesizing the qualitative data from this study, a pilot evidence-based health education program was facilitated in collaboration with Special Olympics in 2022. In 2023, health polices along with the impact of social determinants of health (SDH) was addressed by reviewing literature. In the future, patient data from the pediatric otolaryngology department at Ann & Robert H. Lurie Children's Hospital of Chicago will be analyzed to further understand the impact of SDH. This project has been supported by Special Olympics and Northwestern Medicine. The purpose of this study is to empower families with children living with DS to proactively screen for OSA through improvements in health communication. Interdisciplinary education ensures that children with DS are effectively screened for OSA.

Social vulnerability, built environments conducive to physical activity, and adult obesity in the State of Florida, 2021

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Abstract

Social vulnerability, or a community's ability to respond to stressors on health, might contribute to disparities in obesity rates. For officials to better target anti-obesity efforts, it is also important to understand the contextual factors surrounding social vulnerability from an environmental justice perspective. This study's purpose is to investigate the role of social vulnerability and environments not conducive to physical activity on adult obesity at the county level in Florida. We conducted an ecological, cross-sectional study among the 67 Florida counties. To measure county-level social vulnerability, we utilized the 2020 CDC Social Vulnerability Index (SVI). Environments not conducive to physical activity and adult obesity prevalence were obtained from Robert Wood Johnson Foundation 2021 County Health Rankings. We dichotomized these variables at their medians and performed logistic regression to assess possible associations. Significant differences existed between counties with high and low rates of adult obesity in terms of opportunities for physical activity, and SVI ($p < .05$). In a logistic regression model, counties with high rates of poor opportunities for physical activity (aOR=9.89; 95% CI= 2.97, 32.94) and counties with high SVI (aOR= 4.07; 95% CI= 1.22, 13.52) had greater odds of being counties with high rates of adult obesity. Our results indicate that the intersection between environments not conducive to physical activity and socially vulnerable communities influence adult obesity prevalence among Florida counties. Identifying these socially vulnerable communities is helpful for identifying and responding to counties in need of interventions to address exercise opportunities and obesity.

S-PRG eluate Downregulates Osteoclastogenesis: S-PRG's Possible Indication for Subgingival Caries

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Abstract

Surface pre-reacted glass-ionomer (S-PRG) is a new bioactive filler that has been used for the restoration of tooth decay. S-PRG's unique property to release six types of bioactive ions, including fluoride (F⁻), prevents the adhesion of dental plaque to tooth surface while suppressing tooth demineralization. Although S-PRG may be potentially used for subgingival caries restoration, the possible effect of S-PRG on the pathogenically promoted bone absorption in periodontitis remains unclear. The aim of this study is to investigate the possible inhibitory effect of S-PRG eluate on osteoclasto-genesis (OC-genesis) *in vitro*. S-PRG eluate at the sublethal concentrations, which were formerly determined by WST8-viability assay, were applied to RAW264.7 cells stimulated with or without OC-genesis factor RANKL (50 ng/ml). TRAP staining and pit formation assays were conducted to monitor the effects of S-PRG eluate on the OC-genesis and OCs' bone-resorption function, respectively. S-PRG eluate's effect on the expressions of genes associated with OC-genesis, including, *ocstamp*, *dcstamp*, *cathepsinK*, *nfatc1*, and *acp5*, was measured using Q-PCR. NFATc1, a pivotal OC-genesis transcription factor, was measured using W-blot. At the concentrations tested, S-PRG significantly suppressed OC-genesis from RANKL-primed RAW264.7 cells. The expressions of all OC-genesis-related genes induced by RANKL were significantly down-regulated by S-PRG eluate in a dose-dependent manner. RANKL-mediated induction of NFATc1 was suppressed by S-PRG eluate, suggesting that S-PRG inhibits the RANKL-elicited OC-genesis via suppression of transcription factor required for OC-genesis. These results suggest the possible indication of S-PRG for subgingival caries restoration, due to its effect to prevent periodontitis.

Students' Perceptions of Campus Safety at Nova Southeastern University

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Abstract

Sexual assaults continue to be a significant problem on college campuses. Research suggests that students who do not feel safe on campus tend to suffer levels of anxiety and depression that can interfere with their academic success and positive social experiences. Though Nova Southeastern University's Fort Lauderdale/Davie campus appears to be a safe campus, students' perceptions of safety are not clear. The purpose of this presentation is to present an analysis of student perceptions of safety and the risks of being a victim of violence. Data will be collected using a survey that asks students a series of questions analyzing their perspectives regarding their safety on campus. Using the results from the survey and further research, this project will offer administrators recommendations for how to achieve a safer campus for all students and faculty.

Synthesis of amino-functionalized methacrylamide and methacrylate monomers

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Abstract

Amino-functionalized monomers have versatile applications in the field of medicine. Their current applications include enhanced nucleic-acid based drug delivery as well as the formation of polyplexes for non-viral gene delivery. The cationic amino group in these monomers conjugates with negatively charged amino acids and DNA. One of the most common amino-functionalized monomers is 2-aminoethyl methacrylamide (AEMA). To synthesize the methacrylamide, ethylene diamine is reacted with methacrylic anhydride (or methacryloyl chloride) via nucleophilic acyl substitution. The most prevalent synthesis involves the use of a tert-butyloxycarbonyl (Boc) protection group to ensure that only one of the amino groups is functionalized. This synthesis is expensive, involves numerous steps, and has led to a moderate overall yields. The purpose of this study is to synthesize AEMA using an alternative approach that is more cost-effective and efficient. Rather than using a protecting group, ethylene diamine is directly reacted with methacrylic anhydride. Low temperatures, slow addition, and partial protonation of the diamine help to favor mono-addition over di-addition. Both mono and dimethacrylamide products are formed in about a 3:1 ratio and can be further purified to yield the pure AEMA monomer in good yields. Another alternative is to synthesize 2-aminoethyl methacrylate, another amino-functionalized monomer. The reagent for this synthesis, 2-aminoethanol, undergoes protonation of its amino group at low pH. The non-protonated hydroxyl group can then selectively react with the methacryloyl chloride to form the monomer. Though these are structurally similar monomers, the presence of different carbonyl functional groups results in different properties in terms of their application. The use of these alternative methods can be effective routes in synthesizing amino-functionalized monomers.

