

An exploration of American composer, Gwyneth Walker, as heard in the Song Cycle *Mornings Innocent*

College of Arts and Media

Graduate **GO-1**

Presenter: Renee Knapp, knapp57@marshall.edu

Musical Performance

Mentor: Carline Waugh, waughc@marshall.edu

Abstract: American composer, Gwyneth Van Anden Walker is celebrated for her over 400 commissioned works for orchestra, chamber ensembles, solo instruments, chorus, and solo voice. Her music is described as distinctively American in sound and appeal. Born in 1947 in Connecticut, Walker moved to the Vermont countryside, finding a peaceful environment conducive to composition. It is this New England landscape that has served as inspiration for many of her works.

The song cycle *Mornings Innocent* was inspired specifically by the beautiful landscape of Vermont and draws from the American poetry of May Swenson (1913-1989). Walker's choice of texts speaks to and represents the voice of women, universally. Being an 11th generation Quaker, Walker is a firm believer in "Egalitarianism," the belief that all people are equal and deserving of equal opportunities.

As evidenced in the song cycle, Walker matches Swenson's poetic imagery with her unique sense of musical imagery. With moments of dramatic outburst and declamation balanced with lyrical melodies, the cycle pays homage to womanhood. Presenting her music offers a great range of expression in communicating what is at the heart of the poetry.

Keywords: Musical performance, song cycle, Gwyneth Walker, May Swenson

The Effects of Cumulative and Anticipatory Grief as seen in Gustav Mahler's *Kindertotenlieder*

College of Arts and Media

Graduate **GO-2**

Presenter: Cadence Weaver, weaver122@marshall.edu

Oral Presentation

Mentor: Dr. Vicki Stroehrer stroeherv@marshall.edu

Abstract: Gustav Mahler, a man known for his extraordinary musical encapsulations of nature, maintained a lifelong intimacy with one of the gravest of elements of life on Earth – death. Mahler notoriously coped through his musical compositions, most notably through his ten symphonic works with themes surrounding celestial notions, elements of “natürlich,” epic stories, and mythic death and rebirth. However, death takes a most central theme in his 1904 setting of the *Kindertotenlieder*, a song cycle with poetry from Friedrich Rückert. The poems describe the manic emotions and grief process of Rückert who had lost his children to scarlet fever. Mahler, who had survived the deaths of seven of his siblings and both of his parents, had grown very familiar with the mourning process, but “tempted providence,” said his wife Alma, in setting the poetry upon the birth of his first child. Alma’s warning came to fruition as their oldest daughter Maria died from scarlet fever in 1907. This research discusses bereavement through a twenty-first century lens by incorporating studies in cumulative and anticipatory grief and applying the five stages of grief to each of the five songs of the *Kindertotenlieder*.

Keywords: Musicology, grief, lieder

Rolf Wilhelm's Euphonium Concertino: Expressivity and Virtuosity

College of Arts and Media

Undergraduate **UGO-1**

Presenter: Nate Hunting, hunting3@marshall.edu

Musical Performance

Mentor: Michael Stroehrer, stroehrer@marshall.edu

Abstract: Born in Munich, Rolf Wilhelm began studying piano at the early age of seven. He was admitted to the Vienna Academy of Music at fifteen. Due to mandatory service in World War II, his studies were cut short. Wilhelm endured difficult times during this time as he was held as a prisoner of war. After his release in 1945, he resumed his studies in Munich and graduated in 1948. Wilhelm composed hundreds of works in his lifetime for cinema, television, radio programs, as well as for concert ensembles of every size.

The Concertino is in three movements, beginning with an “Allegro ma non troppo” displaying the virtuosity of the euphonium. The second movement is an expressive song, demonstrating the lyrical qualities of the instrument. Lastly, the final movement is a moderate and spirited dance.

Wilhelm explained, “In July 1997 the International Tuba and Euphonium conference was held...at Riva del Garda. . . . I met so many outstanding international instrumentalists and heard so much fascinating and wonderfully interpreted music that I spontaneously resolved to compose a new piece for euphonium. This new work is a short, uncomplicated piece, striving solely to express the love of music and joie de vivre.”

Keywords: expressivity, virtuosity, musical performance

Sacred Music from Baroque to Contemporary

College of Arts and Media

Undergraduate **UGO-2**

Presenter: Rachelle Snyder, snyder250@marshall.edu

Musical Performance

Mentor: Alexander Lee, leedal@marshall.edu

Abstract: Music has played an integral role in both sacred and secular contexts throughout history. In this program, Rachelle Snyder and Sara Lee will present a collection of sacred music spanning from the Baroque period to contemporary times. The program will showcase the evolution of sacred music over time, featuring renowned composers such as Johan Sebastian Bach, whose works are considered some of the most important of the Baroque era. One such piece is "Seufzer, Tränen Kummer, Not," which showcases counterpoint from the piano line that occasionally shadow the vocal melody or fill with their own melody. Mozart's "Laudamus, te", on the other hand, represents the classical era's form, featuring a sonata style often referred to as the ABA form. Finally, the program will conclude with Moses Hogan's arrangement of the African American Spiritual "Give me Jesus," which features gospel-like harmonies and rhythms. Though all three pieces are sacred in nature, each showcases a distinct style, beauty, and color that are unique to its time period.

Keywords: Baroque music, sacred music, musical performance

Creating a Family Entertainment Center's Branding from Scratch and How to Incorporate Related Media

College of Arts and Media

Undergraduate **UGO-3**

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Oral Presentation

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Abstract: Creating a brand from the ground up with no prior content can be difficult, but branded content can still be created through effort and dedication. In this presentation, I demonstrate how to create six characters that correspond to the branding of a family entertainment center. Each character demonstrates the values and aura that the brand hopes to exhibit. These characters then become branded within other materials related to the entertainment center, such as the center's website, merchandise, and candies. Throughout the multiple touchpoints where audiences interact with this brand, a strong identification is necessary to make one's content stand out. Through the branding and content creation of Leonetta's Big Top, I will demonstrate the level of thought and planning that it takes to bring a cohesive brand together in order to serve its audience through the integration of characters, media, and merchandise.

Keywords: Graphic Design, Branding, Media, Website

Do Effective Management Control Systems (MCS) Unlock Increased Profitability on Bank Technology Investments?

College of Business

Graduate **GO-3**

Presenter: Marjorie Abney, abney6@marshall.edu

Online Presentation

Mentor: Dr. Timothy Bryan, bryanti@marshall.edu

Abstract: The banking industry is currently experiencing its most rapid period of technological transformation in history. Community banks in the U.S. have invested heavily in technology over the past decade with the goal of improving efficiency but have not achieved the expected benefits in efficiency ratio and overall performance. This study applies the academic literature to this current industry problem. The academic literature identifies management control systems (MCS) in accounting as having the potential to benefit corporate innovation processes. While management control systems in accounting were originally thought to be a hinderance to innovation in organizations, modern research suggests that flexible and interactive management control systems (MCS) generally benefit corporate innovation. More specifically, the research suggests that the effectiveness is dependent on the mode of innovation the firm operates within. Following the framework of Simons Levers of Control in management control systems, this study utilizes an established scale to survey U.S. community banks to measure interactive management control structures' mediation of innovation culture mode and examine the effect on financial institution performance. The findings could provide valuable information for community bank managers to use in structuring management control systems to match the innovation mode of the bank.

Keywords: Management Control Systems (MCS), Community Banking, Accounting Innovation

History of Independence in the Accounting Profession

College of Business

Graduate **GP-1**

Presenter: Annika Behnke, behnke5@marshall.edu

Poster

Mentor: Amanda Thompson-Abbott thomps80@marshall.edu and Nancy Lankton lankton@marshall.edu

Abstract: This project analyzes when independence first emerged as a requirement within the accounting profession. Most modern accountants take the idea that independence is a key aspect of the profession for granted. However, the concept of independence within the accounting profession was not expressly codified until 1958, 71 years after the American Institute of Certified Public Accountants was established. This project compiles the history of the concept of independence within the American Institute of Certified Public Accountants' standards. This was accomplished by reviewing 49 years worth of standards published by the American Institute of Certified Public Accountants from 1923 through 2022. During the earlier years of the accounting profession, the standards changed more drastically than in later years by including instances such as serving as a director of a public company or preparing financial statements for an immediate family member as an impairment of independence. Recent years have seen less drastic changes and instead focus on providing guidance on how to interpret standards in order to maintain independence in more specific situations. While independence has remained fairly consistent in recent years, it is important for accountants to understand how independence came to be a key aspect of the profession.

Keywords: Accounting, Independence, History

Examining Issues Related to Celebrity Athlete Endorsements: A Review of the Literature

College of Business

Graduate **GP-2**

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Poster

Mentor: Jennifer Y. Mak, mak@marshall.edu

Abstract: Celebrity athlete endorsements for organizations have become a powerful and reliable way to gain many advantages for the company. While athletes are not typical celebrities, their voices are equally influential and marketable. Celebrity endorsement of athletes can sometimes be even more effective than other celebrities because of perceived trustworthiness within their playing abilities (Challender et al, 2020). Thanks to media coverage and social media, athletes have become some of the most influential figures. Social media has created a venue for athletes to express themselves like never before, creating many new influential voices that people listen to. This study aims to investigate issues related to celebrity athlete endorsements. This study was done by reviewing the existing literature. Articles collected from Google Scholar and SPORTDiscuss with FullText were peer-reviewed, written in English, and published between 2015 and 2022. The results identified key issues such as credibility and social media in celebrity athlete endorsements. Based on the findings of this study, it is suggested that more research is needed to understand the influence and credibility of athletes through social media and their effectiveness.

Keywords: celebrity endorsement, athlete, social media, credibility

CSR-contingent executive compensation incentives link to real earnings management as moderated by board gender diversity

College of Business

Graduate **GO-4**

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Online Presentation

Mentor: Nancy Lankton, lankton@marshall.edu

Abstract: Corporate social responsibility (CSR) is of growing importance in companies and many companies are beginning to compensate their executives based on CSR practices and performance. CSR is linked with earnings management with mixed results while compensating executives with CSR-contingent incentives has been linked to earnings management by a negative association. However, this paper aims to provide evidence that board gender diversity moderates the negative relationship between CSR-contingent incentives and specifically real earnings management. This paper will add to the literature by investigating the importance of board gender diversity and its role not only on real earnings management but the link to incentives. This paper will investigate real earnings management using regression analysis to show evidence that board gender diversity does make a difference. It will aim to show that not only does board gender diversity matter but having a woman in the chair position makes an even bigger impact.

Keywords: corporate social responsibility, CSR-contingent executive incentives, board gender diversity, real earnings management

Mapping Health Inequities: The Case for Investing in Spatial Epidemiology and Analysis in Rural Healthcare during the Post-COVID Era

College of Business

Graduate **GO-5**

Presenter: Paris Johson, johnson10802marshall.edu

Oral Presentation

Mentor: Jon Willis, willis4@marshall.edu

Abstract: In this presentation, it is asserted that investing in spatial epidemiology and analysis is essential to improving rural health care, especially in the era following the implementation of COVID. In spatial epidemiology and analysis, both the distribution of diseases and the factors contributing to their spread are mapped, and the factors that contribute to their spread are analyzed. By understanding the spatial patterns of disease, researchers and public health officials can identify populations at risk and target interventions to prevent the further spreading of an infectious disease. Rural areas are particularly well-suited for this approach, as they have limited healthcare resources and are more vulnerable to disease outbreaks, making it more difficult to control the spread of disease. In the aftermath of the COVID-19 pandemic, it has been highlighted how important it is to invest in spatial epidemiology and analysis in the field of rural health care, as rural communities have been disproportionately affected by this disease. In order to improve health outcomes in rural areas, it is crucial to understand the social determinants of health. This knowledge can inform policies to address these issues and improve health outcomes in rural areas. Eloquenty, it is essential to invest in research and data collection to understand the unique factors in rural communities and identify the root causes of health disparities in these areas. The overall purpose of spatial epidemiology and analysis for rural health care is to determine areas with high disease burdens, determine targeted interventions, identify social determinants of health, and place healthcare resources accordingly. This can have a multitude of benefits for rural health care.

