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Abstract Book

November 7th, 2025

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Schedule and locations for 2025 7-Rivers

9am-10am Registration - **RCE lobby**

10am-11am Keynote Address - **FSPA Lobby**
Dr. Carla Alvarado
Objectively Subjective: The Role of Research in Policy Decisions

11:10am-12:10pm Oral Presentations (**BRC 122 and NRC 195**)

12:10pm-1:15pm Lunch **RCE Lobby, Lounge**

12:10pm – 4:30pm Exhibitors **RCE Lounge**

1:25pm-2:55pm Oral Presentations (**BRC 122, NRC 195, RCE 201**)

2:30pm-3:35pm Poster Presentations **RCE 134**

3:45pm-4:30pm Symposium Social **RCE 134**

Helpful Information

Schedules can be located on the 7 Rivers Research Symposium website or by the QR codes located at the registration table and in each building.

Please stop at the **RCE Lounge and Welcome Center to see our exhibitors**.

Exhibitors:
Viterbo Graduate Programs
University Wisconsin La Crosse Graduate Programs
Winona State Graduate Programs
Mathy Construction Co.
Fastenal

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Password: Research25!!

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Surface Modification of Siloxane Microspheres with Thiol-Ene Click Chemistry

Name: Matthew Binsfeld

Institution: Luther College

Faculty Mentor: Dr. Jen Baldwin

Discipline: Chemistry

Presentation Type: Poster Presentation

Abstract:

PDMS microspheres are a promising directed drug delivery vector due to their biocompatibility, ease of fabrication, and capacity for controlled drug release. Synthesis of uniform and non-aggregated siloxane microspheres has recently been advanced through the use of ultrasonic spray pyrolysis (USP), overcoming a fabrication barrier. However, the potential of PDMS microspheres is limited by a lack of robust protocols for tailoring their surface chemistry, a critical factor that dictates cellular interactions and targeting efficiency. To address this limitation, we developed a novel and efficient method for the versatile surface functionalization of PDMS microspheres using thiol-ene click chemistry. This biorthogonal reaction allows for the covalent attachment of thiol-containing molecules under mild, aqueous conditions. As a proof of concept, we successfully functionalized the surface of PDMS microspheres with L-Cysteine, a canonical and biologically relevant amino acid. We hypothesize that this simple and efficient method can be directly extended to conjugate larger and more complex biomolecules, such as peptides and proteins. This work establishes a foundational strategy for customizing the surface of PDMS microspheres. By enabling precise control over surface chemistry and characteristics, our functionalization protocol paves the way for developing directed drug delivery vectors with enhanced cellular uptake and reduced off-target effects.

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Wastewater-Based Epidemiology Approach to Analyze Fentanyl in Lacrosse, Wi.

Name: Emma Blackdeer

Institution: Viterbo University

Faculty Mentor: Dr. Kyle Backstrand

Discipline: Chemistry

Presentation Type: Oral Presentation

Abstract:

Wastewater-Based Epidemiology Approach to Analyze Fentanyl in Lacrosse, WI: Case Study Between Influent and Effluent. Over the past few years, there has been a growing prevalence of Fentanyl overdoses in the United States. Traditional surveillance methods relied on individual surveys that led to biased and underrepresented drug use. Wastewater-based epidemiology (WBE) provides an innovative approach to monitoring fentanyl concentration at an anonymous level. The specific focus of this research is to analyze the metabolite by examining the influent (incoming) and effluent (outgoing) flows at the La Plume wastewater treatment plant. Wastewater samples were analyzed using solid-phase extraction followed by liquid chromatography-quadrupole time-of-flight mass spectrometry (LC-QTOF-MS). Statistical tests included an independent t-test, which determined the significant difference between the influent and effluent samples. The results indicate a significant difference between the influent and effluent samples, suggesting a substantial amount is being treated at the plant. Future studies should focus on how these residual metabolites affect the environment over long periods of time.

Designing Polar Crystals: Synthesis and Supramolecular Strategies for Organic Molecules

Name: Moorea Brown

Institution: Cornell College

Faculty Mentor: Harmeet Singh Bhoday

Discipline: Chemistry

Presentation Type: Oral Presentation

Abstract:

Molecular polarization is a universal property, yet the controlled design of polar crystals remains a significant challenge. Our research explores strategies for transforming molecular assemblies into dipole parallel aligned crystalline structures. While molecular polarization inherently leads to attraction between opposite charges, this often favors the formation of nonpolar arrangements. Consequently, the probability of generating a polar crystal is relatively low (5â€“8%), and only a small fraction of these (1â€“2%) display dipole parallel alignment. To address this, our approach emphasizes the careful selection of donor and acceptor compounds and the incorporation of aromatic rings to promote and stabilize parallel dipole orientation. Our studies revealed that (MeO,Y)-imines successfully yielded parallel-aligned polar crystals, though their structural kink reduced SHG efficiency. (MeO,Y)-bisimines, while polar, exhibited crystal disorder, limiting their performance. Future work will focus on systematically comparing the efficiencies of bisimines and imines as well as exploring the use of alternative end compounds for imine synthesis. These results highlight both the challenges and opportunities in tailoring molecular assemblies toward polar, aligned crystalline systems with potential impact on photovoltaics, polymorphism, and fluorescence.

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The Effects of Social Isolation and Exercise on BDNF levels in Rats

Name: Sophia Brunner

Institution: Viterbo University

Faculty Mentor: Charlie Lawrence

Discipline: Neuroscience

Presentation Type: Poster Presentation

Abstract:

Brain-Derived Neurotrophic Factor (BDNF) is a protein essential for the survival, growth, and plasticity of neurons within brain circuits related to emotional and cognitive functions, including memory, learning, and mood. Its expression can be altered through life experiences, modifying brain functioning through changes in dendritic spines and spine density. Previous studies have found that decreased BNDF levels are associated with mood disorders, including major depressive disorder, anxiety, schizophrenia, bipolar disorder, and age-related cognitive decline. Physical activity has been linked to increased peripheral BDNF levels, whereas stress has been associated with decreased levels throughout the brain and body. BDNF is produced and stored as proBDNF until it is cleaved into its mature form, among several isoforms that have been identified in humans and rats. Rats were used as a model to study how exercise and stress impact BDNF levels in humans. Initially, all rats were group housed and had running wheels available for daily exercise. The treatment group was subjected to stress-inducing conditions- elimination of exercise opportunities- and was further divided to have one socially isolated group. The control group continued living in an enriched environment. Hippocampal and prefrontal cortex BDNF levels were measured and analyzed using ELISA and Western blot protocols. The ELISA revealed no statistically significant difference in the BDNF levels for the groups of enriched and impoverished living conditions. The Western blot indicated the presence of multiple BDNF isoforms.

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Implementation of Active Learning in an Entry-Level Anatomy and Physiology Course

Name: Isabella Brunton

Institution: Viterbo University

Faculty Mentor: Chris Mayne

Discipline: Nursing, Education, Biology

Presentation Type: Oral Presentation

Abstract:

Universities strive to develop well-rounded students while preparing them to excel as future nurses. Efforts to enhance knowledge and test performance in undergraduate nursing students have grown significantly in recent years. At Viterbo University, active and problem-based learning strategies were introduced in entry-level anatomy and physiology courses for nursing majors with the goal of improving academic performance. This study investigates the effects of implementing active learning by assessing exam performance over the first four years after implementation. Trends in both individual question performance and overall unit exam results were analyzed and compared to a lecture only period. To further assess exam rigor, Bloom's taxonomy scores were assigned to questions across the dataset to evaluate performance on questions of differing levels of learning over time. Through this analysis, we aim to determine how active and problem-based learning approaches influence student outcomes in an early gateway course for nursing students.