Synthesis of antimicrobial polymers via RAFT polymerization

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Abstract

Antimicrobial polymers are important in the field of medicine as they are able to kill bacteria and reduce bioburden by mechanisms that differ from traditional antibiotics. Due to their different mechanism of action, antimicrobial resistance is less likely to occur, and many antimicrobial polymers show great biocompatibility with eukaryotic cells, reducing potential side effects. Most antimicrobial polymers are inspired by naturally occurring antimicrobial peptides which typically contain nitrogen cations that can break up the negatively charged cell wall of bacteria, ultimately leading to cell death. The main purpose of this study is to synthesize several different antimicrobial monomers that are then polymerized using reversible addition-fragmentation chain transfer (RAFT) polymerization. The three monomers of interest contain cationic groups similar to those found in antimicrobial peptides: an ionizable primary amine group, a quaternary ammonium salt, and a biguanide group. All monomers are characterized by H NMR and IR spectroscopy to confirm structure and purity. The monomers are then polymerized by aqueous RAFT polymerization to create water-soluble homo- and copolymers with varying incorporation of the three different monomers. RAFT polymerization allows precise control over molecular weight and polymer architecture in order to determine the impact polymer structure on antimicrobial effectiveness.

Synthesis of Metal Binding Polymers for Water Purification

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Abstract

Water is one of the most precious resources on our planet, making up roughly two thirds of the earth's surface. Despite the abundance of water, access to clean water has become increasingly difficult. Decades of industrial activities and neglect for the environment have contributed to water pollution. Heavy metals, a common water pollutant in drinking water, are known to cause damage to multiple organs and are one of the major causes of cancer as well as other life-threatening conditions. Removal of heavy metal contaminants is a critical part of water purification. While several methods exist, the use of polymers to bind heavy metals offers many advantages over comparable methods, such as improved efficiency and elimination of harmful byproducts. The purpose of this study is to synthesize various chelating polymers with different functional groups and different polymer architectures to determine their efficiency at extracting heavy metals from contaminated water. A single polymer can be functionalized with a variety of metal binding groups, creating a "library" of metal chelating polymers for detailed binding studies. With a controlled polymerization technique, the molecular weight and chain functionality can be manipulated. The polymer poly(pentafluorophenyl acrylate) (PPFPA) was synthesized using reversible addition-fragmentation chain transfer (RAFT) polymerization. This polymer was functionalized with various nucleophiles to install chelating groups onto the polymer, which allows for the binding of various metals to the polymer. IR Spectroscopy, F-NMR, and H-NMR were performed to ensure successful synthesis and functionalization.

Synthesis of Metal Binding Polymers via RAFT Polymerization of Activated Ester Monomers and Post-Polymerization Functionalization

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Abstract

Poly pentafluorophenyl acrylate (PPFPA) is an activated ester polymer used for the binding and removal of toxic metals out of solution through filtration. PPFPA was synthesized via reversible addition-fragmentation chain transfer (RAFT) polymerization using pentafluorophenyl acrylate (PFPA) as the monomer to create linear and hyperbranched polymers. RAFT polymerization allows control over molecular weight and the molecular architecture of PPFPA. H-NMR and F-NMR spectroscopy was utilized to assess monomer purity, polymer conversion, and confirm the structure of the final polymer. The purpose of this study is to synthesize PPFPA, a chelating polymer, as well as to functionalize said polymer with different functional groups to determine the efficacy of the functionalized polymer at extracting heavy metals from contaminated water. PPFPA is a modular polymer that is capable of being functionalized with metal binding groups through post-polymerization aminolysis. The modular activated ester polymers were reacted with different chelating nucleophiles to install various metal-binding groups, including phosphonates, bisphosphonates, and carboxylates. Effective functionalization of the final polymers was confirmed by H-NMR, F-NMR, and IR spectroscopy.

Synthesis of Polymer-Drug Conjugates for Controlled Transdermal Drug Delivery

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Abstract

Polymer drug conjugates represent a novel approach for drug delivery belonging to polymer therapeutics. These nano-drug delivery systems consist of biocompatible monomers covalently linked to drug molecules. One of the most recently developed methods of drug delivery is transdermal drug delivery systems (TDDS). A non-invasive alternative to needle injections, TDDS offers many advantages as it exhibits high drug loading and controlled drug release. While transdermal drug delivery systems based on polymeric micelles have been previously studied, there is limited knowledge of how polymer block length and micelle size affect the drug loading and drug release profile. This project aims to explore transdermal drug delivery systems by synthesizing polymer-drug conjugates while controlling the size of polymeric micelles and the release profile of the drug. Biocompatible double hydrophilic block copolymers of N, N-Dimethylacrylamide (DMA), and (Hydroxyethyl)methacrylate (HEMA) are synthesized via reversible addition-fragmentation chain transfer (RAFT) polymerization. The drug is then conjugated to the poly-HEMA block via DCC coupling to generate an overall amphiphilic block copolymer that can self-assemble into micelles. The use of RAFT polymerization offers control over the block lengths and the overall molecular weight, while the drug loading percentage can be altered using stoichiometric control in the DCC coupling. All-trans retinoic acid (ATRA), which is used to treat various dermatological disorders, is used as a model drug. This project will examine how modifications to the block lengths and drug loading impact solubility, micelle size, and drug release.