Keywords: Spatial epidemiology, Rural healthcare, Health inequalities, Post-COVID era, Social determinants of health

Examining the Benefits of Collegiate Branding through Sports: A Review of the Literature

College of Business

Graduate **GP-3**

Presenter: Christian Kenworthy, kenworthy1@marshall.edu

Poster

Mentor: Jennifer Y. Mak, mak@marshall.edu

Abstract: Branding is a crucial element for any successful business. While colleges and universities may not be seen as traditional businesses, branding is as essential to their success as any conventional business. Sports have become the front porch of a college for the public because they are the most widely visible part of most colleges. The popularity of athletics gives colleges invaluable free advertising during their competitions. This research aims to study how colleges create and utilize branding through sports while adhering to the college's mission. This research was done by reviewing existing literature. Articles collected from the Google Scholar and Summon databases were peer-reviewed, written in English, and published between 2015 and 2022. The analysis was broken into three areas: branding the college itself, transferring the college brand to athletics, and using co-branding and naming rights to advance the college brand. The findings of this paper suggest that, when done well, branding through collegiate sports can effectively amplify a university's overall brand and reach. More studies need to be conducted to improve the co-branding strategy effectiveness through collegiate sports. Specifically, more research is needed on how co-branding, sponsorships, and naming rights can benefit all parties.

Keywords: college sports, collegiate branding, co-branding

Impact Of Covid-19 On Routine Childhood Immunizations In The United States

College of Business

Graduate **GO-6**

Presenter: Patricia Lewis, hurley23@marshall.edu

Online Presentation

Mentor: Dr. Alberto Hencke-Coustasse, coustassehen@marshall.edu

Abstract: The efforts to control the 2019 novel coronavirus disease (COVID-19) resulted in immense obstructions to patients seeking and people avoiding medical care due to fears of exposing themselves and their children to COVID-19. Pediatrics was among the top ten specialties to be the most affected with a 62% reduction in outpatient visits.

The purpose of this research was to analyze the impact of the COVID-19 public health emergency on the administration of routine immunization of children in the United States. It was hypothesized that the COVID-19 pandemic has resulted in decreased administration of routine childhood immunizations.

This study utilized a qualitative literature review, in which five databases were used to collect 33 articles. Of the abstracts reviewed, 32 sources were used for the reporting of information and conclusions.

A decrease in administration of routine childhood immunizations in the U.S. for all age cohorts ranged from 15.5 to 83% compared to pre-pandemic levels. The decrease was more pronounced for children 24-months-old and older. The first decrease in the vaccination rates were noted just after the first confirmed COVID-19 case with a further decline after a national emergency and social distancing instructions were initiated.

Keywords: pediatric, COVID-19, immunization, routine, pandemic

Neonatal Abstinence Syndrome: An Update On The Cost And Length Of Stay Associated With Available Treatment Options

College of Business

Graduate **GO-7**

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Online Presentation

Mentor: Dr. Alberto Coustasse-Hencke, coustassehen@marshall.edu

Abstract: Neonatal Abstinence Syndrome (NAS) has been costly for the healthcare system; every 25 minutes, a newborn was diagnosed in 2022. Medically Assisted Treatment (MAT) for expecting mothers has been shown to decrease costs and length of stay for newborns NAS. This study utilized a literature review and a semi-structured interview. The research showed that medically assisted treatment with methadone or buprenorphine during pregnancy decreased costs, LOS, and severity of symptoms for newborns diagnosed with NAS. The findings showed a positive association between lower costs for the initial stay of infants whose mothers received MAT. Research has further investigated outpatient-only and inpatient-outpatient combination treatment to reduce LOS and costs. Nontraditional treatment plans were also explored for their impact on cost and length of stay.

Keywords: Neonatal Abstinence Syndrome, Cost, Length of Stay

Current Research Methods: Neuromarketing

College of Business

Undergraduate **UGO-4/ UGP-1**

Presenter: Victoria Blickenstaff, blickenstaf3@marshall.edu

Oral Presentation and Poster

Mentor: Liz Alexander, alexanec@marshall.edu

Abstract: Neuromarketing is the process of employing various tools relating to measures of neurobiology in order to increase understanding of consumer behavior from a marketing standpoint. The purpose of this research project is to explore neuromarketing, or consumer neuroscience, as a current research methodology. In doing so, we have determined what neuromarketing is as a concept, determined how it is utilized, considered the outcomes it provides, as well as analyzed a relevant case study within the field of research. Furthermore, we believe that this is relevant to business today because of emerging trends occurring in conjunction with its use such as the metaverse and artificial intelligence. From our findings, we have discovered that there are several ways to implement neuromarketing, which include: content evaluation, eye tracking, biometric testing, fMRI, EEG, and more. In addition to this, we know that branding, advertising, pricing metrics, etc. are all potential outcomes of its use.

Keywords: Neuromarketing, Marketing, Market Research

Innovating Registration at Marshall University Using Design Thinking

College of Business/ Honor's College

Undergraduate **UGO-5/ UGP-2**

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Oral Presentation and Poster

Mentor: Dr. Brian Hoey, hoey@marshall.edu; Brian Morgan, brian.morgan@marshall.edu; Michelle Biggs, miller138@marshall.edu

Abstract: Through using design thinking and gaining deep customer empathy on how we could help undergraduate students register for classes stress-free, we identified many problems with the process, with some of the most apparent being the required time and effort to plan for courses and difficulty understanding degree requirements. To solve this problem students face, we formulated the idea of an all-inclusive platform that allows students to manipulate their 4-year graduation plan, pull a schedule from the plan, and select their sections from suggested courses. This idea features a drag-and-drop interface where students are able to visually plan the courses needed for each semester until graduation. The program will assist them by adjusting based on prerequisites, corequisites, and other degree requirements, notifying the student if the scheduling of a particular class affects their projected graduation date. We have created a user-interface prototype of the platform and gained feedback from students to continue improving it. We are currently searching for a partner to help us with creating a working prototype and hope to see it implemented at Marshall University in the future.

Keywords: registration, design thinking, prototype, student experience, innovation

Ethical Analysis of the Pharmaceutical Industry's Role in the Opioid Epidemic and Price Gouging

College of Business

Undergraduate **UGO-6**

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Oral Presentation

Mentor: bryanti@marshall.edu

Abstract: The opioid epidemic has swept the nation recently, and Huntington, West Virginia has been one of the communities impacted the most by this tragic situation. In this research, ethical dilemmas behind a wide array of situations are brought to light, with corruption behind trends and events in the pharmaceutical company being one of the most prominent. In an ethical scandal that caused outrage among the public, highly notable companies were involved: Purdue Pharmaceuticals, CVS, and the consulting firm McKinsey and Company. These are each powerful and prominent corporations in their respective fields, and each has financially benefited from the detriment of those impacted by opioids. The role that these corporations served in the opioid epidemic will be analyzed using multiple ethical standards.

For determining whether a situation is unethical, there are decision making models that could be utilized. Throughout this research, the focus lies on 3 separate decision making models: Utilitarianism, Rights, and Common Good. Two distinct pricing models are discussed as well, value and dynamic pricing.

Ethical issues add to the complexities of everyday life, and one must use their best judgment to make ethical decisions in hopes of bettering society. This comes from ethical self-awareness, understanding different ethical perspectives/concepts, ethical issue recognition, application of ethical perspectives/concepts, and evaluation of different ethical perspectives/concepts

Keywords: business, ethics, pharmaceutical, opioid, pricing

Teacher-Child Interaction Therapy: Marshall University's Sear Grant Program, A Data Analysis

College of Education and Professional Development

Graduate **GP-4**

Presenter: Andrea Efaw, barrows2@marshall.edu

Poster

Mentor: Sandra Stoebel, stroebel@marshall.edu

Abstract: Teachers and other school personnel are continuing to struggle with students' challenging classroom behaviors. There has been an increase in defiance, inattentiveness, physical and verbal aggression, destruction of property, emotional dysregulation, and negative teacher-child relationships. Teacher-Child Interaction Training is an adaptation to Parent-Child Interaction Therapy and was designed to help improve the teacher-child relationship. We will be looking at data collected from Marshall University students who are currently working through the University's School Psychology Program. The data is in the process of being collected so I will be presenting the Sear Grant, its purpose, the details of my research project, and highlights of the School Psychology program.

Keywords: PCIT, TCIT, CDI, TDI, PRIDE Skills, SEAR Grant

Utilizing High School Factors to Predict the Probability of Pursuing a STEM Major

College of Education and Professional Development Undergraduate **UGO-7/ UGP-3**

Presenter: Bella Vint, vint6@marshall.edu

Oral Presentation and Poster

Mentor: Anna Mummert, mummerta@marshall.edu

Abstract: For this research we look at high school factors that affect a student's decision to pursue a STEM major post high school. We use the HSLs 2009 data to investigate specific factors that influence declaring a STEM major. The three chosen predictors include S1MPERSON1 (student sees themselves as a math person), M1BELIEVE (teacher believes all students can do well), and X1TMCERT (teacher's certification). The Chi-squared test is used to test for association between predictors and response variables. We model the effect of the predictors on choosing a STEM major using logistic regression. The forward step AIC method is used to determine the best fit model.

Results showed that S1MEPRSON1 has a significant association with considering a STEM major, where the other two do not. The full logistic regression shows an increased probability with probationary and regular high school certifications. The step AIC method selected predictors S1MPERSON1 and M1BELIEVE. This model shows an increased probability with higher belief from both the student and teacher. In conclusion, school districts should encourage proper certification to influence students to pursue STEM. Also, math teachers should believe in all students and encourage self-efficacy to increase the probability that students will pursue STEM related fields.

Keywords: logistic regression, STEM, HSLs 2009

Physics Labs and the “Fun Factor”: A Study on Student Dispositions towards Physics and Labs

College of Education and Professional Development Undergraduate **UGO- 25/ UGP-4**

Presenter: Elijah Williamson, williamso211@marshall.edu **Oral Presentation and Poster**

Mentor: Dr. Sachiko McBride, mcbridesa@marshall.edu

Abstract: This presentation examines the crucial relationship between students’ dispositions and their understanding of physics content as influenced by laboratory activities or “labs.” More specifically, it investigates how the level of enjoyment students experience during laboratory activities impacts their academic performance, as well as how different lab designs affect this relationship. The presentation delves into the distinction between traditional labs or “cookbook labs” and labs with a less restrictive design philosophy. The research found that at the advanced placement high school level, there was a positive correlation between high dispositions, or “fun,” and academic scores, while apathy was observed at the middle school level. The results suggest that cultivating an environment of enjoyment in the physics classroom can have a positive impact on student learning outcomes. The findings of this study hold significant implications for physics educators, as they suggest that incorporating a design philosophy that prioritizes student engagement and enjoyment could have a positive impact on their understanding of physics content, but due to the small sample size of the study, it was concluded that more research would be needed to properly study this matter.

Keywords: Physics, Education, Lab Activities, Disposition

Investigation of the Influence of Nylon-6 and Nylon-66 on the Mechanical Performance of Composite Bone Scaffolds

College of Engineering and Computer Sciences

Graduate **GO-8**

Presenter: Brandon Coburn, coburn30@marshall.edu

Oral Presentation

Mentor: Dr. Ross Salary, salary@marshall.edu

Abstract: Despite recent advances in bone tissue engineering, patient-specific treatment of bone pathology using porous osteoconductive scaffolds has faced clinical challenges, which to a great extent stem from a lack of mechanical strength. Therefore, there is a need for synthesis of not only biocompatible, but also mechanically strong materials with low immunogenicity. The goal of this industry-academia research work is to fabricate porous, biologically active, and mechanically robust bone tissue scaffolds for treatment of bone fractures. In pursuit of this goal, the objective of the work is to systematically investigate the effects of Nylon-6 as well as Nylon-66 on the mechanical properties of bone tissue scaffolds, fabricated using fused deposition modeling (FDM), which is a high-resolution additive manufacturing method. In this study, the fabricated bone scaffolds were composed of cellulose fibers, polyamide, as well as polyolefin with complex internal microstructures, designed based on triply periodic minimal surfaces (including Schwarz Gyroid, Primitive, and Diamond microstructures). The mechanical properties (such as elasticity modulus) of the FDM-fabricated bone scaffolds were characterized using compression testing. Overall, the outcomes of this study will pave the way for patient-specific fabrication of mechanically robust bone tissue scaffolds with optimal medical properties for treatment of bone pathology.

Keywords: Advanced Manufacturing; Bone Tissue Engineering; Regenerative Engineering.