The Power of Authority: Can White Individuals Detect Racial Microaggressions from High Authority Figures?

Name: Vivian Cavallin

Institution: Winona State University

Faculty Mentor: Dr. Amanda Brouwer

Discipline: Psychology

Presentation Type: Poster Presentation

Abstract:

Racial microaggressions can be overlooked by White individuals, causing an insensitivity to racism. Individuals may dismiss microaggressions said by people with authority because of their power and status. A mixed methods approach was used to explore the appropriateness of racial microaggressions and participant detailed notice of microaggressions. Participants (N=84) were randomly assigned to one of two groups. In the control group, participants were asked to watch a talk about job opportunities given by a speaker with low authority. The talk included four microaggressions. In the experimental group, participants were asked to watch the same talk, except the speaker had high authority. Both groups of participants were asked to fill out a survey with open-ended and scale questions assessing their perception of the appropriateness of the talk and their ability to identify the microaggressions within the talk. Data was analyzed using an independent samples t-test. A CQR-M qualitative analysis was used to analyze appropriateness and microaggression responses. Participants reported microaggressions as appropriate, inappropriate, or they reported mixed feelings about appropriateness. Those who found the video appropriate noted the helpful advice; those who found it inappropriate noticed the racist comments, speaker's bias, and disrespect. Participants with mixed feelings noticed appropriate and inappropriate parts of the video. Participants also responded to whether they noticed microaggressions. Most participants noticed at least two, one participant noticed all four, and five participants did not notice any microaggressions. In quantitative analyses, appropriateness and the number of microaggressions noticed were not significantly different between authority and non-authority groups. These findings highlight individuals' perceptions of microaggressions, regardless of authority. Results offer further education on noticing different types of microaggressions and insight into the harmfulness of microaggressions. Further research can explore why certain microaggressions are noticed more, and why some may perceive microaggressions as appropriate.

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An Untapped Resource: Religion as a Health Asset in a Free Clinic

Name: Morgan Chase
Institution: Viterbo University
Faculty Mentor: Matthew Bersagel Braley
Discipline: Religious Studies
Presentation Type: Oral Presentation

Abstract:

Healthcare is geared towards preventing death, but this perspective fails to acknowledge the many other factors influencing a patient's ability to flourish. Recently, scholars have proposed the "Leading Causes of Life" as a framework for refocusing health systems away from causes of death and towards what promotes flourishing. This framework is built on previous research regarding religion as a health asset. Much of this research has been conducted in large health systems or in global contexts. This project asks how religious health assets and the "Leading Causes of Life" could inform approaches to care in a free health clinic in the U.S. Preliminary analysis of literature and pilot interviews suggests that this framework allows for a better understanding of the existing sources of life in patients, especially patients whose health is strongly affected by social determinants. Mapping the ways in which religion is a health asset in a free clinic can help identify underappreciated causes of life in the lives of patients. This can provide volunteers and staff with a deeper understanding of how they might work with patients to promote human flourishing.

Caring for the Body, Mind, and Soul through a Catholic Lens

Name: Lillia Chvatal

Institution: Viterbo University

Faculty Mentor: Emily Dykman

Discipline: Religious Studies

Presentation Type: Oral Presentation

Abstract:

Numerous fad diets and health trends are spreading across the internet. Each week seems to uncover a new way to become the "best" version of yourself. My study dives into holistic care. Through surveying and analyzing church documents and a few other resources, I have constructed a synthesis on how to better care for ourselves. I take a trinitarian approach to the body and emphasize how each part (body, mind, and soul) should be nourished fully. Major theologians and papal documents contributed to my work, along with saints in the Catholic tradition. This research has global implications. We are all living humans and are called to take care of the bodies we were gifted with. Our interconnectedness requires all three parts, body mind and soul, to be cared for to live a healthy and meaningful life.

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Decreasing CK2 activity with Copper Chelators to suppress PDL-1 expression on an in vitro model of Osteosarcoma.

Name: Diego Corvera

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Megan Girtman

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

Osteosarcoma is the most common type of bone cancer and the third most common cancer in adolescence. Current treatment for Stage II (high-grade localized) and III (metastatic) tumors include debulking surgery and complementary radiation or chemotherapy treatment. Unfortunately, no innovation in chemotherapy drugs has occurred in the past three decades, and patients commonly develop resistance to the current drug treatment. This resistance has lowered osteosarcoma patient 5-year survival rates from 70% to 25-40%. To address these limitations, this study focused on the immune checkpoint marker programmed death ligand 1 (PD-L1). PD-L1 binds to PD-1 on immune cells, blocking T-cell activation and preventing immune response against cancer cells. Phosphorylation activity of Casein Kinase 2 (CK2) is required to inhibit PD-L1 degradation, which leads to sustained PD-L1 expression and immune suppression. CK2 pathways can be modulated by copper availability. Copper concentration has been found to be increased in osteosarcoma tumor cells. In this research, the effect of copper chelators was assessed in an osteosarcoma cell line (143B). Copper chelators (tetraethylenepentamine, L-penicillamine, and triethylenetetramine) can potentially distort the PD-1 and PD-L1 interaction by decreasing the Casein Kinase 2 (CK2) phosphorylation activity, thereby enhancing PD-L1 degradation and thus increasing the T cell immune response against cancer cells. Findings from this study suggest that 100 ð‡M of copper chelators do not induce cell mortality and can be a viable dose to diminish copper availability, leading to decreased CK2 phosphorylation and increased PD-L1 degradation.

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***Using CRISPR-Cas9 to Investigate the Role of Enhancer Regions in Schizophrenia*.**

Name: Elifsude Degirmenci
Institution: Cornell College
Faculty Mentor: Sophie Gillett
Discipline: Biology
Presentation Type: Poster Presentation

Abstract:
Schizophrenia is a psychiatric disease characterized by cognitive, behavioral, and emotional dysfunctions, and is one of the top 15 causes of disability worldwide. Although it is estimated to be about 80% heritable, most of its genetic architecture remains unknown. In this study, we investigated the role of enhancer regions in the pathogenesis of schizophrenia. We focused on an enhancer region predicted to regulate NKAPL, a gene important for the regulation of gene expression and cell differentiation and associated with schizophrenia through genome-wide association studies. CRISPR-Cas9 was used to remove the targeted enhancer region in a human neuroblastoma cell line, SH-SY5Y. The removal was confirmed via PCR and gel electrophoresis. We measured changes in target gene expression using qPCR and determined that the removal of the enhancer region caused an increase in gene expression instead of a decrease as hypothesized. We then differentiated the SH-SY5Y cells into neuron-like cells to observe morphological changes under the microscope using immunocytochemistry. We observed decreased neuronal differentiation following the deletion. Taken together, these results suggest that the targeted region was not an enhancer region, but possibly a silencer region for gene NKAPL. In addition, removal of this region had a negative effect on neuronal differentiation as suggested by our immunocytochemistry results. Future research should focus on the genome-wide effects of removing this regulatory region and possibly look at phenotypic impacts in an animal model.

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European migration Policies and their impact on African Migrant.