Synthesis of polymer-drug conjugates for transdermal delivery of all-trans retinoic acid (ATRA)

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Abstract

Vitamin A and its derivatives are heavily used in the cosmetics industry to improve the appearance of skin discoloration, texture, as well as to treat skin disorders. Better known as retinoids, these substances are marketed for their anti-aging and anti-wrinkle effects. A common retinoid, all-trans retinoic acid (ATRA), generically known as tretinoin, has diverse biological activities including promoting keratinocyte proliferation, preventing trans epidermal water loss, inhibiting metalloproteinases, and stimulating angiogenesis within the dermis. Despite its various benefits, ATRA is often toxic and highly unstable in its natural form and as a result, is complexed with proteins or chemically conjugated to monomers to increase its stability. Currently, conventional formulations place ATRA as a bolus at the sight of interest, leading to increased irritability and proinflammatory responses due to immediate activation of retinoic acid receptors. Furthermore, multiple applications are required to maintain a therapeutic effect on the skin. Therefore, a clear limitation is observed for topical retinoid cosmetic formulations. New microparticle approaches for the topical administration of ATRA have been explored including the use of nanoparticles, liposomes, and polymeric micelles, to modulate the proliferation of skin cells. However, limited efforts exist determining how conjugations with biocompatible polymers, and more specifically how controlled polymerizations, can affect the formulation of a retinoid such as ATRA. This project aims to build on research for ATRA delivery systems using polymer-drug conjugates, specifically focusing on controlling the size of the polymeric micelle delivery system to better control the solubility, retention, and release profile of ATRA.

The Abundance of *Streptococcus mutans* Within the Oral Cavity of University Students and Implications for Disease Etiology

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Abstract

Microorganisms within the human oral cavity are part of a healthy ecosystem but can also contribute to disease states by increasing the severity of dental caries, the incidence of gingivitis, and the onset of periodontitis. In particular, patients with poor oral health exhibit a significant increase in the pathogenic microbe *Streptococcus mutans*. However, research shows that *S. mutans* abundance may be related to a SNP within the human genome (an A/G substitution at rs7294985 in the microsomal glutathione-S-transferase 1 (MGST1) gene). Here we address the role of *S. mutans* abundance and SNP genotype ratios within a healthy student population (n =39) and compare these results to previously published global data. We used extracted human and microbial DNA in a SNP assay and qPCR abundance profile test respectively. In NSU students, an average of 10.4% of the total microbiota belonged to the *S. mutans* species, with other healthy populations ranging from 2% to 20% and caries impacted populations from 53% to 95.4%. We then examined the MGST1 SNP which had a class genotype ratio of 0.36 and 0.61 and global ratio of 0.37 and 0.63 for the A and G alleles respectively. Most importantly, we did not see a significant difference between *S. mutans* abundance and the previously reported MGST1 SNP. Despite a small cohort, global genotype data supports these local findings and suggests other health metrics need be utilized outside of *S. mutans* abundance. Future studies would benefit a healthy vs. caries population model which integrates peoples of diverse ancestral backgrounds.

The Democratization of South Korea: A Study of the United States Involvement Pre- and Post-Korean War

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Abstract

The United States has an extensive history of foreign intervention, especially during the latter half of the 20th century. While most Americans know this involvement includes Vietnam, the Middle East, and Latin America, the impact of the United States on South Korea is studied less, earning the Korean War its moniker as the forgotten war. The initial involvement of the US in the development of South Korea began following World War II and continued through the end of the 20th century into the 21st century. The similarities between South Korea and the United States demonstrate the build-up of South Korea following the Japanese occupation and during the American military occupation. Sometimes called a Westernized-Asian state, South Korea was accelerated into a democracy on the world stage with American economic, military, social, and political aid as the United States inserted itself into the nation in the name of preventing the spread of Communism. The lasting impact of US efforts becomes obvious by exploring the American military occupation, the government documents of both nations, including constitutions, and American politics, as South Korea was wielded as a political tool. Although the actions of the US could be considered benevolent, the United States intended to create a copy of itself through a proxy state in a key territory.

The Effect of Anti-Angiogenic Agents JFD and F16 on the Cell Cycle Arrest and Apoptosis Mechanisms in U87 and T98 Glioblastoma Cells

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Abstract

Glioblastoma multiforme (GBM) is an aggressive type of cancer that can occur in the brain or spinal cord, with a 5-year survival rate of only 5%. Two novel anti-angiogenic agents, JFD and F16, have been developed and seem to be favorable for treating GBM. They work by inhibiting tumor angiogenesis, which is the formation of new blood vessels that plays a pivotal role in tumor growth. JFD is a small molecule that was developed for blocking vascular endothelial growth factor receptor (VEGFR). F16 is the second small molecule that can cross the blood brain barrier and block angiogenesis in tumors of the brain such as GBM. The aim of our research was to determine the cell cycle arrest and apoptosis ability of JFD original, JFD Water Soluble, F16, and F16 Analog on U87 and T98 glioblastoma cells using the western blot analysis method. After treating the cancer cells, the levels of APAF-1, Cleaved Caspase-3, PARP, p27 and p21 were analyzed. Our research hypothesized that these marker proteins would correlate with the cytotoxicity of glioblastoma cells. The western blot analysis showed that the expression of p27, PARP, and APAF-1 proteins are altered in T98 GBM cell lines following F16 and JFD treatments. These results require further verification in order to confirm the significance of the changes observed. (This research was supported by the generous funds provided by the Royal Dames of Cancer Research Inc., Ft. Lauderdale, Florida).