Investigation of the Mechanical Properties of 3D-Microfabricated PLGA-CPO Bone Tissue Scaffolds

College of Engineering and Computer Sciences

Graduate **GO-9**

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Oral Presentation

Mentor: Dr. Ross Salary, salary@marshall.edu

Abstract: Treatment of bone fractures in clinical practice is a complex medical process, where factors, such as oxygen generation and transport, play a significant role in the dynamics of angiogenesis, osteogenesis, and ultimately fracture healing. The goal of this research work is to synthesize and subsequently fabricate mechanically robust, biocompatible, and porous bone scaffolds for treatment of bone pathology. In pursuit of this goal, the objective of the work is to investigate the influence of polylactic-co-glycolic acid (PLGA) and calcium peroxide (CPO) concentrations on the mechanical properties of bone scaffolds, fabricated using pneumatic micro-extrusion (PME) process. In this study, based on designed experiments, the PLGA concentration as well as the CPO concentration were changed in the range of 80-99 wt. % and 1-5 wt. %, respectively. Porous bone scaffolds were PME-fabricated using a thermoplastic deposition head having a nozzle diameter of 400 μm . Furthermore, print speed as well as pneumatic flow pressure were set at 2.5 mm/s and 100 kPa, respectively. The material deposition was highly viscous on a glass substrate heated at 50 °C. Overall, the outcomes of this study pave the way for the fabrication of complex, mechanically robust bone tissue scaffolds with advanced osteogenic properties.

Keywords: Advanced Manufacturing; Bone Tissue Engineering; Regenerative Engineering.

Effect of 1-min Spin on Human Endothelial Cells at the Vertical Spin Tunnel

College of Engineering and Computer Sciences

Undergraduate **UGO-8**

Presenter: Emma Barrett, barrett79@marshall.edu

Oral Presentation

Mentor: Joon Shim; shim@marshall.edu

Abstract: This study aims to test gene (mRNA) expressions found from human caudate nucleus in health and disease such as normal pressure hydrocephalus (NPH) with increasing age in human vascular endothelial cells (vECs) exposed to spinning motions at the vertical spin tunnel (VST). We cultured human (vEC) line attached to the coverslip placed in a conical capsule (with payload of 64 g) with culture media and exposed cells to the 20-Foot (FT) VST at NASA Langley Research Center. We isolated the total RNA from both groups of the ground control and those exposed to spin motions and assessed the mRNA expressions. We then stained the cells on the coverslip to compare the responses of microtubules in endothelial cells exposed to the same mode of 1-min spin at the VST. The results suggest that the spin motion for 1 min at the VST gives rise to an effect against aging in human vECs as compared with the human caudate nucleus assays on neonatal and elderly specimens.

Keywords: Aging, vertical spin tunnel, human endothelial cell, gene expression, ion channel

Whole transcriptome RNA-seq. of the human brains: hydrocephalus vs. Alzheimer's disease

College of Engineering and Computer Sciences

Undergraduate **UGP-5**

Presenter: Emma Barrett, barrett79@marshall.edu

Poster

Mentor: Simon Shim, shim@marshall.edu

Abstract: The goal of this study involving the human postmortem tissue was to quantify mRNA expressions of potential marker genes in the caudate nucleus with normal pressure hydrocephalus (NPH) and Alzheimer's disease (AD) as compared to unaffected controls. This preliminary study pertains to 14 aged specimens and really helped the generation of new data on 'whole transcriptome RNA-sequencing (RNA-seq.)'. Here, in this presentation, we share the status of our new preliminary data.

Keywords: RNA-seq, hydrocephalus, Alzheimer's disease, caudate nucleus, epigenetics

Effect of Ellagic acid and retinoic acid on collagen and Elastin production by Human Dermal Fibroblasts

College of Engineering and Computer Sciences

Undergraduate **UGP-6**

Presenter: Chloe Duckworth, duckworth27@marshall.edu

Poster

Mentor: Nasim Nosoudi, nosoudi@marshall.edu

Abstract: Elastin is a fibrous protein key to the structure and supports skin and other organ tissues. Elastic fibers are in the skin's dermal layer and make up approximately 2% to 4% of the fat-free dry weight of the dermis in the skin of adults. Aging causes the progressive degradation of elastin fibers. Loss of these fibers can cause skin sagging and wrinkling, loss of healthy blood vessels and lung capacity, aneurysms, and Chronic Obstructive Pulmonary Disease (COPD). We hypothesized that ellagic acid will increase elastin in human dermal fibroblasts (HDF) due to elastin's binding properties. We treated HDF's with 2µg/ml ellagic acid for 28 days to see the elastin deposition in HDF cell cultures. To test this, we treated HDFs with ellagic acid for 3, 7, and 14 days. For comparison, we included a group of ellagic and retinoic acid since retinoic acid is already in the market for elastin regeneration. In preliminary results, HDF cells treated with ellagic acid showed substantial increase in matrix at D14 and 21. Based on this, we are planning to treat the HDF cells with retinoic acid and compare our result with it to see which one supports the highest amount of elastin deposition.

Keywords: Elastin, Ellagic Acid, Retinoic Acid, Collagen, Human Dermal Fibroblasts

Exploring the effect of alternating current (AC) electrical stimulation on Chondrogenesis of Mesenchymal Stem cells

College of Engineering and Computer Sciences

Undergraduate **UGP-7**

Presenter: Joshua Conrad, conrad62@marshall.edu

Poster

Mentor: Nasim Nosoudi, nosoudi@marshall.edu

Abstract: The induction and direction of stem cell differentiation into needed cell phenotypes is the central pillar of tissue engineering. While the electrospinning/electrospraying of cells has been reported previously by other groups [1, 2, 3]. Our lab is the first to report cell differentiation during electrospraying [4]. Preliminary data show that in a precise voltage and flow rate (15kv, 200 μ l/min), using direct current (DC), human adipose tissue-derived stem cells (hASCs) differentiate into chondrocytes. This differentiation does not occur at lower voltages (<2mV). Our chondrocyte induction data lead us to posit that cell electrospinning/spraying holds promise to realize a new differentiation method to guide undifferentiated cells into mature, functional cells. Based on the previous work in this lab, we decided to look at the individual effect of electricity on hASCs.

Keywords: Mesenchymal, Electrospinning, AC Current, DC Current

Development of a Rapid, Portable, and Inexpensive Biosensor Device to Detect Sepsis

College of Engineering and Computer Sciences

Undergraduate **UGO-9**

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Oral Presentation

Mentor: Masudar Rahman, rahmanm@marshall.edu

Abstract: Sepsis is one of the leading causes of death in the United States, with nearly 270,000 fatalities out of 1.7 million adult cases per year. Sepsis can begin from what seems like a small, nonfatal infection; it is often underestimated and can quickly develop throughout the body. Timely treatment for sepsis is critical for the survival rate of the patient. Since there is no single diagnostic test for sepsis and most require in-hospital blood lab testing, a portable, non-experienced user-friendly test device is needed. The use of an at-home-or-on ambulance rapid test (like the Covid-19 quick test kit) will eliminate the time required to reach the hospital, go through check-in and triage, and wait for the blood test results to return from the lab before beginning IV antibiotic treatment. Our motivation is to develop a rapid, portable, and inexpensive biosensor device to detect sepsis. Interleukin-6 is a pro-inflammatory cytokine and anti-inflammatory myokine protein, produced in response to inflammation. Most often, inflammation at the site of an infection is one of the beginning steps toward a possible case of sepsis. Therefore, in instances of severe infection, IL-6 should hypothetically be a positive marker for sepsis when it surges within the bloodstream. This study will establish a real-time IL-6 protein blood test using the Lateral Flow Assay (LFA) method and find an affordable test kit to expedite sepsis detection and save lives. The long-term goal is to validate our improvement for industrial applications.

Keywords: Biomedical, IL-6 protein, antibody, sepsis, disease screening

Wearable Sensor Devices for Construction Site Safety: A Literature Review

College of Engineering and Computer Sciences

Undergraduate **UGP-8**

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Poster

Mentor: Ammar Alzarrad, alzarrad@marshall.edu

Abstract: The work environment in the construction industry is characterized by occupational uncertainty and risk. When compared to other industries, the construction business has one of the highest rates of worker sickness, injuries, deaths, and near-misses. The development of Wearable Sensor Devices (WSDs) has created remarkable prospects for the real-time collection and analysis of construction workers' safety data. However, the abundance and accessibility of a wide range of WSD alternatives on the building site raised concerns about the interoperability and coordination of the utilized devices. The goal of this research is to offer a thorough analysis of WSDs to develop a list of different WSDs utilized in the construction industry. With the help of this literature analysis, the construction industry will be able to plan holistically for a coordinated, linked construction site that will further increase safety while leveraging cutting-edge technology.

Keywords: Wearable Sensor Devices, Construction Safety Management, Internet of Things (IoT)

Modeling Aortic Phantoms and Lynch Coils in 3-Dimensional Experimental and Computational Domain

College of Engineering and Computer Sciences

Undergraduate **UGP-9**

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Poster

Mentor: Joon Shim, shim@marshall.edu

Abstract: Objectives: This study aims to model aortic phantoms in the wet-lab environment and the computational domain using finite element method as part of the Senior Capstone project.

Method: Using polyethylene (Pea)-60 we designed our Lynch coils and scaled aorta. With this in hands, we then measured the dimensions and created the computational aorta using ANSYS software (rel. 2021).

Result and discussion: In total, five coils were created and two will be used for the experiment. The first coil to be used is the second coil of Phase 1 with the smaller diameter to be used in the mouse brain. This coil holds 100 uL of infusate and is the proper size to fit into a rat brain. We next created the aortic phantom that fits a scale of an adult rat. In the computational domain, we created the geometries, the mesh in triangle element, and solved the problem by applying fluid properties with blood viscosity with the assumption that fluid flow is Newtonian. We found that the geometries of aortic phantom and computational phantom are in fairly good agreement, particularly in the convexity and/or concavity of the curved site near renal arteries. The computational models allowed us to visualize the blood flow in ascending and descending aorta as well as renal arteries in which flow recirculation was detected. These models will pave the groundwork to further create the umbrella-type novel angioplasty that we aim at in the future.

Keywords: Lynch coil, aortic phantom, experimental and computational modeling

Design and Implementation of a very Low Power and High Voltage AC Power Supply for Biomedical Applications

College of Engineering and Computer Sciences

Undergraduate **UGP-10**

Presenter: Alexa Hoffman, hoffman118@marshall.edu

Poster

Mentor: Jayanta Debnath, debnathj@marshall.edu

Abstract: In this interdisciplinary capstone project, we developed a safe and functional AC power supply that meets the requirement of biomedical engineers to be used to test the effect of an electric field on mesenchymal stem cell differentiation. The system developed consists of transformers, signal generators, and operational-amplifiers (OP-amps) to produce about 2300 volts (peak to peak) from a 10-volt (peak) supply. We used the module-based implementation technique: each module produces about 300V from the input and several of these modules connected in series achieved a higher voltage. An electronic buffer circuit using OP-Amp was utilized to keep the output of the signal generator at a constant level and the buffer circuit helps retain the sinusoidal waves necessary for the experimentation on the mesenchymal stem cells. The system is currently in testing with the biomedical team, and we seek to study cell differentiation and its intricate molecular mechanisms using this power supply as a novel and reproducible method. Our engineering approach holds the promise of developing strategies to direct the differentiation of undifferentiated cells into mature, functional cells.

Keywords: Electrical Engineering Design, AC Power Supply, Circuit Design

Introducing Youth to Computer Science through Drone Programming

College of Engineering and Computer Sciences

Undergraduate **UGP-11**

Presenter: Emily Kisor, kisor5@marshall.edu

Poster

Mentor: Dr. Paulus Wahjudi, wahjudi@marshall.edu

Abstract: Careers in computer science are in high demand expecting to grow 15% from 2021-2031 (Bureau of Labor Statistics). However, students in grades K-12 have little exposure to computing concepts, with only 54% of U.S. high schools offering foundational computer science (Code.org). We investigated what groups remain underrepresented in STEM and developed lesson plans to introduce computing concepts to middle and high school students. Tello Drones were programmed to work with Scratch, a block-based programming language for children 8-16. Written tutorials were created to teach programming basics and how to program drones to Scratch. After learning base concepts, students can participate in a “Nurse Simulator” scenario comprising of tasks. Students code in Scratch to control the drone that simulates working at a hospital as a nurse. The tasks use the programming concepts learned to navigate the nurse through the “hospital,” with each task increasing in difficulty. Future direction for this project includes introducing more concepts such as if-statements and loops.