Name: Ishmael Dekrahn

Institution: Viterbo University

Faculty Mentor: Keith Knutson

Discipline: History

Presentation Type: Poster Presentation

Abstract:

This research examines European migration policies and their impact on African migrants, with a focus on how legal frameworks, border control, and integratio shape migrant experiences across the European Union. Using a qualitative approach that includes policy analysis and secondary data from international migration reports, the study explores the tension between European humanitarian commitments and its restrictive migration practices. It highlights how policies such as the Dublin Regulation, visa restrictions, and external border agreements with African nations contribute to unequal treatment, prolonged asylum procedures, and socio-economic marginalization of African migrants. The research further analyzes how these policies reinforce neocolonial dynamics by outsourcing migration control to African states while limiting safe and legal pathways to Europe. Ultimately, the findings underscore the need for more equitable and human-centered policy reforms that prioritize protection, social inclusion, and shared responsibility among EU member states. This study contributes to ongoing debates about migration justice and the ethics of European border governance in the 21st century.

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Behavioral and Neurological Impact of Exercise Restriction

Name: Casey Frankland

Institution: Viterbo University

Faculty Mentor: Charlie Lawrence

Discipline: Biology

Presentation Type: Poster Presentation

Abstract:

Exercise plays a vital role in maintaining mental health and cognitive performance, largely through the regulations of brain-derived neurotrophic factor (BDNF), a neurotrophin essential for learning, memory, and decision-making. Sudden stop of exercise, which often occurs in injured athletes, can lead to significant stress responses, potentially reducing BDNF levels and increasing vulnerability to dysfunctional coping behaviors such as alcohol consumption. This research investigates how an unexpected stop in exercise affects BDNF expression, learning performance, and alcohol risk behaviors in an animal model. Male Long Evans rats were divided into an exercise control group, with continual wheel access, and a treatment group subjected to a forced exercise stop and isolation. After a 21-day exercise period, rats underwent two weeks of restricted activity before participating in operant conditioning chamber trials. Lever-press tasks linked to ethanol rewards were used to assess motivation, non-hippocampal learning, and alcohol preference. After behavioral testing, serum samples were analyzed using a rat BDNF ELISA and Corticosterone ELISA to quantify neurotrophic changes. The treatment group showed higher BDNF levels in the prefrontal cortex than the control group, they also demonstrated greater alcohol preference and slower learning, suggesting that stress-induced exercise restriction alters neurotrophic signaling without improving adaptive behavior. This highlights how abrupt loss of exercise can dysregulate motivation and decision-making pathways, emphasizing the importance of maintaining consistent physical activity for neurological and behavioral stability. This study aims to clarify how disrupted exercise routines alter neurobiological pathways related to decision-making and addiction vulnerability. Understanding this connection may cast light upon mechanisms underlying alcohol risk in trauma-injured athletes and inform interventions promoting mental resilience through controlled physical activity. The findings could advance neurobiological insights into stress, brain plasticity, and behavioral regulation following exercise cessation.

Defining the Self-as-Doer: A Qualitative Analysis of Cognitive and Behavioral Approaches to Healthy Eater Identities

Name: Esther Gauerke

Institution: Winona State University

Faculty Mentor: Dr. Amanda Brouwer

Discipline: Psychology

Presentation Type: Poster Presentation

Abstract:

Individuals have strayed from healthy eating patterns that can lower disease risk, with few consuming recommended amounts of healthy foods. Psychosocial factors such as health-conscious identity, self-control, and the creation of healthy eating goals are related to healthy eating. The self-as-doer identity, an identity construct in which one sees oneself as doing an activity, has been found to increase healthy eating behaviors. However, less is known about how individuals define a healthy eater. That is, what does a healthy eater look like and in turn, do? Better understandings of how individuals conceptualize healthy eaters may help promote more healthy eating behaviors. Therefore, we qualitatively explored how individuals perceive and describe healthy eaters. Participants (N=383) responded to open-ended questions describing a healthy eater. Consensual qualitative research methodology was used to analyze themes. Among other themes described in other research, two themes related to how individuals approach eating emerged. One theme, behavioral approach, embraced the idea that healthy eaters are those who engage in specific kinds of behaviors related to healthy eating. These behaviors include tracking food consumption, meal planning, food measurement, eating certain foods consistently, and balancing their diets with a variety of foods. A second theme, cognitive approach, also emerged. Participants described healthy eaters as those who are mindful and aware about their eating habits, set goals, and use intuitive eating strategies. Healthy eaters are seen as â€œdoersâ€; they plan, record, and regulate eating behaviors. They are intentional and mindful about prioritizing nutrition and setting dietary goals. Self-as-doer healthy eaters encompasses the duality of cognitive and behavioral components needed to facilitate healthy eating behaviors; deliberate cognitive processes are necessary to promote the action of healthy eating. Future researchers could quantitatively explore how identities are shaped and affect healthy eating behaviors and how social influences shape healthy eating identities and behaviors.

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Theology of Love

Name: Gerard Glab II

Institution: Viterbo University

Faculty Mentor: Emily Dykman

Discipline: Theology & Religious Studies

Presentation Type: Oral Presentation

Abstract:

This project examines the theology of love as the foundation of Christian leadership and pastoral practice, exploring how the church can remain faithful to its mission in a world often characterized by hatred, exclusion, and indifference. Through textual and theological analysis of scripture, the Catechism of the Catholic Church, papal encyclicals, and the writings of John Duns Scotus, this study explores how the Christian tradition consistently identifies love expressed as agape and kenosis as both a divine command and a model for pastoral practice. It argues that authentic leadership must be rooted not in power or control but in love that manifests through service, humility, and mercy.

USP Synthesis of Drug-Loaded Gelatin Microspheres with Thermoresponsive Properties

Name: Tia Gonzales

Institution: Luther College

Faculty Mentor: Jen Baldwin

Discipline: Chemistry

Presentation Type: Poster Presentation

Abstract:

This project demonstrates the synthesis of thermo-responsive gelatin/N-isopropylacrylamide (NIPAAm) microspheres via ultrasonic spray pyrolysis (USP) for potential use in triggered drug delivery. USP enables a clean, single-step process without surfactants or toxic solvents, producing uniform 3-6 Î¼m microspheres characterized by SEM and FTIR, which confirmed crosslinked gelatin-NIPAAm networks. Ibuprofen-loaded microspheres exhibited accelerated release at 40 Â°C compared to 25 Â°C, with a sharp burst following a temperature shift, consistent with poly (NIPAAm)'s lower critical solution temperature behavior. These findings demonstrate USP as a scalable route for fabricating biocompatible, thermo-responsive delivery systems. Overall, this approach expands the utility of USP for producing polymer-based drug carriers with controlled release capabilities.

Stigma Related to Psychological Distress by Target Gender and Disorder Type

Name: Alanna Hartman

Institution: Winona State University

Faculty Mentor: Elizabeth Russell

Discipline: Psychology

Presentation Type: Poster Presentation

Abstract:

This study seeks to assess the stigma of specific psychological disorders in relation to gender. Approximately 350 undergraduate students from a public university will read a series of vignettes describing fictional individuals with four different disorders: major depressive disorder, social anxiety disorder, alcohol use disorder, and bulimia nervosa. Genders of the individuals in the vignettes were randomly assigned. Following each vignette, participants completed a self-report questionnaire regarding five dimension of stigma: comfort with proximity, hostility, sympathy, attribution of responsibility, and severity. Disorder differences will be analyzed using a one-way repeated measures MANOVA and gender differences will be analyzed using four one-way between subjects MANOVAs. Though we are still collecting data, the preliminary findings suggest individuals held more stigma toward alcohol use disorder in general and bulimia nervosa in men. We anticipate completing data collection in early October. Results of this study would be beneficial to educators in psychology and related fields, along with mental health practitioners. Such professionals may be better able to support individuals with these diverse experiences and recognize their own unconscious biases.