The Effect of Sexual Behavior, Gender Identity, and Sexual Orientation on Mental Health Among Adolescents: A Scoping Review

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Abstract

Recent CDC data from 2021 indicates an excess of one-third of high school students are struggling with poor mental health, which is a major public health concern. There is a growing body of literature about the relationship between sexual orientation and gender identity on mental health among adolescents, highlighting the need for further research on the intersection between mental health and sexuality in this vulnerable population. The objective of this scoping review is to provide a comprehensive understanding of existing literature on the relationship between sexual behaviors, gender identity, and sexual orientation on mental health among adolescents. A scoping review methodology was used to identify relevant peer-reviewed articles in accord with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist across multiple databases, including PubMed and Google Scholar. The selected studies reviewed met pre-determined inclusion and exclusion criteria; eligible studies met the inclusion criteria and were included in the review. Depression, anxiety, and suicide rates are higher in females and groups of differing sexual orientation than in males and heterosexuals, with having multiple partners increasing rates of suicide ideation and depression. The majority of the studies found were cross-sectional; thus, additional longitudinal research is needed to fully understand the complex relationship between sexual orientation, gender, sexual behavior, and suicide rates. This research is significant for public health when designing school-based interventions to target high-risk groups to mitigate mental health issues and suicide among adolescents.

The Effect on Porphyrin Basicity of Fluorine Substituted Meso Phenyl Porphyrins

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Abstract

The protonation of meso-Tetra(2,6-difluoromethylphenyl) porphyrin (2,6-DF), meso-(3,5-difluoromethylphenyl) porphyrin (3,5-DF), and meso-Tetra(2,3,5,6-tetrafluorophenyl) porphyrin (TF) will be studied through UV vis spectroscopy. Protonation is achieved by titration of each porphyrin in toluene with trifluoroacetic acid (TFA). The depiction of a wavelength shift from the free base Soret to the protonated Soret will indicate the formation of a dication. The data from the UV spectra will be used to calculate the pKa values associated with each porphyrin. Based on the results, the average pKa for 2,6-DF upon protonation was 1.67, the average pKa for 3,5-DF was 1.75, and the average pKa for TF was 1.31. A greater acidic value for TF was indicated from these results. In addition, a similar acidic value was demonstrated for both 2,6-DF and 3,5-DF, however, the 2,6-DF showed greater acidic character. This could indicate a correlation between the fluorinated position in the porphyrin as well as the number of fluorine substituents in relation to the formation of dication.

The Effects of Forced Exercise on Traumatic Brain Injury

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Abstract

Traumatic brain injury (TBI) is a worldwide public health problem that can alter daily function and quality of life. TBIs affects approximately 1.5 million people in the United States annually and 300,000 of these TBIs are sports-related. Sports-related TBIs are generally known as concussions and have garnered attention due to the neurobehavioral outcomes that could arise from athletic training or exercise. This study aims to examine how forced exercise can affect TBI. This study was conducted by inducing stress via forced exercise and mild TBIs. Behavioral tests included elevated zero maze, novel object recognition, open field, and sucrose preference. Currently, sucrose preference analysis indicated a significance in TBI and stress interactions at $p = 0.0064$. Results show that after TBI there was a decreased consumption of sucrose, furthermore, the inclusion of stress greatly decreased consumption when comparing no TBI conditions. Results suggested a sex difference in the no TBI and TBI conditions. It was found that females consumed more sucrose than males with no TBI but males consumed more than females in the TBI condition. After completion, the rats were euthanized and brains were collected to conduct tissue analysis for neurological changes. The current findings suggest that interactions between stress and TBI worsens the effects of TBI. Overall, males with TBI were found to be less anhedonic compared to females, as well as males without TBI. These results could lead to further research opportunities to determine why males with TBIs are less anhedonic than females and healthy males.

The Impact of NSU's Social Media on Recruitment

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Abstract

Currently, universities are relying on social media to recruit future students, and scholarship points to brand awareness leading to higher enrollment (Mindzak et al, 2022; Roya-Velo & Hünermund, 2016). Currently, NSU uses multiple forms of social media to communicate with and recruit students for general enrollment and for more specific departments or programs; however, it is not well known how impactful that presence is on new student enrollment. This project will examine NSU's social media presence and its influence on current student enrollment by analyzing a corpus of texts compiled from comments on the @NSUFlorida Instagram account and collecting responses from current NSU freshman and sophomore students via a mixed-methods survey. The poster presentation will display show information derived from application years 2020-2022 generated from both negative and positive comments left on NSU's official Instagram account and how that compares to currently enrolled students' feedback on how NSU's social media presence influence their decision to enroll.

The Impact of Playing Music in the Neonatal Intensive Care Unit

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Abstract

Infants in the neonatal intensive care unit (NICU) are at increased risk for developmental delays, anxiety, and stress. Additionally, parents and caregivers are susceptible to an increased risk for trauma due to the hospital admission. This occurs secondary to the medical environment, including negative medical touch and unnatural motoric and sensory stimulation to the developing brain. The purpose of this scoping review of the literature, is to determine if music therapy in the NICU decreases stress and trauma.

A scoping review will be completed of peer reviewed articles assessing the impact of music therapy on infants in the NICU and their parents/caregivers and their stress levels. Scoping review revealed that stress and trauma are pervasive in the NICU. Music therapy positively impacts the mental health of both the caregiver and infants. This sensory stimulation helps to relieve stress and trauma from the developing brain of infants, while providing a familiar musical environment that leads to a new motivation and confidence for families in the NICU.