Keywords: programming, drone, Tello, Scratch, coding

Facial Recognition based Semi-autonomous Robots for Healthcare Industry

College of Engineering and Computer Sciences

Undergraduate **UGP-12**

Presenter: Julian Lahdelma - Sanderson, lahdelmasand@marshall.edu **Poster**

Mentor: Zhu, Pingping zhup@marshall.edu

Abstract: For this project, I will construct a scaled replica of the original robot R2D2, which is featured in the movie series Star Wars and was designed by Ralph Angus McQuarrie. This robot is to be used in the healthcare industry as a tool to lift the emotional distress and anxieties of immunocompromised patients. To enhance the experience, this robot will utilize facial recognition artificial intelligence to interact with the patient. In the year 2022 alone, the Center of Disease Control reported an estimate of eighty-nine thousand five hundred immunocompromised cancer patients in the United States alone. It has been reported by the American Childhood Cancer Organizing that there are more than two hundred pediatric cancer facilities in the United States. These hospitals, which specialize in immunocompromised cancer patients would be the primary group that I would focus on helping. I plan to take the interactive robot to these treatment centers. Each year there are over fifteen-thousand children in the US and three hundred thousand patients globally diagnosed with cancer of which 1 in 10 do not survive. For these pediatric patients and their families, it is essential to help them through their emotional distress, which is difficult due to the patients having compromised immune systems. Additionally, there are new pressures of fighting human-transferred global viruses that are on the rise. Constructing an interactive robot will eliminate the risk of spreading contact and repertory-based viruses to sick patients. It is my hope that in this small endeavor with this interactive robot that it helps the patients in their enormous journey they are embarking on.

Keywords: AI, R2D2, Healthcare

The Password Dungeon Delver

College of Engineering and Computer Sciences

Undergraduate **UGP-13**

Presenter: Rick LeMaster, lemaster82@marshall.edu

Poster

Mentor: Yoo, Wook-Sung, yoow@marshall.edu

Abstract: Companies, schools, even the government have pressed hard on the importance of teaching Cybersecurity techniques due to the rising of cyber attacks within the past decade. Password cracking has been one of the first techniques hackers have used in gaining access to networks. However, the learning methods of password cracking or about the value of strong passwords could be hard to understand or be boring and mundane. Since games have always been a fun and engaging way to teach people new skills and help them retain information, a capstone team at Marshall University created The Password Dungeon Delver game. This game allows the users to learn about password cracking techniques. The three main techniques taught through the game were brute force, dictionary attack, and rainbow tables. The game has four levels where in each level, the user must use the corresponding technique by taking each part of a Hashcat command, which is taught to them individually, and correctly put them in order. The final level was created to be a comprehensive test to see if the player has learned all three methods by requiring all three methods to be used under a time restraint. A .exe file has been created to be able to run on Windows platforms and is freely available for any users of interest.

Keywords: Cyber Security, Game, Password Cracking, Teaching

Marshall's NSF S STEM Website Renovation

College of Engineering and Computer Sciences

Undergraduate **UGP-14**

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Poster

Mentor: Yoo, Wook-Sung, yoow@marshall.edu

Abstract: Marshall University has been awarded an NSF Scholarship-STEM Grant to support academically talented students with financial needs who pursue STEM-related degrees. The program website was created in 2020 to recruit students into this program providing information on the purpose of the program and the application process with application links. Two years have passed since this program was established and the program successfully recruited to fill all open positions. The program has run Project-based Work Studio (PWS) generating multiple student projects with paper publications and awards and successfully hosted various events and activities in the past years. However, the current single-page program website neither provides new information nor shares the research results through the program with the public. This project is to renovate the current website to provide up-to-date information about the program to the public. The project was developed using WordPress with several plug-ins to display multiple pages with a proper menu bar with interesting contents and additional information; program overview, projects, people, and activities. The renovated program website is easy to navigate with a user-friendly interface, and easy to maintain through the content management system. The final website will be launched on the Marshall University website after field testing.

Keywords: scholarship, website, project. update, team

Use of Machine Learning in Cybersecurity Education

College of Engineering and Computer Sciences

Undergraduate **UGP-15**

Presenter: Neil Loftus, loftus6@marshall.edu

Poster

Mentor: Dr. Husnu Narman, narman@marshall.edu

Abstract: Cybersecurity can often be a difficult subject for students to understand. Hands-on learning through labs and simulations can help students become more familiarized with the subject, but there is a balance between making the content easy to understand while not oversimplifying or misrepresenting the content. Through use of machine learning, this balance can be more easily maintained. The goal of this project is to improve upon a Cybersecurity Simulation by making the content more accurate and in depth. To counteract the difficulty increase from these improvements, a system of automatic feedback was developed using machine learning and natural language processing to correct users when they make typographical errors. A student trial was performed with students completing a survey before and after using the application. These survey results were then compared with results from a previous version of the application to measure how the machine learning system affected user feedback. The updated version of the application with machine learning functionality had a net increase in the user ratings of almost every survey field, with students notably rating the application's user friendliness and overall experience as significantly higher compared to the original application.

Keywords: "Machine Learning", "Computer Science", "Cybersecurity", "Natural Language Processing", "Education"

Virtual Reality Museum Application for the Arts

College of Engineering and Computer Sciences

Undergraduate **UGP-16**

Presenter: Joshua Maddy, maddy15@marshall.edu

Poster

Mentor: Dr. Husnu Narman, narman@marshall.edu

Abstract: Most K-12 students are monetarily or physically inhibited from visiting private or public institutions. The Metaphysical Exhibit project goal is to give all ages a modern, technological take on the museum experience by providing a Virtual Reality alternative. By lowering the barrier of entry to a one-time purchase for hardware, any classroom can experience masterworks in an immersive environment. A rich collection of art pieces can be displayed under one roof by compiling public information on historical works. By utilizing Virtual Reality, the museum is easily distributed and portable. In this paper, we aim to develop a virtual art museum and observe its effects on users. The developed application can run on modern headsets, specifically Meta Quest 2. To analyze the viability of the application in a classroom and personal setting, we find answers to the following questions: (i) Does experiencing the museum in this format feel analogous to prior exhibit experiences? (ii) What is the level of interest in exploratory, self-guided VR content used in education from a student and teacher perspective? (iii) How can the experience be improved? The results show that the project was received positively by students and teachers as an introductory experience for the arts.

Keywords: Virtual Reality, Arts, Education

Design and Construction of a Hybrid Electric Bicycle

College of Engineering and Computer Sciences

Undergraduate **UGO-10**

Presenter: Cameron Nichols, nichols191@marshall.edu

Oral Presentation

Mentor: Dr. Jayanta Debnath, debnathj@marshall.edu

Abstract: In our capstone project, we want to build an electric bicycle. To provide a transportation alternative in urban areas, we will be using materials we acquired prior to starting like an old bicycle and lab equipment we have accrued over our time in the Electrical Engineering program at Marshall University. Our group wants to personally show that transportation alternatives can be readily available and affordable to everyone. We want a reasonable range that would allow someone to get somewhere in Huntington and back to where they came from. The Bicycle will be driven on a single chain-driven sprocket by a 36V, 250W brushed DC motor. This motor was chosen because it was part of the kit of mechanical connections, we could quickly get from amazon. The kit comes with a prebuilt controller, but for our project, we will be building our own PWM (Pulse Width Modulation) controller that will offer better efficiency and allow us to do a closed-loop control using the Arduino as the source of the square wave.

Keywords: PWM Controller, Arduino

Detecting Birds with Real Time Image Processing for Drone Safety

College of Engineering and Computer Sciences

Undergraduate **UGP-17**

Presenter: Cade Parlato, parlato2@marshall.edu

Poster

Mentor: Dr. Husnu Narman, narman@marshall.edu

Abstract: The field of small, unmanned aviation has increased precipitously over the past few years. This has increased chances of collision with aerial wildlife. This project aims to use machine learning and image processing to allow drones to detect birds mid-flight and act accordingly, ensuring their safety. We are developing a graphical software to easily control the drone's video feed, as well as process it with a machine learning model that we have trained to detect birds; when the software detects a bird, instructions will be sent to the drone to avoid a collision. This collision prevention could consist of any kind of evasive action, or possibly some sort of audiovisual deterrence. In order for this action to not be used erroneously, the system will be developed with some capabilities to detect if a bird is close enough to be a threat. The currently planned implementation is to use known sizes of birds, as well as the focal length of the camera, to calculate the distance of the bird from the drone. Alongside our distance calculations, there will also be systems in place to differentiate single birds from flocks, for more optimal detection.

Keywords: "Machine Learning", "Aeronautics", "Computer Science", "Image Processing", "Software Development"

Solar-Tracking Photovoltaic Panel

College of Engineering and Computer Sciences

Undergraduate **UGP-18**

Presenter: Gavin Richardson, richardso191@marshall.edu

Poster

Mentor: Dr. Jayanta Debnath, debnathj@marshall.edu

Abstract: In this project, we aim to create an efficient solar-based energy source that utilizes solar-tracking paired with a photovoltaic panel. The problem with the current state of solar panel technology is that they are very expensive, inefficient and use a vast amount of space relative to their power output compared to other methods of energy harvesting. Our project aims to offer a compact solution to this problem. The value in our project is for individuals or locations looking for a more efficient and compact use of solar energy. Our project's purpose, in its simplest form, is to demonstrate a more efficient photovoltaic device could be implemented with the use of a lens and solar tracking. The lens could serve as a way to concentrate the sun's rays into a smaller area, resulting in a larger power output relative to size. This project would demonstrate a more efficient and worthwhile resource to increase solar efficiency.

Keywords: Solar, Photovoltaic Panel, Light-tracking

Web Application for Marshall University Gen Cyber Competition

College of Engineering and Computer Sciences

Undergraduate **UGP-19**

Presenter: Dakota Pruett, pruett10@marshall.edu

Poster

Mentor: Yoo, Wook-Sung, yoow@marshall.edu

Abstract: GenCyber© is a federally supported national program created to address the Nation's shortfall of skilled cybersecurity and digital forensics professionals. Marshall University has been awarded funding by GenCyber, allowing them to host summer teacher camps to increase interest in these fields. These camps include project competitions as pre-camp activities. Currently, the process of competition is managed manually, combining phone, email, and Google Forms. Some core issues include a limited entry format, no ability to edit projects after submission, and tedious assignment of judges. We developed "Web Application for GenCyber Competition" to streamline this process, including project management, user management, and a judge review process online. This web application is designed to support three main users: teachers, allowing freeform submissions, and project editing. Judges, provided with an online dashboard showing them projects to be graded. Admins, who are allowed an organized system showing teacher applications, email service functionality, and user management. The web application's deployed at GoDaddy.com to be accessible by competition participants.

Keywords: Web development, Online application, Session, Email, Database

Predicting Timing and Location of HABs on the Ohio River Using Machine Learning

College of Engineering and Computer Sciences

Undergraduate **UGO-11**

Presenter: Miranda Simpson, simpson130@marshall.edu

Oral Presentation

Mentor: Sanghoon Lee, leesan@marshall.edu

Abstract: Harmful Algae Blooms (HABs) are excessive growths of algae that occur when the algae in a body of water grow out of control, mainly due to the overloading of nutrients such as phosphorus and nitrogen. Stormwater runoff from nutrient-rich soil flows into receiving water bodies, where algae feed on nutrients and grow rapidly, causing the water to produce toxins that can cause sickness in animals and people who consume the water. The water quality along the Ohio River has been impacted by frequent HABs. Although many contributing factors related to the formation of HABs are known, forecasting the timing, location, and magnitude of HABs in the Ohio River has been challenging. Our research project explores machine learning-based approaches to predict HABs in the Ohio River using publicly available data published by the Ohio River Valley Water Sanitation Commission (ORSANCO). One of the machine learning algorithms will be adopted to accurately forecast HABs by analyzing the cause and effect of multiple environmental parameters. Especially, our study will advance HABs studies by analyzing the relationship between chlorophyll and three parameters: nitrogen, phosphorus, and temperature as well as exploring other parameters such as flow rate, biochemical oxygen demand, and fish population.