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Extraction of Antibiotics from the Rodent Gut Microbiota

Name: Ella Herman

Institution: Viterbo University

Faculty Mentor: Luke Bussiere

Discipline: Psychology

Presentation Type: Poster Presentation

Abstract:

Over one million lives are lost each year as a result of antimicrobial resistance (AMR), a growing threat driven primarily by misuse and overuse of current antimicrobials. AMR refers to the broad ability of various microbes to survive drugs meant to kill them, while antibiotic resistance specifically refers to the ability of bacteria to resist antibiotics. Bacteria are capable of evolving rapidly, allowing them to develop mechanisms of resistance against treatment. As bacterial resistance evolves rapidly, the pace of new antibiotic development has slowed. Finding alternative strategies and solutions has become essential to maintaining the integrity of modern medicine. Historically, antibiotics have been discovered in locations with high bacterial competition, which has most extensively been in the soil. In previous work, our research has identified an uncharacterized microbe, JV-3, isolated from the gut of rodents. JV-3 exhibited antimicrobial potential, prompting further efforts to characterize and extract a secondary metabolite from the organism. To investigate this potential antibiotic, the compound was extracted and purified from JV-3 by means of C18 solid phase extraction. All extracts were re-filtered through a 0.2i-m filter to confirm that observed antimicrobial effects were attributable solely to extracellular compounds. Antimicrobial activity of the isolate was assessed against several bacteria using a disc diffusion assay technique. Zones of inhibition of up to 30mm were measured using 80-100% methanol SPE fractions. To further evaluate the efficacy of JV-3, we plan to expand testing to various other clinically relevant pathogens. Additional biochemical assays were also performed to further identify JV-3. This work contributes to efforts to discover alternative sources of antibiotics, particularly through exploration of underexplored microbial environments. By investigating microbes like JV-3, this research supports the ongoing search for new antibiotics to help combat rising antibiotic resistance.

Communicating Through Motherhood: Postpartum Voice Single-Subject Longitudinal Pilot Study

Name: Skey Hermsen

Institution: Viterbo University

Faculty Mentor: Theodora Nestorova

Discipline: Voice Science & Psychology

Presentation Type: Oral Presentation

Abstract:

There is a distinctive research gap for longitudinal comprehensive studies on the postpartum singing voice (Woodley, 2025). Existing studies on the postpartum voice highlight major changes in neuroplasticity, cognitive function, and memory recall that may significantly affect a performer's ability to rehearse or memorize (Pritschet et. al,2024). Furthermore, the biopsychosocial wellness of mothers is often overlooked yet has not been studied systematically. The objective of this single-subject longitudinal pilot study is to examine the interaction and change over the first postpartum year in acoustic and self-perceived physiological, emotional, and mental parameters in a professional classical singer. The participant recorded the same speaking and singing tasks every two weeks for a year following the birth of her child. She also recorded a reflective journal that asked both quantitative and qualitative questions and completed the Edinburgh Postnatal Depression Scale (EPDS) standardized questionnaire. Results indicated that there was no correlation between EPDS score, hours of sleep, breastfeeding, and the average aggregate ease of singing self-perception score, comprised of a novel singing component rating scale. Contrary to the original hypothesis, descriptive statistics of self-perceived specific singing components demonstrated like singing low notes had the lowest mean score of 4.59, and singing softly had the second lowest mean score of 4.95, while coloratura (vocal agility) had the highest mean score of 6.09 and singing high had the second highest mean score of 5.82. Qualitative thematic content analysis revealed that receiving help with childcare had a positive effect on self-perceived singing ease and mental focus. This study's insights act as a springboard for future studies on the under-researched area of voice function during the postpartum period. Future work includes expanded acoustic analysis, a larger study cohort and sample size, adding an endocrinological component for hormone level tracking, and a longer data collection duration.

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Designing Polar Crystals: Synthesis and Supramolecular Strategies for Organic Molecules

Name: Jacob Hidding

Institution: Cornell College

Faculty Mentor: Harmeet Bhoday

Discipline: Chemistry

Presentation Type: Oral Presentation

Abstract:

Molecular polarization is a universal property, yet the controlled design of polar crystals remains a significant challenge. Our research explores strategies for transforming molecular assemblies into dipole parallel aligned crystalline structures. While molecular polarization inherently leads to attraction between opposite charges, this often favors the formation of nonpolar arrangements. Consequently, the probability of generating a polar crystal is relatively low (5.8%), and only a small fraction of these (1.2%) display dipole parallel alignment. To address this, our approach emphasizes the careful selection of donor and acceptor compounds and the incorporation of aromatic rings to promote and stabilize parallel dipole orientation.

Our studies revealed that (MeO,Y)-imines successfully yielded parallel-aligned polar crystals, though their structural kink reduced SHG efficiency. (MeO,Y)-bisimines, while polar, exhibited crystal disorder, limiting their performance. Future work will focus on systematically comparing the efficiencies of bisimines and imines as well as exploring the use of alternative end compounds for imine synthesis.

These results highlight both the challenges and opportunities in tailoring molecular assemblies toward polar, aligned crystalline systems with potential impact on photovoltaics, polymorphism, and fluorescence.

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Synthesizing Porous Polymer Microspheres

Name: Summer Jensen

Institution: Luther College

Faculty Mentor: Jen Baldwin

Discipline: Chemistry

Presentation Type: Poster Presentation

Abstract:

Porous polymers have shown promise in absorbing contaminants from water. This research explored methods of creating porous polymer microspheres utilizing Ultrasonic Spray Polymerization (USP), then compared the microspheres' ability to absorb nonpolar contaminants. Two methods to create porosity in the microspheres were tested, including (1) using calcium carbonate particles as a sacrificial template and (2) a tin-catalyzed polymerization reaction generating hydrogen gas bubbles in the spheres. The microspheres were characterized using FTIR, SEM, and TEM. Optimization of microsphere fabrication and contaminant-absorption trials are in progress.

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Predicting English premier League Match Outcome Using Machine Learning

Name: Spandan KC

Institution: Winona State College

Faculty Mentor: Dr. Iverson Todd

Discipline: Mathematics, Statistics, and Data Science

Presentation Type: Poster Presentation

Abstract:

In the high-stakes world of English Premier League football, predicting match outcomes is both a data-rich challenge and a valuable opportunity. Leveraging historical match statistics including goals, team performance metrics, and betting odds this study applies machine learning to forecast whether the home or away team will win. Three models are developed and compared: Logistic Regression, Support Vector Machines (SVM), and Random Forests, with a focus on the latter for its interpretability and predictive strength. Through rigorous evaluation and visualization, the project identifies key factors influencing results and demonstrates the powerful role of data-driven methods in modern sports analytics.