Music therapy can directly impact the mental health of the infant and caregivers. Practical suggestions are provided to promote the utilization of music therapy in NICU. This scoping review revealed that there needs to be continued clinical research and application to determine long-term effects.

The Relationship Between Minority Communities, Health Care, and Sexual Literacy

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Abstract

Within the medical field, there is evidence of disparities related to the race/ethnicity of individuals, specifically in minority communities (Guzzo & Hayford, 2012). This issue is highly prevalent, and multiple studies have been conducted attempting to find the root cause (Richardson & Norris, 2010; Guzzo & Hayford, 2012). This study aimed to not only understand the background between minority communities, sexual literacy knowledge, and healthcare access but to also conduct a pilot project that spread information about reproductive health to a predominantly Latinx community in Sarasota, Florida. Additionally, the values and culture of those communities were investigated to identify the spread of misinformation. This health literacy project began in the Fall of 2022 which included a literature review focusing on the background, beliefs, and barriers associated with this issue. The literature review indicates that many individuals receive information about sexual health from their community leaders (maternal figures, religious institutions, school) or on their own, leading to deeply rooted misunderstandings. There were also indications of hesitancy to discuss sexual topics which decreased the likelihood of using established resources for their sexual health. An infographic has been developed and will be distributed soon to the patients at the clinic about contraception and Sexually Transmitted Infections (STIs). An anonymous survey will then be distributed to gauge the impact of the infographics and the understanding of healthcare disparities in this at-risk population, pending IRB approval. The results will then be analyzed and formally presented.

**The Relationship Between Race and Factors Related to Poor Mental Health and Suicide Ideation
Among High School Students: An analysis using 2019 YRBSS & SAMHDA data**

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Abstract

The correlation between age and mental illness among adolescents is relatively high. There is a noteworthy amount of research into the prevalence of suicidal ideation, and attempted suicide within this age group, however, there is a need for research into the relationship between suicidal indicators, display of symptoms, and actual diagnoses of mental illness. Previous research show trends between minorities and females leading to higher rates of mental disorders and suicide, but there is little evidence to make a prediction about differences in regard to specific race and suicidal indicators. This study aims to analyze the correlation between race in relation to feelings of sadness or hopelessness, a diagnosis of depression, suicidal ideation, and attempted suicide in high school students in the United States. Data examined from the 2019 Youth Risk Behavior Surveillance System (YRBSS) include feelings of sadness or hopelessness, suicide ideation, and suicide attempt. We will also perform a one-way ANOVA test to test for statistical significance. Depression diagnosis data will be obtained from 2019 Mental Health Client Level Data (MH-CLD). Based on the previous literature, we anticipate that within different racial groups, there will be a higher prevalence of all four mental health factors in the white population. Analyzing the data will show a trend between race and mental health indicators and will allow for general correlations to be found between said mental health indicators. In conclusion, we expect to see noteworthy trends between race and symptoms of depression, depression diagnosis, thoughts of suicide, and attempted suicide.

The Role of Inflammatory Cytokines in Alzheimer's Disease

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Abstract

Alzheimer's disease (AD), the most frequent cause of dementia and disability in the elderly, results in non-reversible neurodegenerative alterations of the brain such as synaptic and neuronal loss, extra-cellular amyloid deposits, and intra-cellular deposition of degenerate filaments. It has been hypothesized that inflammatory cytokines have been linked to Alzheimer disease (AD) neurodegeneration and disease progression. To test this hypothesis a systematic review and data meta-analysis was conducted from thirty prevalent studies. Identified representative studies from various countries were found using national studies using the search query Alzheimer's Disease:Inflammation:Cytokines:Dementia:Progression. All of the studies included data from the elderly adult population with the age cutoff of 85 years old for both individuals with AD or without depending on whether the study used a control group for comparison. The overall results reveal that there is a link between the over-expression of cytokines and the development and progression of Alzheimer's Disease. These results aid towards further studies necessary for developing therapeutic strategies to help treat individuals on the basis of the data found.

The tale of traditional tobacco as told through the Hummingbird Brings Back Tobacco Cherokee legend

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Abstract

Hummingbird Brings Back Tobacco is a Cherokee legend which emphasizes the cultural, spiritual, and medicinal properties of tobacco. The plot of this story will align with the research of, and presentation on, traditional tobacco. The story begins with a connected community praying for healing and wisdom through tobacco rituals. Suddenly, the community suffers as their tobacco was stolen by the Dagul'ku geese who wanted the benefits for themselves. In the end, the heroic hummingbird reclaims the community's tobacco thus restoring their spirit. The paradox of tobacco for many Native American communities confounds anthropological study. Tobacco has been revered as a sacred plant; yet the current grips of the commercial tobacco industry have led to addiction and health ailments. With the decay of devotional tobacco practices, the commercial tobacco industry may come in like the Dagul'ku geese and attack Native American autonomy. In using visual storytelling this interdisciplinary presentation will attempt to correlate the starved spirit to the threatened physical health of modern Native American communities.