Keywords: machine learning, harmful algae bloom forecasting, long short-term memory, harmful algae bloom

A Phishing Campaign Guideline for Organizations to Effectively Assess their Employees' Phishing Awareness

College of Engineering and Computer Sciences

Undergraduate **UGP-20**

Presenter: Ethan Tabata, Bailey605@marshall.edu

Poster

Mentor: Wook-Sung Yoo, yoow@marshall.edu

Abstract: Phishing campaigns are an effective tool for assessing and improving an organization's preparedness against phishing threats. However, without a solid guideline explaining how to properly execute a phishing campaign, organization leaders are left without the knowledge of how to do this effectively. To remedy this issue, a capstone team at Marshall University has created a solution to produce an effective guideline tutorial that teaches organization leaders how to properly conduct a phishing campaign. This solution proposed deliverables which included an instructional slide deck, demonstration videos explaining different phishing methods and their preventions, along with additional instructional documents for deeper understanding. These deliverables were designed for two goals: to establish a basic guideline for running an effective phishing campaign with included step-by-step tutorial, and to educate organization leaders of the various phishing types as well, allowing managers who are not knowledgeable in the cybersecurity field to understand and effectively utilize this phishing campaign guideline for their company. These deliverables can be freely retrieved by any organization leaders planning to run a phishing campaign for their company. This availability provides a baseline knowledge on how to run an effective phishing campaign, which increases the global defense against phishing attacks universally.

Keywords: Phishing, campaign, cyber, security, defense

Characterization of the Functional Properties of 3D-Microfabricated Bone Scaffolds Synthesized Based on Novel Biomaterial Formulations

College of Engineering and Computer Sciences

Undergraduate **UGP-21**

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Poster

Mentor: Dr. Ross Salary, salary@marshall.edu

Abstract: Many patients suffer yearly from bone fractures and defects worldwide. 3D-microfabrication has emerged as a high-resolution method in clinical practice for fabrication of osteoconductive bone tissue scaffolds. However, patient-specific treatment of bone fractures is a complex clinical problem, governed by a wide range of factors, such as biomaterial formulation, fabrication process dynamics, and stem cell-driven osteogenesis. Therefore, there is a need for investigation of the influence of biomaterial formulation, among other factors, on the functional properties of fabricated bone scaffolds. In the absence of such knowledge, fabrication of bone scaffolds will not tailor the medical needs of patients. The long-term goal of this work is to fabricate patient-specific and biocompatible bone tissue scaffolds for treatment of bone pathology. In pursuit of this goal, the objective of the work is to synthesize, fabricate, and characterize bone tissue scaffolds using novel natural-based biomaterial formulations. To realize this objective, a wide range of bone tissue scaffolds are 3D-fabricated on the basis of chitosan, polysaccharide, calcium phosphate, and hydroxyapatite. Furthermore, the functional properties of the fabricated scaffolds will be characterized using biodegradation, live/dead, and compression analyses. Overall, this project will pave the way for effective recovery of patients, who have suffered from bone-related injuries.

Keywords: Advanced Manufacturing; Bone Tissue Engineering; Regenerative Engineering.

Dry Needling with Electrical Stimulation vs. Transcutaneous Electrical Stimulation in Quadriceps Delayed Onset Muscle Soreness

College of Health Professions

Graduate **GO-10/GP-5**

Presenter: Chibuike Obinnakwelu, obinnakwelu@marshall.edu **Oral Presentation and Poster**

Mentor: Dr. Scott Davis, davis1090@marshall.edu

Abstract: The purpose of this study was to determine the effectiveness of Dry Needling plus transcutaneous electrical nerve stimulation (DN+TENS), conventional TENS (c-TENS), and interferential electrical stimulation (IFC) on delayed onset muscle soreness (DOMS) as measured by pain – Visual Analog Scale (VAS), pressure pain threshold (PPT), single leg stance (SLS), and single leg vertical jump (VJ). To date, 14 subjects (preliminary data) have participated in the study. The research design was a single-blind, randomized controlled trial, where the testers were blinded to the treatment allocation. All participants self-reported their baseline muscle soreness (VAS) and then underwent testing for PPT, SLS, and VJ. All participants then underwent an eccentric training protocol on the Humac Norm of the non-dominant quadriceps to induce DOMS. The participants returned two days later for repeat testing (VAS, PPT, SLS, VJ). Participants were then treated and were re-tested. The subjects then performed 20 minutes of low-resistance exercise on an exercise bike, followed by a final bout of testing. The electrical stimulation treatments produced a decrease in VAS, an increase in PPT, and an increase in VJ, but there was no change in SLS. There was no difference identified in any variable based on the treatment group.

Keywords: Quadriceps, exercise, pain, soreness

Pet Therapy Effects on Anxiety in Pediatric Patients

College of Health Professions

Undergraduate **UGP-22**

Presenter: Kyle Allen, allen439@marshall.edu

Poster

Mentor: Debra Greene, [greene35@marshall.edu](mailto:green35@marshall.edu)

Abstract: Context: Hospitalization of pediatric patients alters their lives in many different aspects. This causes an increase in anxiety due to the disturbance of the patients' everyday lives.

Objective: This project aims to answer the PICO question: In pediatric patients, what is the effect of pet therapy on anxiety compared to no pet therapy during hospitalization?

Data Sources: Review of the literature conducted using Google Scholar and Summon databases, selected articles published 2018-2023. Keywords were: anxiety, pet therapy, hospitalized children, and pediatrics.

Study Selection: Five articles were selected that contain various study designs focusing on children between ages 3-18. All studies chosen set a significance level at $p < 0.05$. One article selected is a scoping review of literature, which provides background and frameworks for future studies.

Data Extraction: Four investigators reviewed studies that used different methods or designs but revealed significant results of decreased anxiety in pediatric patients.

Data Synthesis: All studies chosen have control and intervention groups. Four of the studies utilize the State-Trait Anxiety Inventory and/or vital signs to accurately measure anxiety.

Conclusions: Pet therapy can significantly decrease anxiety in pediatric patients, assisting with completing interventions and ultimately increasing the patient's well-being.

Keywords: anxiety, pet therapy, hospitalized children, pediatrics

The Effect of Head Rotation on Scapular Kinematics

College of Health Professions

Undergraduate **UGP-23**

Presenter: Faith Auvil, auvil16@marshall.edu

Poster

Mentor: Mark Timmons, timmonsm@marshall.edu

Abstract: Background: It is understood previously that scapular kinematics is affected by arm elevation. It is seen that the scapula exhibits upward rotation, internal rotation, and posterior tilt. Previous studies conducted a study with forward-eye focus with no cervical rotation. The current study tested the hypothesis that head rotation will produce scapular kinematics associated with the development of rotator cuff injury.

Methods: Five participants without a history of shoulder injury took part in the investigation, and all provided their written informed consent. The participants' shoulder and trunk strength and range of motion were measured using standard clinical procedures. Motion tracking sensors are attached to the participant. Participants will then perform 2 bouts of 5 unilateral arm elevations with their left and right arms with a fixed target for eye focus in cervical rotation. Measured scapular movement through electromagnetic motion tracking.

Results: When the head is rotated away from the elevating arm the scapula experienced less toward rotation, internal rotation, and posterior tilt than when the head is rotated looking towards the elevating arm.

Conclusion: When the head is rotated away from the elevating arm the scapular kinematic patterns are like the scapular kinematic patterns associated with the development of rotator cuff injury.

Keywords: Scapular kinematics, Cervical rotation

Acromial Humeral Distance during shoulder external rotation maximal voluntary isometric contraction

College of Health Professions

Undergraduate **UGP-24**

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Poster

Mentor: Mark Timmons, timmonsm@marshall.edu

Abstract: Introduction

Decreases in the acromial humeral distance (AHD) is reported to contribute to the development of rotator cuff (RC) disease. The AHD measurement has been shown to decrease during arm elevation and due to muscle fatigue. The changes in the AHD measurement during a maximal external rotation (ER) maximal voluntary isometric contraction (MVIC) have not yet been recorded. The current study tested the hypothesis that the AHD measurement would decrease during the ER MVIC.

Methods

AHD was measured with ultrasound imaging during ER MVIC. Ultrasound images were collected prior to and after a bout of 30 over head raises.

Results

The AHD decreased during a shoulder external rotation MVIC, this was during both pre and post fatigue. The post fatigue the AHD during rest was greater than the pre fatigue. During the ER MVIC there was a greater decrease in the AHD measurement post fatigue than pre fatigue.

Discussion

The decrease in AHD measurement during the ER could increase impingement on the RC during arm abduction. The greater decrease in AHD measurement post fatigue was an unexpected finding. Likely due to increased activity of the scapular upward rotators as a strategy to maintain the width of the subacromial space.

Keywords: subacromial space, rotator cuff, fatigue

The effects of repeated arm elevation on deltoid and infraspinatus activity

College of Health Professions

Undergraduate **UGO-12/ UGP-25**

Presenter: Dustin Darnell, darnell21@marshall.edu

Oral Presentation and Poster

Mentor: Mark Timmons, Timmonsm@marshall.edu

Abstract: Context: The synergetic relationship of the deltoid and infraspinatus during arm elevation has been hypothesized to maintain healthy width of the subacromial space. During repeated arm elevation, the ratio of the deltoid to infraspinatus activity changes. The current study is exploring the ratio of deltoid and infraspinatus activity changes during arm elevation.

Methods: Subjects without shoulder injuries were recruited. Muscle activity was recorded with EMG during arm elevations. The subjects performed 30 arm elevations. The deltoid and infraspinatus ratio (DEL/INF) was calculated during the first three and last three repetitions.

Results: During the first three repetitions, deltoid activity increased from 60-90° of arm elevation. Deltoid activity increased from 45-60° of arm elevation, reaching a maximum contraction at 60° during the final three repetitions. During the first three repetitions, Infraspinatus activity increased during 60-90° of arm elevation. During the last three repetitions, infraspinatus activity increased with arm elevation from 30-90°. The DEL/INF ratio increases during 60-90 arm elevation. DEL/INF is shown to decrease during 30-45 and 60-90 arm elevation, and increase during 45-60° of arm elevation during the last three repetitions.

Conclusion: Repeated arm elevation increased the activity of both the deltoid and infraspinatus. Deltoid and infraspinatus activity increased along with arm elevation. DEL/INF was shown to not be greatly affected by fatigue.

Keywords: Scapula, shoulder, muscle activation, fatigue

The Effects on Arm Elevation on Trunk Rotation

College of Health Professions

Undergraduate **UGO-13/ UGP-26**

Presenter: Raleigh Elk, elk3@marshall.edu

Oral Presentation and Poster

Mentor: Mark Timmons, timmonsm@marshall.edu

Abstract: Context: Movement of the arm is associated with trunk motion with trunk rotation and lateral flexion towards the moving extremity during arm elevation. When an arm elevates the trunk rotates towards the arm to create a structurally secure movement plane for the shoulder and its surrounding soft tissue. The effect of head rotation on trunk rotation during arm elevation has not been sufficiently studied. The current study tested the hypothesis that during arm elevation the trunk rotates towards the elevating arm.

Methods: Five participants without shoulder injury were recruited. The participants' trunk rotation was measured using electromagnetic tracking. Participants performed 2 bouts of 5 right arm elevations with their head turned towards the right or left.

Results: During right arm elevation while looking right the experienced no trunk rotation or lateral flexion. During right arm elevation while looking left the subject started 5° left trunk rotation. The trunk experienced 1° towards the right.

Conclusion: The data shows that trunk rotation is seen in arm elevation with opposing head rotation but not with head rotation towards the same side as arm elevation is occurring. Further exploration of this topic can lead to greater understanding of the mechanisms leading to shoulder injury.