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Investigation of Vegetarian Diets and the Impact Inflammatory Markers

Name: Andrew Kaja

Institution: Viterbo University

Faculty Mentor: Chris Mayne

Discipline: Biology, Dietetics

Presentation Type: Oral Presentation

Abstract:

Obesity is an epidemic, and it is one that is only getting worse in the United States. One method that some have adopted to counteract its onset is adhering to a vegetarian diet. These dietary interventions have previously been shown to improve many aspects of health, including lowering body mass index (BMI) and lowering systemic inflammation levels. Here, we examined whether a short-term intervention could effectively lower inflammatory markers in human participants. This study included 8 individuals who underwent a baseline screening, 12-weeks of intervention or control, then a final screening. Serum samples were collected and analyzed to determine inflammatory markers C-Reactive Protein (CRP) and Interleukin-6 (IL-6) levels at both pre- and post-intervention screenings. Results indicated that after 12-weeks, the vegetarian diet had little impact on CRP and IL-6 concentrations, indicating that further research is needed to determine if the intervention is viable to impact inflammation.

Flutamide affects certain aspects of sign tracking

Name: Liam Kubitschek

Institution: Winona State University

Faculty Mentor: Dr. John Holden

Discipline: Psychology

Presentation Type: Poster Presentation

Abstract:

Sign-tracking refers to interaction with or approach of an appetitive conditioned stimulus (CS). This is a behavior with implications for cue-induced relapse in those trying to recover from drug dependency. Pharmacological options for reducing sign-tracking may therefore be helpful in rehabilitative efforts. Flutamide is an antiandrogenic testosterone blocker that has potential for reducing sign tracking in males. We hypothesized that flutamide would reduce sign tracking in male rats in a standard sign tracking task. Male Sprague-Dawley rats were trained in a basic sign-tracking task and were intraperitoneally administered or vehicle during drug testing. It was shown that flutamide administration significantly reduced sign-tracking probability but not total number of responses. The ANOVA for latency showed a significant omnibus effect but post hoc testing showed no specific significant pair wise comparisons. Although the data is promising we plan for further testing to be done in the future.

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Investigating the Significance of Cone Opsin Mislocalization in Causing Cell Death in a CNGA3 Mutant Model of Achromatopsia

Name: Jeeyoon Kwon

Institution: Saint Mary's University

Faculty Mentor: Dr. Rowley

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

Achromatopsia is a genetic condition that causes partial or complete loss of color vision. The most common cause of achromatopsia is a mutation of CNGA3, a subunit of the cone photoreceptor cyclic nucleotide-gated channel that is involved in phototransduction. A mouse line with a mutation in Cnga3 gene, known as cpfl5, was investigated to observe the pathophysiological mechanism that causes photoreceptor degeneration. Previous studies suggest M-opsin, one of the two cone opsins, mislocalized in 10-week old cpfl5 mice. We hypothesized that the cpfl5 mutation in Cnga3 mice caused mislocalization of both S- and M-opsin, which led to photoreceptor degeneration. To test this, we characterized the subcellular localization of cone opsin over time using immunofluorescence staining of opsins from mice that are between 3- and 10-weeks old. Additionally, we used electron microscopy to examine the ultrastructural phenotype of cpfl5 cone photoreceptors. In rod photoreceptors, mislocalized rhodopsin led to the release of rhodopsin-containing extracellular vesicles from the cell body and based on this, I expected that cone opsin mislocalization in cpfl5 photoreceptors caused the accumulation of extracellular vesicles originating from cones. From this we were able to visualize that at 5 weeks of age, these mice had no cone opsin mislocalization even though there were signs of cone cell degeneration and in 11-week old mice we saw mild cone opsin mislocalization with more extensive signs of degeneration. Our findings reveal that cone opsin mislocalization does not drive cone cell degeneration but only occurs after the onset of cone cell death. Future work will focus on determining the mechanism underlying photoreceptor degeneration in these mice. Ultimately, understanding the extent and timeline of cone opsin mislocalization and ultrastructural defects in cone photoreceptors associated with a mutation in Cnga3 is necessary for identifying future therapeutic strategies to preserve cone photoreceptor function in achromatopsia patients.

Crappy samples, great science: Finding antibiotic producers in the gut

Name: Maddisen Quinn Larsen

Institution: Viterbo University

Faculty Mentor: Luke Bussiere

Discipline: Microbiology

Presentation Type: Oral Presentation

Abstract:

Antibiotic resistance has become a major global health crisis, with both the CDC and World Health Organization (WHO) declaring the situation dire. Nearly all existing antibiotics now face resistant strains of bacteria, creating an urgent need for new antibiotics. Antibiotics are typically found produced by microbes in environments with high competition. Even some strains of bacteria generate antibiotics as a defense mechanism against other bacteria. Historically, many antibiotics were discovered from soil bacteria, but the gut microbiota, another diverse microbial environment, remains largely unexplored as a potential source. This study aimed to identify novel antibiotic-producing bacteria from the gut microbiota of mammals. Fecal samples from dogs and rats were plated on BHI aga r and tested for antibiotic activity using an adapted Waksman method after 1â€“5 days. Bacteria that exhibited zones of inhibition (ZOI) on plates with E. coli, P. aeruginosa, or S. epidermidis were considered potential antibiotic producers and were further investigated. Antibiotic-producing bacteria were identified through biochemical testing and 16s rRNA sequencing. Using 16s rRNA sequencing allowed for identification at the genus, but not species level for each organism. It was observed that one strain of Bacillus bacteria had antibiotic properties against gram positive S. epidermidis. Further research can now be done to test these antibiotic properties more extensively, identify the bacterial species, and isolate the antibiotic itself. The results of this study confirm the gut microbiota as a viable source for antibiotic discovery. By expanding antibiotic sourcing beyond soil, this research contributes to the global effort to combat antibiotic resistance and supports the development of new treatments for drug-resistant infections.

Bridging the Language Gap: Evaluating Language Access Training for Healthcare Professionals and Students

Name: Cassandra Lozano

Institution: Viterbo University

Faculty Mentor: Michelle Pinzl

Discipline: Nursing

Presentation Type: Poster Presentation

Abstract:

Effective communication is central to safe, equitable healthcare. Yet many healthcare professionals and students report minimal training on working with interpreters or supporting linguistically diverse patient populations (Diamond et al., 2010). A lack of structured education and early exposure can contribute to safety risks and perpetuate health disparities (Flores, 2006; Youdelman, 2020).

This mixed-methods study explored the relationship between language access training and confidence in patient communication among current and future healthcare professionals. Participants completed a survey assessing training history, confidence levels, and real-world experiences with patients who have limited English proficiency.

Confidence was highest among those trained before graduation (8.10/10), compared to those with on-the-job training (7.78) or no formal training (6.85). Qualitative responses revealed concerns about miscommunication, delayed care, and emotional strain when interpreter access was limited or absent. More than one-third of participants emphasized the need for simulation-based, ongoing, and language-focused training.

These findings align with national calls for structured, reiterative education that prepares healthcare professionals for real-world communication with linguistically diverse populations (Lindholm et al., 2012; O'Reilly, 2021; AMN Healthcare, 2023). Strengthening language access education is not only a professional competency but a moral imperative for patient safety and health equity.