Tree Canopy Biodiversity in an Urban Forestry Setting on Nova Southeastern University's Main Campus

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Abstract

Urban forests are important for the mitigation of flooding and dissipation of heat-island effects, resulting in the offset of energy costs for urban areas. An analysis of tree canopy biodiversity at Nova Southeastern University's (NSU's) main campus was done to create a baseline of tree biodiversity and study how landscape management can become more sustainable. In 2022, 10 of the 36 zones, from a 2017 hurricane damage assessment map of NSU, were surveyed. In 2023, an additional 10 zones were surveyed, totaling 1,458 trees. The precise location of each tree was plotted on TreePlotter and the diversity data was analyzed with PrimerV7. TreePlotter data was transferred to ArcGIS to depict the concentration of species and the variation in Shannon-Weiner diversity per zone, using a semi-transparent 3D surface map. The overall Shannon-Weiner diversity value was 2.066915, indicating low biodiversity of campus trees. The value for Simpson's diversity, 0.83343, indicated a diverse spread of species on campus. To reflect the multi-disciplinary nature of this work, Bray-Curtis similarity analyses tested for factors influencing tree location. The only significant difference was between border and interior zones (P-value = 0.0001). A similarity percentage analysis showed which species contributed to that result, allowing the separate functions of trees in bordering zones and interior zones to be studied more closely. As NSU participates in the Tree Campus program founded by the Arbor Day Foundation, these results are crucial to the continuation and expansion of planting trees that enhance the overall health of ecosystems and urban living.

Understanding the Link Between Parity and Dementia

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Abstract

Dementias, including Alzheimer's and vascular dementia, are devastating diseases and as the aging population increases, their incidence does as well. Given the striking sex/gender difference in the prevalence of dementia, it is urgently important to understand the unique social and biological factors that predispose females. There is growing concern over potential impacts of ovarian hormones (e.g., oral contraceptive use and hormone replacement therapy during/after menopause), but reproductive experience is wildly understudied as a risk factor for dementia. Dementia is characterized by cognitive difficulties likely caused by impaired hippocampal plasticity and function. Intriguingly, postpartum females typically experience reduced hippocampal plasticity, volume, and function while lactating. Whether these transient changes have long-lasting effects that confer or ameliorate risk during aging has become a point of curiosity. Data from humans suggest reproductive and maternal experience increase disease risk and severity. The amount of risk differs with the number of children a woman has, her genetic risk factors, and even where geographically she lives. While some studies suggest an increased risk, others show a reduced risk of dementia, and these disagreements may be related to the number of offspring gestated and raised, culture, etc. In the few controlled experiments in nonhuman animals, parity had an age and genotype-dependent effect on cognitive deficits related to aging in transgenic mice. As these findings are preliminary, our goal is to fill the gap in research and provide insight into whether parity impacts hippocampal function and plasticity in aging and disease, and how it does so.

Usahay

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Abstract

“Usahay” is a documentary short film about the relationship between a grandma with Alzheimer’s and her granddaughter. It explores the bond between the two and the difficulties they face due to the progressive disease. The Filipino word *usahay* means *sometimes* and it is reflective of the day-to-day of caregiving: Sometimes things are good, sometimes things are bad. Sometimes she remembers and sometimes she does not. It is in such moments they learn to make the most of what they have. The documentary is directed by Samantha Carl Selorio.

Using X-Ray Crystallography To Inform Small Molecule Drug Design

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Abstract

This project involves organic synthesis, X-ray crystallography, and the design of small molecule drugs. The ultimate goal of this project is to better understand the forces that affect the conformation of small molecules in order to develop more effective cancer therapeutics. The key molecule in this project is in reminiscent of an indole-2-carboxamide, and past research has shown that these molecules have antitumor and apoptotic effects against a variety of cancer cells. The crystals of this molecule were orthorhombic in $P2_12_12_1$ with unit cell dimensions $a = 14.0111(1)$, $b = 17.7521(1)$, $c = 45.0224(3)$ and a unit cell volume of $11198.26(7) \text{ \AA}^3$ ($Z = 5$), which is unusual. Analyzing the geometry of this small molecule led to the understanding that the crystal system was modulated and possessed a long range superhelical structure along the b-axis. In contrast to many similar indole-2-carboxamide derivatives, this molecule did not assume a tight and folded three-dimensional shape. This is because the presence of the two carbonyl groups caused it to bind to the two adjacent amide protons in nearby molecules. Studies have shown that new indole-2-carboxamide derivatives can serve as allosteric modulators with improved potency compared to the parent compounds. However, the unusual solid-state conformational preference of the indole-2-carboxamide small molecule examined in this research raises questions on how it will act on its targets. The solid-state conformation of this molecule is different than typical indole-2-carboxamide derivatives, and that can inform the design of future therapeutics in this class of anti-cancer drugs.

When Having More Can Be Risky: Women's Resources Predict Experience as a Victim

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Abstract

People accumulate different kinds of resources that they use to solve problems, including the problems of finding, attracting, and retaining a mate. Mate retention behaviors include all behaviors that function to maintain a long-term partner's investment in the current relationship. Some of these behaviors are benefit-provisioning and function by enticing a person's continued investment in the relationship by offering gifts, compliments, or other positive inducements. Previous research has demonstrated a relationship between men's resource accumulation and men's use of cost-inflicting versus benefit-provisioning mate retention behaviors. The objective of the current study is to further investigate the relationship between resources and mate retention by examining the extent to which women's accumulation of six distinct types of resources relates to women's experience as a victim of men's cost-inflicting mate retention behaviors. Results confirm that women's overall resource accumulation positively correlates with women's experience as a victim of cost-inflicting mate retention. However, additional analyses indicate that two specific types of resources uniquely predict an increase in women's risk of victimization while one type of resource predicts a decrease in women's risk of being a victim of men's cost-inflicting mate retention behaviors.

X-Ray Crystallography of Self-Assembling Materials

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Abstract

This research represents an interdisciplinary collaboration between NSU and KAIST, a leading research university in South Korea, and involves organic synthesis, X-ray crystallography, and materials self-assembly. This research informs the design of a new generation of self-assembling materials with improved physical properties for biomedical and technological applications.