Keywords: shoulder trunk kinematics

Type II Diabetic Patient Exercise and Diet Adherence: A National Sample Comparing Rural and Urban Communities

College of Health Professions

Undergraduate **UGP-27**

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Poster

Mentor: Clinton Brown, browncl@marshall.edu

Abstract: Diabetes Mellitus Type II (T2DM) affects a person's ability to produce and utilize insulin, and it is estimated that over 100 million US adults are prediabetic or diabetic. Rural communities are especially impacted by this disease (e.g., 16% higher prevalence of T2DM & 20% higher T2DM-related hospital mortality) with many studies indicating that rural patients receive inadequate diabetes education and experience significant barriers to care. However, no studies, to date, have compared differences in patient-provider communication and how patient-provider communication leads to different health outcomes in rural and urban type II diabetic patient populations. Surveying T2DM patients from both rural (n = 455) and urban (n = 362) communities, this study examines the relationship between patient-provider communication, patient diet adherence, patient exercise adherence, and patient health outcomes. Results indicate that when compared to urban T2DM patients, rural T2DM patients have lower health literacy rates, lower understanding of type II diabetes, lower levels of diet adherence, lower levels of exercise adherence, and poorer patient-provider communication. These factors all contribute to rural patients experiencing higher A1C levels (average blood sugar level) than urban patients, and thus are at greater risk for serious T2DM complications.

Type II Diabetes, Rural Health, Provider Communication, Patient Adherence

Keywords: Type II Diabetes, Rural Health, Provider Communication, Patient Adherence

Investigating the Variant and Invariant Differences in the Biomechanics of a Jump Shot in Different Locations

College of Health Professions

Undergraduate **UGP-28**

Presenter: Ethan Hahn, Hahn14@marshall.edu

Poster

Mentor: Dr. Steven Leigh, leighs@marshall.edu

Abstract: From general motor program theory, invariant and variant features characterize a well-learned motor skill. When jump shooting from different court positions, a basketball player should use similar relative joint motions; however, the absolute joint motions will vary. We recorded 16 jump shots of collegiate basketball players at close, far, wing, and corner locations with Vicon Motus. We digitized a three-dimensional model of the whole body, calculated joint angles and timings, and then compared them among shooting locations statistically. There were no differences among locations in absolute joint angles ($F = 1.031$, $p = 0.467$), absolute joint times ($F = 1.109$, $p = 0.415$), or relative joint times ($F = 1.060$, $p = 0.437$). Relative joint angles were different among locations ($F = 98.381$, $p = 0.010$); participants used their hips relatively more at the far location (0.879 vs 0.7819, $p = 0.024$). The basketball players were using two different movement patterns for shooting, one for far and one for everywhere else on the court. The basketball players parameterized all their shots in the same way. Practices should include shooting at a variety of different locations to practice these two distinct skills.

Keywords: Basketball, biomechanics, motor control, shooting

Forearm Pronation Reduces Glenohumeral External Rotation

College of Health Professions

Undergraduate **UGP-29**

Presenter: Brettina Jeffers, jeffers68@marshall.edu

Poster

Mentor: Dr. Mark Timmons, timmonsm@marshall.edu

Abstract: Introduction: People with limited glenohumeral (GH) external rotation (ER) have a greater risk of developing shoulder pain. Kibler, et al., reported that forearm pronation reduces GH ER in throwing athletes. This finding has not been reported in the general population. The purpose of this current study was to explore the effects of forearm pronation on GH ER in a general population.

Methods: Participants include individuals without a history of shoulder pain. The GH ER of the right and left shoulder was measured using standard two arm goniometer. The GH ER was measured with the participants shoulder at 0 and 90 shoulder abduction and forearm supination and pronation. GH ER was measured twice in each shoulder and forearm position. The means of the 2 measures were used for analysis.

Results: At 0° shoulder abduction, forearm pronation had no effect on GH ER rotation. At 90° shoulder abduction, forearm pronation reduced GH ER. Greater GH ER at 90° abduction at the right than the left shoulder.

Conclusion: Forearm pronation reduced the GH ER at the 90° arm abducted position. Further research needs to be conducted to explore the relation between shoulder pain, forearm pronation, and GH ER.

Keywords: Glenohumeral External Rotation; Forearm Pronation; Glenohumeral Abduction

Infraspinatus Activity during Maximal External Rotation Trials in Three Different Conditions

College of Health Professions

Undergraduate **UGO-14/ UGP-30**

Presenter: Seth Jude, jude68@marshall.edu

Oral Presentation and Poster

Mentor: Dr. Mark Timmons, timmonsm@marshall.edu

Abstract: Context: Movement and stabilization of the shoulder requires coordinated muscle activation. Differences in the timing and magnitude of muscle activation have been identified between healthy and painful shoulders. Lower levels of infraspinatus activation have been associated with reported shoulder pathology. Several methods of measuring infraspinatus activity during external rotation (ER) trials have been proposed. Infraspinatus muscle activity would be hypothesized to be the greatest during a constrained ER contraction.

Methods: Subjects were recruited with no history of shoulder injury. Subjects were instructed to perform shoulder ER, in three different conditions – free, foam restricted, belt restricted – at a maximum contraction. Results were recorded via electromyographic sensors placed above the infraspinatus. The maximum root mean square (RMS max) values of the contractions were calculated and analyzed.

Results: The RMS max of the unconstrained contraction was 4.22 ± 0.52 mV. The RMS max of the foam constrained contraction was 4.18 ± 0.46 mV. The RMS max of the belt constrained contraction was 4.02 ± 0.66 mV. There was no statistically significant difference between all three contraction conditions.

Conclusion: Currently, there was deemed to be no significant difference between the constraints' effects on infraspinatus activity. However, this data is calculated from a small sample and as more data is collected, a difference may arise.

Keywords: Shoulder, infraspinatus, muscle, activation

A Connection between Religious Involvement and Mental Health

College of Health Professions

Undergraduate **UGP-31**

Presenter: Michaela Marshall, michaela.marshall@marshall.edu **Poster**

Mentor: Elizabeth Pacioles, caseyel@marshall.edu

Abstract: The purpose of this study was to examine the relationship between religious affiliation (perceived involvement, type of group, attendance frequency) and participation in mental health resources among Marshall University college students. The study will include questions addressing demographics, the individual's mental health, the use of campus and community mental health resources, and campus religious involvement. The questions will measure student participation in various organizations. A negative correlation is expected between the degree of involvement of organizations and the involvement of mental health resources. Based on prior findings of early life religious attendance and health of early adulthood (Upenieks, L., & Schafer, M. H. (2020), it hypothesized that frequent adult religious attendance, social support from religious members, and the greater meaning of life will be related to a higher health-related quality of life. The results of the study will be used to inform members of the campus community about the relationship between types of religious affiliation and students' use of mental health resources. The results also could potentially be published to add to the growing knowledge of religious affiliation on the mental health of college students.

Keywords: Campus Religious organization, Mental Health

Biomechanical variables of disc golf driving technique to optimize distance and accuracy

College of Health Professions

Undergraduate **UGP-32**

Presenter: Christopher Pinkerton, pinkerton15@marshall.edu **Poster**

Mentor: Steven Leigh, leighs@marshall.edu

Abstract: When teaching a motor skill, instructors should focus on the most influential movements. Effective throwing technique creates optimal release characteristics which determine success in disc golf throwing. We investigated which technical parameters were optimal for success in the sport. Twenty experienced disc golfers threw to a basket at a local course. We measured thrower movement using 3-D motion capture and success based on final disc location. Technical parameters and release characteristics were calculated from motion capture data. A structural equation model was developed to assess the associations among technical parameters, release characteristics, and success. Accuracy was the major success factor and was mainly determined by a combination of release angle ($r = 0.903$, $p = 0.036$) and release height ($r = -0.932$, $p = 0.021$). Distance thrown was independent of accuracy ($r = -0.706$, $p = 0.183$) and not significantly associated with release speed ($r = 0.676$, $p = 0.210$). Release angle and release height were controlled by wrist orientation ($r = 0.964$, $p = 0.008$) and throwing arm elevation ($r = -0.882$, $p = 0.048$). Disc golfers should focus on their accuracy by releasing lower, closer to waist height, while throwing the disc slightly above horizontal to be successful. This release control can be achieved by moving their arm along a slight downward path and flicking their wrist upwards at release.

Keywords: Disc Golf, Biomechanics, Technique

Perception and Consumption of True Crime Content

College of Liberal Arts

Graduate **GP-6**

Presenter: Lily Billiter, billiter5@marshall.edu

Poster

Mentor: Chris LeGrow, legrow@marshall.edu

Abstract: The purpose of this research is to examine the reasons why people consume true crime content. America's fascination with true crime appears to be the result of numerous factors, including but not limited to: fascination with evil, a belief that consumption of true crime content increases our chances of survival if we are involved in a crime, and the enjoyment of attempting to solve a crime like a complex puzzle. The present study will seek to examine gender differences in the perception and consumption of true crime content. Participants will be recruited for this anonymous, online survey study via email, text, and personal social media accounts of the Principal Investigator and Co-Investigators. The online survey is divided into two parts. In Part A, participants will be asked to answer a series of questions about their perceptions and consumption of true crime content. In Part B, participants will be asked to provide demographic information. Participants will contribute to our understanding of the reasons why men and women consume true crime content, types of true crime content they are most interested in, and the impact of consuming true crime content on perceptions of safety and feelings of security.

Keywords: True Crime, Gender, Media Consumption, Violence, Crime

Are Your Favorite YouTubers Encouraging Cult-Like Tendencies?

College of Liberal Arts

Graduate **GP-7**

Presenter: Rhiannon Brewer, brewer123@marshall.edu

Poster

Mentor: Dr. Chris LeGrow, legrow@marshall.edu

Abstract: A social media influencer is an individual who promotes products, services, or events via social media (Glucksman, 2017) and gains “followers,” a term associated with cult members (Spencer, 2019). Some have gone so far to refer to social media influencers as “the new cult leaders” in society (Cole, 2020) and Youtube is a popular online platform where social media influencers commonly promote products, services, events, and themselves (Spencer, 2019). Constine (2020) has also noted that social media influencers use a common playbook to transform casual fans into “cultists” by consuming and subscribing to an influencer’s content, sharing an influencer’s content on other social media platforms, buying products or services promoted by an influencer, donating money to help them create new content, and transforming or redefining one’s identity around an influencer (Watkins, 2019). The purpose of the research is to examine the extent to which demographic variables, Youtube viewing behavior, and perceptions and behaviors related to one's favorite Youtubers are predictive of an individual's willingness to engage in a variety of cult-like behaviors on behalf of a hypothetical group of which they are seeking to become an accepted member of. The results of this study will be presented at the symposium.

Keywords: Youtube, cults, social media, influencer

Characterizing the Unexplainable: Examinations of Trauma in Once There Were Wolves

College of Liberal Arts

Graduate **GO-11**

Presenter: Britney Cox, cox297@marshall.edu

Oral Presentation

Mentor: Dr. Jana Tigchelaar, tigchelaar@marshall.edu

Abstract: Within the rise of what we understand as contemporary literary fiction, there has been an uptake in traumatic narratives as lived experiences and are often important in identifying and sharing one's experience with mental health. We are seeing trauma used in literature to advance plot, especially within novels classified as thriller/psychological. In the novel *Once There Were Wolves* by Charlotte McConaghy, the main character and her twin sister experience a shared traumatic event that changes their life trajectory as well as how they further view and trust their surrounding world. Using the lens of trauma theory, I look at how exactly trauma builds the narrative, and how the plot cannot survive without out this traumatic event. I will be discussing trauma within the novel in terms of dissociation, repression, and collective trauma. Though there will be acknowledgement towards earlier theorists like Freud, I will mainly discuss the works of Michael Richardson, Cathy Caruth, Bessel A. van der Kolk, and Onno van der Hart. I will look at how the traumatic scene is described linguistically, as trauma often defies linguistic representation, and embedded within the novel.

Keywords: Trauma, Narrative Theory, Literary Theory, Representation, Psychology

Marxism as Represented Through Science Fiction

College of Liberal Arts

Graduate **GP-8**

Presenter: Duncan Crowley, crowley4@marshall.edu

Poster

Mentor: Dr. Stephen Underhill, underhills@marshall.edu

Abstract: Fiction is a playground where a writer can create realized conceptions and ideologies more coherently than the real world can present, since they can choose to omit parts of real life that may conflict with those concepts and ideas, while also constructing a fictional world that is perfect for those concepts and ideas to bear the most fruit. Science fiction, to a more specialized degree, is an orchard ripe with dystopian futures, imagined societies of hyperbolic class division, and hypothetical tyrannies waiting to be overthrown. Counter-cultural, revolutionary, or utopian messages are frequently portrayed in the realm of science fiction, as science fiction can serve as a cloak to shield intention. Being able to present a deeper, sometimes unapproachable or unpalatable message to an audience through high value, flashy, silver screen productions, or well-written and thoughtful novels is a benefit for Marxism. Marxism, a topic many only know through its association to communism and therefore “bad stuff” is a buzzword that would turn off many from even considering approaching any media portraying its concepts or ideology. Marxism donning the mantle of “sci-fi” makes public consumption much easier for a society programmed to wince at any reference of communistic themes.