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Bridging the Gaps: An Exploration of the Leading Causes of Life in a Free Clinic

Name: Gwendolyn Mahoney

Institution: Viterbo University

Faculty Mentor: Matthew Bersagel Braley

Discipline: Public Health

Presentation Type: Oral Presentation

Abstract:

There are many factors that affect our physical health, and the social setting in which we live plays a major role. Increasingly, health care systems acknowledge the impact of these factors through the social determinants of health framework. More recently, scholars and practitioners informed by the social determinants of health framework have begun focusing on what causes life (as opposed to what causes death). These leading causes of life are areas that people use to find meaning and exercise agency in their lives. Without these, individuals are more susceptible to illness, disease, and early death. Clinical encounters in a free clinic make clear the impact of the social determinants of health on the lives of those served. However, the clinics, themselves, have limited ability to address these issues. When looking at a free clinic, they are there to treat the physical ailments that people are experiencing, but often these physical ailments are compounded by social and societal factors. By examining the other aspects of a person's life that may affect their health, proactive measures can be taken to address the non-clinical factors impacting health behaviors and outcomes. The project "Bridging the Gaps: An Exploration of the Leading Causes of Life in a Free Clinic" aims to identify opportunities for incorporating the leading causes of life framework in the approach to both individual care of patients served and community-level responses in underserved populations.

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Seed foraging habits of Deer Mice

Name: Nicole Martens

Institution: Waldorf University

Faculty Mentor: Bitterroot Wildlife Internship

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

In recent years in Montana there has been a population boom of moles, and this boom has led the moles to eat the cambium layer of Sagebrush which kills the bush. Sagebrush is crucial to Montana's ecosystem it contributes to the biodiversity of plants, helps support various wildlife species, and it promotes growth of native plants since it serves as a nurse plant. So, understanding how the moles are affecting the population of Sagebrush is important since it is such a big part of Montana's ecosystem. To better understand this trend, my internship mentor set up a research project to see if the moles going after sagebrush affected other species in the area specifically, Deer Mice. Our goal was to see if Deer Mice would change their see foraging habits because of moles takeover on Sagebrush.

To see if the seed foraging habits of Deer mice would change, my mentor came up with the idea of setting up fifteen different stations with three separate petri dishes, each set up in a different setting. Two dishes were underneath a healthy or dead Sagebrush, and the last one was a control that was in the open. Each dish contained twenty Lental seeds, and we counted the seeds every morning to see the number of remaining seeds within the dishes to see the mice's activity at the different settings to see if they had a preference of eating under healthy or dead Sagebrush bushes.

Overall, our study did not show anything significant to say mice prefer heathy Sagebrush over the dead ones, but it did show that mice preferred the covered trays over the open. However, our smaller project helped my mentor with her similar but much bigger long-term study that is seeing how rodents seed predation influence grassland species of Montana.

Studying the Connectivity of the Upper Mississippi

Name: Morgan Muhlbauer

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Peter Pfaff

Discipline: Environmental Biology and Conservation

Presentation Type: Oral Presentation

Abstract:

Connectivity between rivers and their floodplains plays a critical role in shaping ecological processes, influencing sediment transport, and maintaining biodiversity. This study aims to quantify the hydrological connectivity of floodplain features in the Upper Mississippi River from 1993 to 2020 using geospatial data from Landsat Imagery and the Dynamic Surface Water Extent (DSWE) products. Connectivity will be assessed every 14 days over the 27 years across five discharge categories using pixel-based classifications of water presence. Discharge and climate data, derived from satellite imagery, will model spatiotemporal patterns in floodplain flooding and connectivity. The results will demonstrate shifts in the frequency and extent of connectivity events, likely driven by both natural and anthropogenic changes. The model this project will develop can provide baseline connectivity data that can be critical to conservation planning and ecosystem management, particularly for species that are dependent on these habitats, like wetlands and oxbows. The research will highlight the utility of remote sensing in long-term hydrological monitoring and its importance in understanding river-floodplain dynamics in the context of environmental changes.

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The Effects of Ecological Restoration on Small Mammal Communities

Name: Abby Nachand

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Ben Pauli

Discipline: Environmental Biology and Conservation

Presentation Type: Oral Presentation

Abstract:

Habitat degradation threatens biodiversity and ecosystem health by increasing disease risk and species loss. Ecological restoration, on the other hand, provides a mechanism to reestablish ecosystem functioning. Tallgrass prairies are a critically endangered ecosystem that is valuable due to their unique habitat and carbon storage system and are often targeted for restoration. In tallgrass prairies, small mammals occupy a central role in the food web, play key roles in seed dispersal, aeration, and nutrient cycling, making them bioindicators of a successful restoration. During August and September 2025, small mammal abundance was surveyed at seven pre-restoration prairie plots in the Pleasant Valley watershed near Winona, MN. To capture small mammals, 25 Sherman box traps were arranged in a standardized 40x40 meter grid, with each site surveyed twice over 3 weeks. All captured mammals were identified by species, sexed, tagged, weighed, had morphometric measurements taken, and were then released. Plant community data was independently collected at each site. A stepwise regression analysis was performed to assess correlations between the proportion of leaf litter, plant diversity, and the proportion of grass at each site with the number of individual mammals caught and the species richness of mammals identified. It was found that plant diversity and the proportion of grass together were weak indicators of small mammal abundance in both individual captures and species richness. Structural diversity of plants is positively related to small mammal diversity due to increased niches. Furthermore, grass cover strongly influences small mammal richness and relative abundance. This study suggests that plant diversity and grass cover should be prioritized during restoration efforts to optimally support small mammal communities.

Lavender, Pine Needle, and Frankincense Essential Oils Inhibit Survival of ZR-75-1 Breast Cancer Cell Line

Name: Abigael Neller

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Matthew Rowley

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

Cancer continues to be one of the leading causes of mortality each year in the world. While there are traditional treatment options such as surgery, hormonal therapy, radiation therapy, and chemotherapy which are more widely accepted, complementary holistic treatments are gaining increased attention. Essential oils have been shown to possess various therapeutic properties including anticancer, antioxidant, anti-inflammatory, and cytotoxic effects. This study investigates the survival of Zr-75-1 breast cancer cells following the treatments with three essential oils, frankincense, pine needle, and lavender. The objective of this study was to assess a high (2.5%) and low (0.25%) concentration of lavender, pine needle, and frankincense essential oils to evaluate their potential to induce apoptosis in the breast cancer cell line. Results indicated that all three oils significantly reduced the viability of the Zr-75-1 cells when compared to a control carrier oil. These findings contribute to the expanding research on essential oils as complementarity therapies to current breast cancer treatments.

Berberis thunbergii (Japanese barberry) Patterns in Relation to Land Use and Juglans nigra (black walnut) in NE Iowa Woodlands

Name: Bao Nguyen

Institution: Luther College

Faculty Mentor: Eric Baack

Discipline: Biology/Ecology

Presentation Type: Poster Presentation

Abstract:

Berberis thunbergii (Japanese barberry) is an invasive shrub that threatens forest ecosystems in the United States, including Hickory Ridge Woods in northeast Iowa. This study investigated the relationship between Japanese barberry distribution, historical land use, and the presence of Juglans nigra (black walnut), a native tree species known for its allelopathic effects via the compound juglone. Using GPS mapping, canopy measurements, and GIS analysis of 1930s and contemporary orthophotos, we analyzed barberry and walnut occurrences. Contrary to previous studies suggesting barberry thrives in previously disturbed or open areas, our results indicate barberry is more successful in areas that were historically shaded, suggesting the risk of invasibility in long-established forest plots. Furthermore, we found a statistically significant negative correlation between the presence of black walnut trees and Japanese barberry shrubs, supporting the hypothesis that juglone or other allelopathic effects may suppress barberry growth. These findings highlight the importance of historical landscape context in predicting invasive species spread and suggest potential avenues for bio-control through native species interactions.