Through analysis of the software packages CRYSTALS and Mercury, the structure of the molecule was found. The X-ray crystal's parameters were found to be triclinic in P1 with $a = 8.7008(5)$, $b = 11.5507(7)$, $c = 12.8580(8)$, $\alpha = 69.8418(18)$, $\beta = 80.9295(18)$, $\gamma = 88.4199(18)$ and a unit cell volume of $1197.41(7) \text{ \AA}^3$ ($Z = 1$). The helical structure of the peptide backbone is interrupted by solvent intercalation. This structure is interesting because it has a disordered solvent pocket and a helical peptide backbone. The forces that hold the crystal together give us a clue as to why these can self-assemble into vehicles for active pharmaceutical ingredient delivery.

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William Kochen
Zahilyn Roche Allred

USS 2023 Judges

Aileen Farrar
Alexander Soloviev
Andrea Nevins
Anymir Orellana
Arthur Sikora
Aya Shigeto
Beatrix Aukszi
Belay Seyoum
Carlene Alexis-Carey
Charlene Desir
Cheryl Thomas-Harcum
Christi Navarro
Christopher Blonar
Daniel Benjamin
Darshana Palkar
David Kerstetter
Deanne Roopnarine
Dimitrios Giarikos

Elizabeth Campbell
Glenn Scheyd
Holly Madison
Horace Hibbs
Iris Berryhill
James Munoz
Janine Morris
Jason Gershman
Jeffrey Hoch
Jessica Brown
Jonathan Banks
Joshua Feingold
Kelly Anne Concannon
Kershen Huang
Kniaka Bethel
Leanne Boucher
Marcelo Castro
Maria Ballester

Mark Jaffe
Nelson Bass
Patricia Calvo
Rashid Moore
Rita Shea-Van Fossen
Robert Smith
Russell Driver
Sandra Trotman
Stacey Pinnock
Stephen Grant
Stephen Thompson
Steven Hecht
Toshihisa Kawai
Vivian Haye
William Collins
William Kochen
Yair Solan

The USS celebrates the research and creativity of undergraduate students from all disciplines. In honor of students' artistic and literary achievements, we'd like to highlight the winners of the 14th Juried Art Exhibition and the release of NSU's *Digressions Literary & Art Journal*.

14th Juried Art Exhibition Winners

First Place

Desiree Jenkins

Honorable Mention

Sophia Dakkuri

Faculty Choice in Studio Art

Cassidy Zangwill

Second Place

Aaliyah Washington

Honorable Mention

Prata Rattan

Dean's Purchase Award

Nada Bleibel

Third Place

Nicholas Waguespack

Faculty Choice in Graphic Design

Sofía Guerra

Dean's Choice Award

Ava Hilgher

Digressions Literary & Art Journal

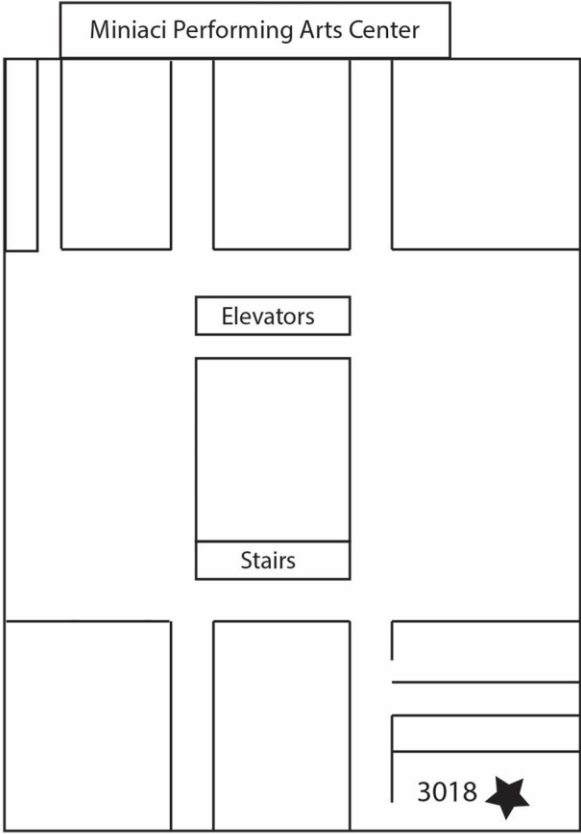
This year of *Digressions* is the 20th anniversary of the journal, celebrating the work of authors and artists from across NSU. This year's cover designer, Sofia Aurora Guerra Cardona, produced a cover design that incorporates stylistic elements from the previous 19 issues: "I made a huge collage with elements from every single past issue of *Digressions*, so that readers look into the shapes and see glimpses of the past."

For more on Sofia's cover design, as well as access to the rest of the journal, click [here](#).