Keywords: Marxism, sci-fi, socialism.

Microaggressions and Resiliency of Women of Orthopedic Disability

College of Liberal Arts

Graduate **GP-9**

Presenter: Rachael Englund, englund2@marshall.edu

Poster

Mentor: Dr. Brittany Canady, smith541@marshall.edu

Abstract: Women with orthopedic disability face unique challenges impacting physical movement, ability to perform daily activities, and discrimination. Microaggressions are subtle interactions or behaviors that communicate discrimination towards a marginalized group. The present study explores the experience of women with orthopedic disability regarding microaggressions as well as resilience.

Data collection for this study is currently underway (n=115) and expected to conclude in March 2023. Participants are recruited via social media posts to groups focused on women with disabilities. Participants complete an online questionnaire measuring demographics, microaggressions via the Ableist Microaggressions Scale, and resilience via the Connor-Davidson Resilience Scale. Preliminary results suggest that women with orthopedic disabilities consistently report experiencing microaggressions.

Women with orthopedic disability face marginalization due to the intersectionality of gender and physical ability. The present study will provide a clearer picture of how this may translate to experiences with microaggressions, as well as resilience in the face of these challenges.

Keywords: disability, microaggression, resiliency

Norman Bates No Longer Exists: Or, How I Learned To Stop Worrying and Love the Bomb

College of Liberal Arts

Undergraduate **UGP-33**

Presenter: E.T. Bowen, bowen214@marshall.edu

Poster

Mentor: Dr. John Young, youngj@marshall.edu

Abstract: This capstone project revolves around a central question/curiosity- what would happen if we blew up the fourth wall separating us (or more specifically- Myself) from all the “evil” trans characters of American film? From Norman Bates and Buffalo Bill to Dr. Frank-N-Furter and Divine, what if we were forced to imagine and reckon with the glimmers of humanity beneath what Toni Morrison calls “all that costume” of evil? Possibly we might even catch the glimmers of actual transness- of real queer beauty and rage.

Using Eve Kosofsky Sedgwick’s essay “Paranoid and Reparative Reading” as my critical framework, I will be creating both a zine and an auto-critical essay that chronicles my creative progress. For the zine, I will be using photography, collage, letters, poetry, and other materials to confront the trans villains in question, and the history I have with them. It will be, at its core, a reparative reading of trans destructiveness.

My auto-critical journal gives vital context to the project- detailing both the political/personal forces that shaped it, and the creative processes that brought it to life. The entries will be continuously revised until the end of each month, which will allow for open-ended reflection and engagement with the material. It aims to be a documentation of affect. A personal history of my own private Idaho. My movie monologue moment, performed on paper. Amidst the hurt it addresses, my hope is that those glimmers of transness come through. May they always come through.

Keywords: Trans, Queer, Zines, Radical, Liberation

Braided and Experimental Forms in Creative Nonfiction

College of Liberal Arts

Undergraduate **UGP-34**

Presenter: Abigail Cardwell, cardwell27@marshall.edu

Poster

Mentor: Rachael Peckham, peckham@marshall.edu

Abstract: Students of upper-level creative nonfiction will share portions of braided or hybrid essays which

incorporate researched material in contrast or in conversation with personal narrative. Both scientific and personal research play a role in the construction and development of these essays. Braided essays weave together two or more strands of a story and blend them together in an unexpected way. Typically, a researched element allows the writer to ground the story in something factual. The hybrid form, or “hermit-crab essay,” lends the writer an opportunity to take up a pre-existing form and use it to their advantage, subverting the expectations associated with that particular form. Each panelist will read an excerpt from their essay, followed by a short Q&A session.

Keywords: Nonfiction, Experimental, Braided, Essay

The Desire to Be Truly Recognized: How Incels, Don't Worry Darling, and The Stepford Wives Exemplify the Master-Slave Dialectic

College of Liberal Arts

Undergraduate **UGO-15**

Presenter: Abigail Cunningham, cunningha218@marshall.edu **Oral Presentation**

Mentor: Stephen Underhill, underhills@marshall.edu

Abstract: This paper analyzes the social commentary presented in the film *Don't Worry Darling* on incel culture through the characterization and motivations of Jack Chambers. Analysis is performed through feminist rhetorical theory, citing Sherryl Vint (2007), emphasizing her application of Hegel's master-slave dialectic on a contemporary of the film, *The Stepford Wives* (2004). This dialectic states that self-consciousness is dependent upon other consciousnesses, though these distinct consciousnesses' existence creates tension between them often resulting in a one-sided recognition. Master is recognized by slave and master is fully recognized because he has power over another consciousness that willfully submits. He desires love and power over a real person, not just an object. This explains the motivations of Jack Chambers in fundamentally altering his wife's personality without following *The Stepford Wives* in turning his wife into a robot. In *The Stepford Wives*, Walter Eberhart's decision to not turn Joanna into a robot may not be altruistic, rather it "might simply express his own need to have (some) power over another true subject" (Vint 2007). Much of incel culture stems from beliefs of entitlement and inadequacy, both beliefs that feed into the justification of slavery and is exemplified in Jack Chambers and Walter Eberhart.

Keywords: film, feminism, incels, master, slave, entitlement

Shielded Support: Marshall's Unique Ability to Leverage Seeming Setbacks to Create Pro-Trans Change

College of Liberal Arts

Undergraduate **UGO-16**

Presenter: Zoe Davin, davin4@marshall.edu

Oral Presentation

Mentor: Dr. Rensenbrink, rensenbrink@marshall.edu

Abstract: From 2015 to 2019, the American public was engaged in a heated debate. As trans-visibility emerged, many Americans feared trans people occupying gender-related spaces, especially bathrooms. Specifically in states with mostly Republican voters, it became common to restrict bathrooms people used to the bathroom that correlated with their gender assigned at birth. Marshall was not immune from these debates. Using Marshall University Student Government Association resolutions, Parthenon articles and editorials, and interviews from those involved, the story of Marshall's response can be pieced together. SGA debates, along with resolutions, show that MU students made change through the guise of helping families, justifying their need for unisex bathrooms as a need to give parents the ability to take their kids to the bathroom. Additionally, support for trans people was added to uncontroversial subjects, such as feminine product disposal sites. Through this, it is clear that Marshall University used its status as a university that serves commuter and non-traditional students to leverage unisex bathrooms, as well as hiding trans-support systems, in an attempt to avoid the highly controversial nature of this discussion, while still serving all of their students.

Keywords: History, Marshall University, Trans Bathrooms

Subtitled or dubbed: Learning Japanese culture through anime in the U.S.

College of Liberal Arts

Undergraduate **UGP-35**

Presenter: Ryan Green, green305@marshall.edu

Poster

Mentor: Natsuki Anderson, andersonn@marshall.edu

Abstract: While Japanese anime as a medium has expanded its range of audience over the past few decades, not much is known about the effects that anime has on the larger population and their knowledge of Japanese culture. Furthermore, anime could potentially provide differing effects on a person's knowledge of Japanese culture depending on the way in which the anime is watched. This is commonly seen in the form of subtitled or dubbed anime. These different forms of consumption can lead to different levels of exposure to Japanese culture. In this study, the survey data and online discussion on the reception of two different forms of anime consumption and their lasting effects on Japanese cultural knowledge are analyzed. The central questions guiding the study are as follows: 1) How is Japanese cultural knowledge retention affected by the chosen method of consuming anime? 2) How does the genre of anime affect Japanese cultural knowledge retention? By understanding how the choice of subbed or dubbed anime and the genre of anime can affect Japanese cultural knowledge, this study will contribute to new and dynamic understandings of Japanese culture and anime as a learning medium in the U.S.

Keywords: Anime, dubbed, subbed, Japanese culture, learning

The Evolution of Marxism: From Genocide to Freedom

College of Liberal Arts

Undergraduate **UGO-17**

Presenter: Ashlea Krasnansky, simmers2@marshall.edu

Oral Presentation

Mentor: Dr. Stephen Underhill, underhills@marshall.edu

Abstract: The written works published by Karl Marx has held various meanings throughout the 150 to 175 years that they have existed. Marx's life story combined with the literature that he produced provides an insight to the original work's purpose and meaning. However, various alterations of Marxism have come to exist, such as Nazism, Marxism-Leninism, and Maoism. Yet, modern versions of the ideology exist and thrive too, such as Neo-Marxism. This genealogical project examines the progression of Marxism from an ideological tool which once twisted to justify the genocide of millions of perceived Jewish people in Germany, communistic followers in the Soviet Union, and various, diverse groups in China to its current utilization within the modern civil rights movement of the LGBTQIA+, Black Lives Matter, and Feminist communities. This project also evaluates Marxism as a sub-discipline and calls attention to the significance of this classification through a brief analysis of several key contributors to the ever-changing ideology.

Ashlea Krasnansky, College of Liberal Arts, Marshall University, Huntington, WV, 25755.
The Evolution of Marxism: From Genocide to Freedom.

Keywords: Marxism, Extremism, Genealogical

Violence Against Anthropomorphic Characters Increasing Aggression in Children

College of Liberal Arts

Undergraduate **UGP-36**

Presenter: Celeste Maddy, maddy14@marshall.edu

Poster

Mentor: Prof. Puspa Damai, damai@marshall.edu

Abstract: This paper will explore a topic well documented in research through a new medium of anthropomorphic characters. There are papers on how violent media can affect people but not a lot about how children might empathize with non-human characters more and have a stronger emotional reaction than adults when violent situations happen to those characters.

Keywords: Anthropomorphic, Children's Literature, Violence, Aggression

Body Image, Social Media Use, and Mental Health

College of Liberal Arts

Undergraduate **UGO-18**

Presenter: Emilee Pugh, pugh57@marshall.edu

Oral Presentation

Mentor: Masa Toyama, toyama@marshall.edu

Abstract: This study seeks to understand the inconsistencies found in previous research regarding the relationship between interactions on social media and body image. The overall results of the existing literature demonstrate that there is a negative relationship between social media use and body image, but there is no conclusive evidence as to what explains this relationship. Our study aims to look into the relationship that body image, social media, mental health, and other related factors have on each other. To examine this, we developed an online questionnaire that includes measures related to body image, social media, mental health, and other psychological factors. We are recruiting participants (with a target of at least 100) with the help of psychology professors by requesting their students to complete the questionnaire. We will then analyze the collected data to answer our research questions. Some questions include whether or how different social media platforms (TikTok, Instagram, etc.) predict body image, anxiety, depression, stress, and related outcomes differently. As these questions have not been fully addressed in previous research, there is an expectation that this study will be an important contribution to further the knowledge of the relationships between social media, body image, and mental health.

Keywords: body image, social media, mental health

Valuing the Unwritten: Navigating Oral History Methods and a Call for Cross-Disciplinary Collaboration

College of Liberal Arts

Undergraduate **UGO-19**

Presenter: Emma Rau, rau@marshall.edu

Oral Presentation

Mentors: Dr. Robin Conley-Riner, conleyr@marshall.edu; Dr. Marie Nikki, Pareja Cummings cummingsma@marshall.edu; Lori Thompson, thompson39@marshall.edu

Abstract: While oral histories are unlikely to survive in the archaeological record, they give researchers unique access to the human experience that would otherwise not been fully understood. Non-written storytelling can outlast material culture because the stories and histories have the ability to survive into the narratives of future generations. These types of histories should not be an overlooked element of cultural history.

This project aims to bring notice to oral histories has an aspect of cultural studies. Investigating bias, shared authority, preservation and recording, accessibility, colonialism, and other aspects of oral history interviews as an attempt to assert merit to unwritten stories. This project questions the colonial and ethnocentric value judgements of written texts by navigating the translation of unwritten material into written formats.

Open-ended interviews were conducted with museum professionals, archivists, historians, and folklorist about their personal and institutional identities and experiences with oral history, intangible heritage, and interviewing in general. Although many disciplines use a multitude of interviewing methods that can individually be purposeful and successful, there is a need for cross-disciplinary collaboration in interview methodologies to gain a fuller, more holistic account of oral histories and human culture(s). Such cross-disciplinary collaboration will more deeply promote active community engagement, purposeful accessibility, and value to the unwritten stories or the past, present, and future.