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Injury & Identity: Mental Health Challenges in Athletes Facing Sudden Exercise Disruption

Name: Lydia Niederstadt

Institution: Viterbo University

Faculty Mentor: Charlie Lawrence

Discipline: Biology/Neuroscience

Presentation Type: Poster Presentation

Abstract:

Athletes who experience sudden exercise disruption due to injury are at increased risk for depression, yet the underlying behavioral and neurological changes contributing to this vulnerability remain unclear. This study modeled the abrupt loss of exercise in Long-Evans rats to examine its effects on depressive-like behavior, social motivation, and neurobiological markers linked to mental health. All rats were given access to running wheels for three weeks to establish an exercise habit, then half were denied further access for an additional three weeks while controls continued exercising. Following the six-week period, rats completed a forced swim test to assess depressive-like behavior and a light/dark social motivation task to measure willingness to approach a paired companion. Hippocampal brain-derived neurotrophic factor (BDNF) and corticosterone concentrations were quantified using ELISA. Results showed minimal behavioral differences between groups: treatment and control rats displayed similar mobility in the swim test, and although control rats demonstrated slightly greater social motivation, the difference was not significant. These findings suggest that three weeks of exercise removal may not be sufficient to produce strong behavioral or neurological changes. Understanding the conditions under which sudden exercise loss impacts mental health may guide future research aimed at supporting injured athletes during recovery.

Meeting the Spiritual Needs of the Incarcerated

Name: Madie Olson

Institution: Viterbo University

Faculty Mentor: Sean Martin

Discipline: Religious Studies

Presentation Type: Oral Presentation

Abstract:

Moral theology is a framework used in the Catholic Church for understanding how ethical decisions should or should not be made. One of these decisions is regarding ministering to the imprisoned. We are called to care for those in prison; this is a part of Christian obligation that goes largely unfulfilled. There is a fear of the other and a sense of danger. The reality is, though, that through imago dei, we are all made in God's image and likeness. Even those guilty of the most heinous immorality deserve to be cared for and ministered to. Programs of care and concern are one of the most important things one can do to help the imprisoned live a more fulfilling and purposeful life. What, as a society, do we see as our moral obligation to the imprisoned? Is it our ethical duty to make sure that these people find themselves in programs that are helping them to change their lives? While the Catholic Church does regard ministering to the imprisoned as important, the Church does not give enough attention and is not actively engaged in this work as it should be. When people are struggling, instead of shutting them out from the world, how do we connect with them so that healing can begin?

Optimizing a Co-Culture Model to Account for the Follicular Lymphoma Tumor Microenvironment in Treatment Response to Bispecific Antibodies

Name: Rahaf Qarabsa

Institution: St. Olaf College

Faculty Mentor: Mark Murakami

Discipline: Bilogy, Immunology

Presentation Type: Poster Presentation

Abstract:

Follicular lymphoma (FL) is an indolent non-Hodgkin lymphoma (NHL), accounting for ~20% of all NHL1. It is characterized by frequent relapses and potential transformation to diffuse large B-cell lymphoma, making it less responsive to novel treatments such as bispecific antibodies (BsAbs). BsAbs, specifically the effector cell engager type, recruit T-cells via CD3 on one end, while the other end recognizes€‹ the tumor-associated antigen CD20 on B-cells, bringing those cells into close proximity, facilitating cytotoxic tumor cell killing2. Despite being a promising therapeutic approach, the efficacy can be dampened by the FL tumor microenvironment (TME)3. The TME is characterized by a large number of myeloid cells, primarily tumor-associated macrophages (TAMs), which directly and indirectly exhaust the T-cells4. Our goal is to employ an assay for testing tumor response to BsAb therapy. To better study this immunosuppressive context, our goal is to establish a co-culture system that accurately models the TME. This system will be used to reproduce key features of T-cell exhaustion driven by TAMs, provide a platform for testing tumor responses to BsAb therapy, and enable mechanistic insights into T-cell dynamics.

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The Search for Antibiotic Producers in Potted Houseplants

Name: Treasure Roraff

Institution: Viterbo University

Faculty Mentor: Luke Bussiere

Discipline: Microbiology

Presentation Type: Oral Presentation

Abstract:

The objective of this research was to look for antibiotic producers in the soil of potted plants. Antibiotic resistance is an increasingly prevalent public health crisis due to various reasons, namely overuse. Many of the antibiotics in use today have been discovered in soil samples all over the world. After testing the soil in 10 different potted plants, 2 potential antibiotic producers against 3 common pathogens were identified. The next steps for this research involve identifying the exact microorganisms, isolating the antibiotics, and determining if they are safe for use in humans.

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ANALYSIS OF PER2 EXPRESSION IN MUS MUSCULUS NEURAL TISSUE AFTER IN UTERO ATRAZINE EXPOSURE

Name: Priyanka Satish

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Debra Martin

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

Atrazine is a widely used herbicide in the United States, particularly in Midwest agriculture. While its environmental persistence and endocrine-disrupting effects have been well-documented, its potential impact on circadian gene regulation remains less understood. This study examined the effects of in-utero and early-life atrazine exposure on the expression of the Per2 gene in brain tissue. Pregnant females were exposed to four concentrations of atrazine (0 ppb, 3 ppb, 30 ppb, and 300 ppb) through drinking water, and the pups continued exposure for four weeks postnatally. Brain tissue was collected, RNA was extracted, and Per2 expression was analyzed using qRT-PCR. One-way ANOVA results indicated that Per2 expression significantly increased across treatment groups at 8 Zt ($p=1.74E-15$), 16 Zt ($p=6.80E-19$), 20 Zt ($p=2.60E-11$), and 24 Zt ($p=3.38E-32$), while no significant increase was observed at 0 Zt, 4 Zt, or 12 Zt ($p>0.05$). In addition, a two-way ANOVA was conducted to evaluate the interaction between circadian rhythm and atrazine treatment, which revealed no significant increase in Per2 gene expression ($p=0.570$). These findings demonstrate that in utero and early-life atrazine exposure disrupts circadian expression of the Per2 gene, suggesting that atrazine may have phase-specific effects on circadian regulation and neurological health.

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Investigating the Effects of Curcumin on Cell Viability in 4T1 Cells

Name: Kendra Schneider

Institution: Saint Mary's University of Minnesota

Faculty Mentor: Megan Girtman

Discipline: Biology

Presentation Type: Oral Presentation

Abstract:

Breast cancer is the most common cancer in women across the globe. Many scientific advancements have modernized the field of medicine and have made breast cancer much easier to detect and treat; however, non-invasive naturopathic strategies are also growing in popularity in the Western world as a treatment for a variety of illnesses including cancer. Specifically, nutraceuticals, or naturally occurring cancer suppressors, have been used more frequently recently due to their ability to act upon an extremely vast number of signaling pathways and molecular targets in cancer cells. Curcumin, a chemical giving the turmeric (Curcuma longa) plant its yellow color, has been shown to exhibit nutraceutical properties on breast cancer cells by promoting cell death, preventing metastasis, inhibiting downstream cell signaling, and even increasing cancer drug efficacy. The objective of this study was to determine if curcumin influenced cultured cells of the 4T1 breast cancer cell line. Cell viability was assessed using an in vitro experimental design. There was a slight trend in decreased cell viability in 4T1 cells treated with curcumin. These results suggest further research into curcumin is necessary to determine mechanisms of decreased cell viability.