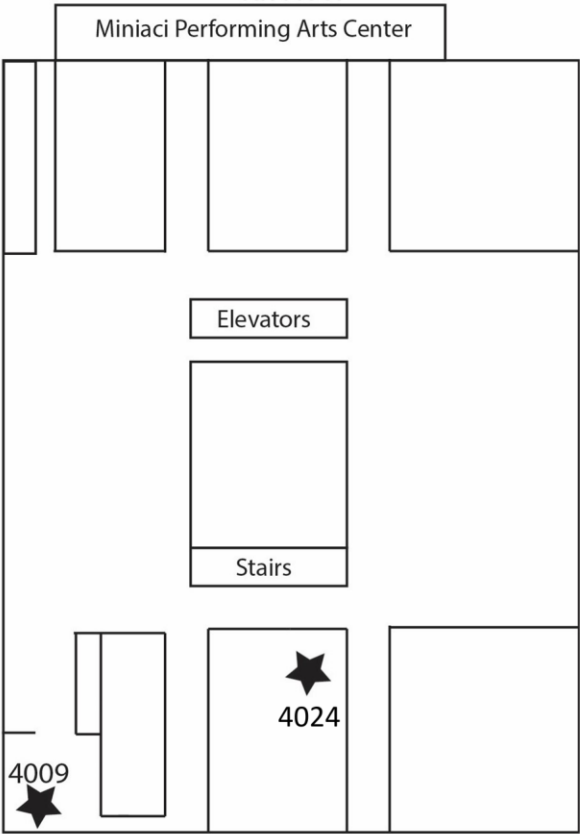


Alvin Sherman Library, Research, and Information Technology Center

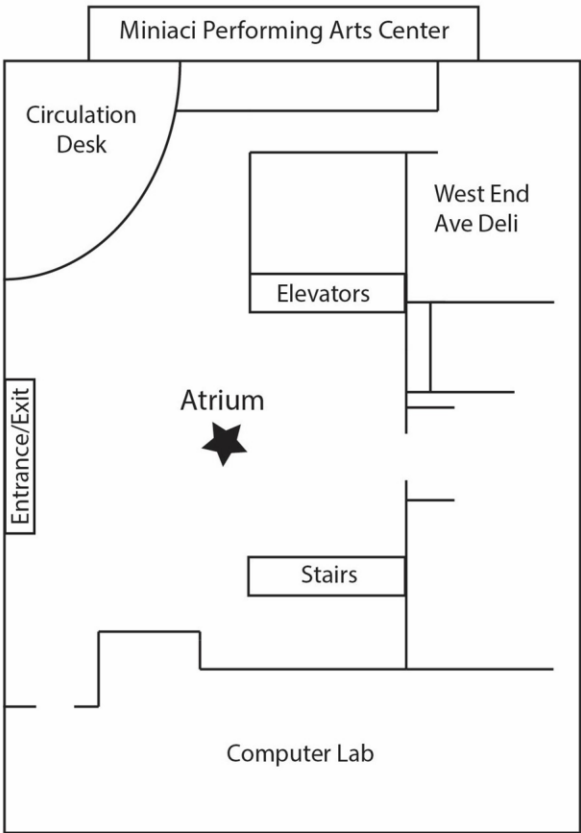
3rd Floor



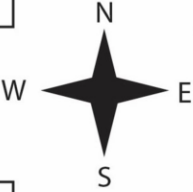
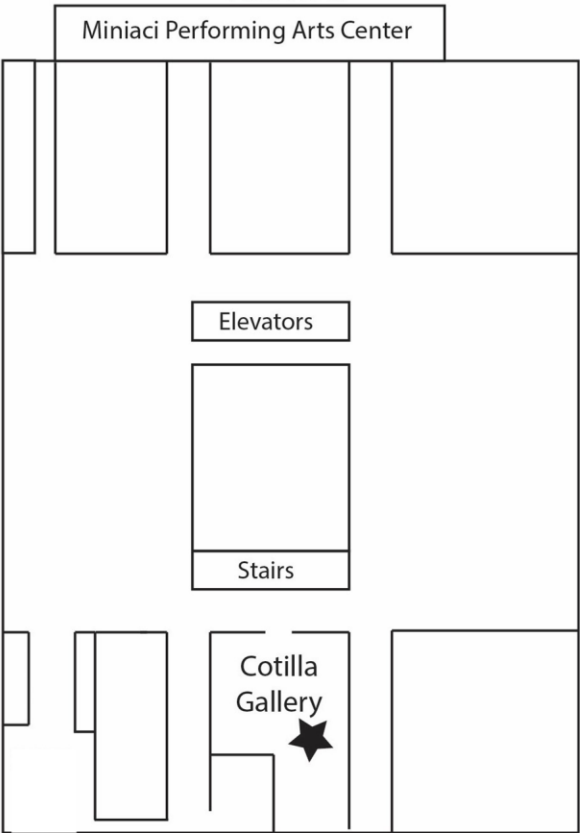
4th Floor



1st Floor



2nd Floor



UNDERGRADUATE STUDENT SYMPOSIUM
2023 Program Schedule

DATE AND TIME	EVENT AND LOCATION
April 5, 2023 12 – 1 pm	Opening Ceremony Andrea Nevins, Ph.D., M.F.A. Dean, Farquhar Honors College Keynote Speaker Peter Gannett, Ph.D., Professor and Associate Dean for Research in the College of Pharmacy <div style="display: flex; justify-content: space-around;"> Cotilla Gallery Alvin Sherman Library </div>
April 6, 2023 10 am – 1 pm*	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> Poster Presentations </div> <div style="text-align: center;"> Atrium and Cotilla Gallery </div> <div style="text-align: right;"> Alvin Sherman Library </div> </div>
April 6, 2023 12:30 – 2 pm*	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> Oral Presentations </div> <div style="text-align: center;"> Rooms 3018, 4009, and 4024 </div> <div style="text-align: right;"> Alvin Sherman Library </div> </div>
April 6, 2023 4 – 5 pm	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> Closing Ceremony </div> <div style="text-align: center;"> Cotilla Gallery </div> <div style="text-align: right;"> Alvin Sherman Library </div> </div>

*See separate detailed schedule for poster easel numbers and oral presentation room assignments.

Farquhar Honors College
NOVA SOUTHEASTERN UNIVERSITY