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Strategic Herpesvirus Immune Evasion and Latency Defense

Name: Emma Schoen

Institution: Viterbo University

Faculty Mentor: Darby Oldenburg

Discipline: Virology

Presentation Type: Oral Presentation

Abstract:

Herpesviruses are highly effective at evading host immune responses and establishing lifelong latency, which presents major challenges for vaccine development and long-term treatment strategies. This project, titled Strategic Herpesvirus Immune Evasion and Latency Defense, is a collaborative effort with the National Institutes of Health (NIH) aimed at investigating the molecular genetics of murine gammaherpesvirus 68 (MHV68). MHV68 serves as a well-established model organism for studying human gammaherpesviruses, including Epstein-Barr Virus (EBV) and Kaposi Sarcoma-Associated Herpesvirus (KSHV). To explore how EBV and KSHV interact with the host immune system, seven genes known for their immunomodulatory roles were selected and inserted into the 57/58 neutral locus of the MHV68 bacterial artificial chromosome (BAC) using en passant mutagenesis. BACs are recombinant DNA constructs capable of stably propagating large genomic fragments in bacterial hosts, allowing for high-fidelity replication and manipulation. The MHV68 BAC used in this study was engineered with a CMV promoter and regulatory elements to ensure robust expression of the inserted genes. Knock-in genes were captured on plasmids at the NIH and sent to the Gundersen Medical Foundation's virology lab, where a unique Afe-I restriction site enabled cloning of a Kanamycin resistance (KanR) cassette into the gene sequence. This cassette allowed tracking and PCR amplification of the inserted genes. Engineered E. coli expressing Red recombinase a phage-derived enzyme system facilitated homologous recombination of linear DNA fragments into the BAC. After insertion, the KanR cassette was removed using Isce-I induction with L-arabinose, leaving markerless clones. PCR and sequencing confirmed successful integration, with 100% sequence identity to NIH templates. These engineered BACs will be used to assess how specific viral genes influence immune evasion and virulence, providing a powerful platform for understanding herpesvirus pathogenesis and guiding future antiviral strategies.

Testing Zoledronate in a Drosophila Model of LMNA-Related Emery-Dreifuss Muscular Dystrophy

Name: Julia Southwell

Institution: Waldorf University

Faculty Mentor: Gary Coombs

Discipline: Biology

Presentation Type: Poster Presentation

Abstract:

Autosomal dominant Emery-Dreifuss muscular dystrophy (EDMD) is a rare muscle disorder associated with mutations in the Lamin A/C gene (LMNA), leading to skeletal muscle atrophy and cardiac muscle damage. No effective therapies are currently available. Recently published data reveal that mutations in Drosophila LamC (human LMNA homolog) can upregulate TGF-Î² signaling, and mutations in SMAD7 that further upregulate TGF-Î² signaling can exacerbate the effects of mutant lamin expression on muscle retention and function. Zoledronate, a bisphosphonate used to treat osteoporosis, can dampen TGF-Î² signaling by down-regulating TGF-Î²1/2 and inhibiting SMAD2/3 phosphorylation. We have seen positive effects of zoledronate on larval body wall function and are assessing its effects on survival of flies expressing mutant LamC in adult heart muscle.

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The So Called Nones a Failure of Material-Theological Response

Name: Jude Wagner

Institution: Viterbo University

Faculty Mentor: Sean Martin

Discipline: Religious Studies

Presentation Type: Oral Presentation

Abstract:

The purpose of this study is to provide a link between trends in relation to religiosity and modern neo-liberal capitalism, how the negative association has created a substantial group of people who are largely religiously unaffiliated. A broad and interdisciplinary literature study that was including church documents, historical resources both first and second hand, several works of political and theological science. Critical analysis was applied to the texts, helping to derive and substantiate findings. As a result of the research, I came to the conclusion that the trend of religious affiliation is tied to the state, and the larger structure that said state exists within. This association in one regard justifies the existence of the state but simultaneously degenerates the ability of religious adherents to connect with the base spiritual phenomenon. If institutions dissociated themselves from the state and messaged against the harmful systems, then such a reconciliation could potentially come to pass.

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How Hearing Loss Shapes Our Perception of Voice Quality: A Preliminary Investigation

Name: Erin Walters

Institution: Viterbo University

Faculty Mentor: James Lewis

Discipline: Communication Disorders and Sciences

Presentation Type: Poster Presentation

Abstract:

Age-related hearing loss affects an individual's awareness, discrimination, and identification of sound. These challenges may impact a clinician's judgement on the severity of voice disorders as such judgements are routinely made using a perceptual approach. The purpose of this study was to investigate the impact of age-related hearing loss on the perceptual evaluation of voice quality. Two hundred ninety-seven voice recordings from the CAPE-V Perceptual Database were modified to simulate varying degrees of high frequency hearing loss. The cepstral peak prominence (CPP) was then calculated for each recording and hearing loss simulation. CPP is an objective metric that correlates to perceptual judgements of voice quality. Higher CPP is associated with more normal voice quality. We hypothesized that one's ability to accurately judge voice quality depends on the extent to which the CPP is represented in the auditory system. Hearing loss was predicted to alter the CPP. Findings demonstrated that the CPP is sensitive to simulated hearing loss. As the severity of the loss increases and extends to lower frequencies, the CPP progressively decreases. The decrease in CPP was analyzed so as to predict the expected impact on perceptual voice quality ratings. The decrease in CPP resulting from hearing loss suggests that the clinician may rate the voice as more severely disordered than it actually is. This was a preliminary study that did not involve perceptual ratings by speech-language pathologists with hearing loss. To further this research, it would be helpful to include perceptual ratings by speech language pathologists with hearing loss as well as evaluate the effectiveness of hearing aids in the perceptual evaluation of voice quality. Additionally, analysis of CPP within the auditory system using models of the human auditory system and/or electrophysiologic techniques would provide a more detailed evaluation of the correlation between CPP and voice quality rating.

Leading Causes of Life at the Margins: Exploring Healthcare among Immigrants in a Free Clinic

Name: Marianna Zea

Institution: Viterbo University

Faculty Mentor: Matthew Bersagel Braley

Discipline: Social Ethics

Presentation Type: Poster Presentation

Abstract:

While free clinics provide critical access to healthcare for underserved populations, the challenges patients face extend beyond medical issues and are evaluated the social determinants of health. These often create barriers to human flourishing that traditional clinical interventions cannot fully address. This study explored how volunteers at a free clinic understand these non-clinical barriers in immigrant populations. The project applies to the Leading Causes of Life framework to approach what promotes and sustains life rather than only preventing disease in clinical and community health settings. A qualitative, exploratory design was used for the present study, which involved in-depth and semi-structured interviews performed at volunteers at the clinic. The data was analyzed thematically to identify how participants perceive and respond to non-clinical barriers and the identification of assets that contribute to human flourishing. The findings reveal that volunteers recognize the importance of relationships, community support that volunteers recognize the importance of relationships, community support, and meaning making as essential to patient well-being. Integrating the Leading Causes of Life framework into clinic operations could enhance holistic care approaches, promote resilience among patients, and inform broader community health strategies.

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