Keywords: Oral History, Interviewing, Intangible Heritage, Public History, Community Engagement

Equality Throughout a Nation: The Equal Rights Amendment is the Key to Protect All Citizens

College of Liberal Arts

Undergraduate **UGP-37**

Presenter: Nico Raffinengo, raffinengo@marshall.edu

Poster

Mentor:

Abstract: The Equal Rights Amendment (ERA). A policy that was drafted over 50 years ago with the intention to provide a constitutional guarantee that all current and future laws shall not infringe on the rights of citizens on account of sex. Recently, the 3/4 of states' threshold of ratification on ERA was met. Despite this support, the ERA has not been made the 28th amendment of these United States. While the ERA has not been made the 28th amendment, the concept that these United States. This failure does not mean that the United State should not continue to strive to be a more perfect union. This essay will examine not only why the country needs to secure the rights of cis women, but of all women and LGBTQ+ folk who would be protected under the ERA's definition of protection on the basis of sex. In doing so, it will review the history of the ERA and why it was proposed, analyze why protections are needed for both cis women and LGBTQ+ people, and speculate of about what could occur if the ERA were made the 28th amendment based on legal precedents and the current political climate.

Keywords:

The Influence of Sensory Sensitivity on Visual Perception

College of Liberal Arts

Undergraduate **UGP-38**

Presenter: Nathan Stump, Stump78@marshall.edu

Poster

Mentor: Dr. Chris LeGrow, LeGrow@marshall.edu

Abstract: The present study will examine the influence of sensory sensitivity on a visual perception task. The personality trait called sensory processing sensitivity (SPS) causes individuals with this trait to process information slower, more deeply and to take longer to make decisions than others. They are more easily overstimulated and often need silence, downtime, or alone time to cope with overstimulation. They are sensitive to even the most subtle changes of stimuli within their environment and are affected by stimuli others may not even notice. They are emotionally reactive and experience stronger emotions in response to stimuli in their environment and they are referred to as “highly sensitive people” (HSP). Participants will complete the 27-item Highly Sensitive Person (HSP) scale to assess the trait of sensory processing sensitivity. Participants will then examine three images containing subtle details artistically hidden within the images. Participants will then indicate which of these subtle details they saw in each of the images and what emotions they experienced when examining the images. The relationships between scores on the HSP scale, HSP subscales (Ease of Excitation (EOE), Awareness of Aesthetics (AES), Low Sensory Threshold (LST), cognitive abilities, and performance on the visual perception task will be examined.

Keywords: Visual, Perception, Sensitivity, Emotions

Species Limits and Systematics of Asiatic White-eyes (Zosterops spp.)

College of Science

Graduate **GP-10**

Presenter: Madeline Boyd, boydm@marshall.edu

Poster

Mentor: Herman L. Mays, maysh@marshall.edu

Abstract: The currently recognized Warbling White-eye (*Zosterops japonicus*) is the result of a lumping of the Japanese White-eye (*Z. japonicus*) in the Japanese archipelago, and the Mountain White-eye (*Z. montanus*) found from the Philippine islands to Indonesia. This revision is based solely on prior work involving mitochondrial DNA (mtDNA) and suggests a paraphyletic *Z. montanus* relative to *Z. japonicus*. Prior work on these taxa involved few nuclear DNA (nuDNA) markers and did not sample widely from both *Z. japonicus* in the Japanese archipelago and *Z. montanus*, particularly for *Z. montanus* populations in the Philippines. Also, previous studies did not include other codistributed *Zosterops* in the Philippines. We performed a multilocus molecular systematic analysis that includes seven nuDNA loci and one mtDNA locus across Philippine populations of *Z. montanus*, all subspecies of *Z. japonicus* in Japan, *Z. simplex* on the island of Taiwan and Mainland China, and *Z. evertti*, *Z. nigrorum*, and *Z. meyeri* from the Philippines. Our analysis shows remarkably little genetic variation among all of these named species, with the exception of *Z. simplex* and *Z. nigrorum*, and suggests an even more inclusive polytypic species lineage than originally suggested.

Keywords: Zosteropidae, Taxonomic Classification, Species Delimitation

Investigation of Morphological Differences Between Tardigrade Cryptobioses Using Scanning Electron and Confocal Microscopy

College of Science

Graduate **GO-12**

Presenter: Brendin Flinn, flinn9@marshall.edu

Oral Presentation

Mentors: Dr. Derrick R.J. Kolling, kolling@marshall.edu; Dr. Michael L. Norton, norton@marshall.edu; David Neff, dneff@marshall.edu

Abstract: Tardigrades exhibit extraordinary tolerance to environmental stressors, including freezing temperatures, extreme pressures, desiccation, irradiation, as well as novel stress conditions such as a high concentration of osmolytes (including calcium chloride and sucrose) and chemical stress with hydrogen peroxide. Tardigrades accomplish this by entering a suspended state called cryptobiosis which is characterized by a decline in metabolic rate and, in some conditions, by the tardigrade curling in on itself into a spheroid shape known as a 'tun' (accompanied by a loss of internal water content). While their ability to survive such extreme conditions in their cryptobiotic states has been well documented, the differences in morphology between cryptobioties is presently lacking. In this study, the morphological differences between tardigrade cryptobioses induced by sucrose, calcium chloride, and hydrogen peroxide are investigated using scanning electron microscopy for surface structure comparison and shadow imaging for measurement of volume changes upon entering different cryptobiotic states.

Keywords: Tardigrades, Cryptobiosis, Morphology, Stress, Microscopy

Excitons and Trions in Semiconductors

College of Science

Graduate **GP-11**

Presenter: Jayden Leonard, leonard57@marshall.edu

Poster

Mentor: Dr. Huong Nguyen, nguyenh@marshall.edu

Abstract: Being initially theorized in 1958, charged excitons are a fairly new phenomenon in physics in which an exciton (i.e. an electron coupled with an electron hole) is coupled with either another electron or another hole (giving either a 'negative exciton' or 'positive exciton' accordingly). These terms were often interchangeable with the negative and positive 'trion', but this definition has very recently been challenged. It is proved that actually negative (positive) excitons and negative (positive) trions actually are different quasiparticles, with the trion instead describing the direct coupling of all three particles without the first exciton coupling. In order to understand more about the differences between these quasiparticles, in this work the electric field effect and splitting of energy levels are calculated for a negative exciton structure inside a direct band gap semiconducting quantum dot. The respective wave functions of the resulting states have been obtained as well for the first time. With time permitting, the same process will be applied to the positive exciton, and comparisons will be made between the electric field effects for the trion and the charged exciton.

Keywords: Quantum Dot, Trion, Charged Exciton, Semi-Conductors

Visualization of Ignitable Liquid Residues on Burned Substrates Using the Foster+Freeman Crime-lite® AUTO

College of Science

Graduate **GO-13**

Presenter: Kaylee Morton, morton66@marshall.edu

Oral Presentation

Mentor: Lauren Waugh, richards18@marshall.edu

Abstract: The Crime-lite® AUTO by Foster + Freeman combines the abilities of UV, visible, and infrared light with long pass and band pass filters to visualize ignitable liquids. The present research intends to investigate the use of the Crime-lite® AUTO to visualize potential ignitable liquid residues in situations simulating those commonly encountered at residential fire scenes. Specifically, the ability to visualize gasoline, diesel, charcoal lighter fluid, and turpentine on carpet, laminate flooring, hardwood, and oriented strand board was investigated. The results showed that every sample was visualized as presumptive positive under at least one light source and filter combination with the Crime-lite® AUTO and then confirmed to be positive by GC-MS, thereby indicating that the Crime-lite® AUTO could be a valuable tool in the search for potential ignitable liquid residues. Additionally, samples that were visualized as presumptive negative by the Crime-lite® AUTO but that gave positive GC-MS results demonstrate that the presence of heavy charring has a deleterious effect on fluorescence. Furthermore, when investigating the visualization of the same ignitable liquid on different substrates, there was minimal overlap with respect to which light source and filter combination provided a positive result. This demonstrates that substrate composition has an effect on the visualization of fluorescence. When investigating the visualization of different ignitable liquids on the same substrate material, there was greater overlap with respect to which light source and filter combination provided a positive result. This suggests the Crime-lite® AUTO can visualize a broader range of ignitable liquids on some substrate compositions.

Keywords: Ignitable Liquid Residue, Crime-lite® AUTO, fire investigation

Long-term effects of Fire Frequency on Floral Abundance and Bumblebee Abundance

College of Science

Graduate **GO-14**

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Oral Presentation

Mentor: Kyle Palmquist, palmquist@marshall.edu

Abstract: Pollinators are declining due to global climate change and habitat loss. In fire-adapted ecosystems, fire promotes plant biodiversity by reducing competition but little is known regarding the effects of fire on *Bombus* (bumblebee) abundance. We hypothesized that sites with more frequent fire will have a higher abundance of floral resources and bumblebees. In 2022, vegetation surveys were conducted in the Wayne National Forest, OH at 22 sites in areas with different fire frequency: no fire, periodic, and frequent. Bumblebee surveys were conducted for one hour per site with sweep nets. We found 240 plant taxa in our sites. Floral abundance under periodic fire was significantly higher (6.7/m²) compared with no fire (1.6/m²) ($p = 0.048$), and marginally higher under frequent fire relative to no fire (6.0/m²) ($p = 0.09$). Two *Bombus* species were observed: *B. impatiens* and *B. bimaculatus*, but few individuals were detected as most surveys had zero observations. Our results suggest that periodic fire has a positive effect on floral abundance. Prescribed fire may be an effective tool for promoting the availability of floral resources with direct benefits to pollinator communities.

Keywords: Fire, Plant Ecology, Bumblebees, Biodiversity

On 2-Primitive Triangle Decompositions of Cocktail Party Graphs

College of Science

Graduate **GP-12**

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Poster

Mentor: Michael Schroeder, schroederm@marshall.edu

Abstract: A decomposition of a graph Γ is a collection C of subgraphs, perhaps nonisomorphic, that partition the edges of Γ . Given a graph H , we call C an H -decomposition of Γ if each subgraph in C is isomorphic to the graph H . A subdecomposition of C refers to a nonempty subset of C which partitions the edges of an induced subgraph of Γ , and C is said to be k -primitive when there exist no proper subdecompositions of C containing k or more subgraphs. In this work we examine decompositions of cocktail party graphs into triangles. In particular, we establish the existence of 2-primitive triangle decompositions of cocktail party graphs with $6k + 2$ vertices for each nonnegative integer k . Coupled with the results of a recent undergraduate capstone, this work completes the classification of when such decompositions exist for all cocktail party graphs. Results about k -primitivity can be useful in modeling the flow of information, the spread of disease, and the nature of substructures in larger connected systems.

Keywords: Graph theory, decomposition, primitivity

Rare Earth Element and Yttrium Concentrations in Coal Refuse, Shales, and Fireclays

College of Science

Undergraduate **UGO-20**

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Oral Presentation

Mentor: Aley El-Shazly, elshazly@marshall.edu

Abstract: Our current electronics industry is heavily reliant on the Rare Earth Elements and Yttrium (REEY). REEY minerals typically occur in economic concentrations in uncommon intrusive igneous rocks called carbonatites. Almost all carbonatite bodies in the US have already been mined for REEY minerals, however, leading these already limited, hard-to-get elements to be in greater demand. This great demand has, as such, led many producers to look for new, less-traditional sources of these elements such as coal fly ash and fireclays. The usual equipment for analyzing for REEY is the inductively coupled plasma mass spectrometer (ICP-MS), which is quite expensive, and requires skills for operating and maintenance. On the other hand, the significantly less expensive inductively coupled plasma atomic emission spectrometer (ICP-AES) has been recently used to analyze for REE with variable success. The results showed that the studied samples, which were collected from shales and coal impoundments, did contain small amounts of REEYs. The ICP-AES that was used to measure the samples, although slow, did provide meaningful and reliable results.

Keywords: REEY, ICP-AES, Shales

Transcription and Digitization Initiatives at the Marshall University Herbarium (MUHW)

College of Science

Undergraduate **UGP-39**

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Poster

Mentor: Dr. Pamela Puppo, pamela.puppo@marshall.edu

Abstract: The Marshall University Herbarium (MUHW) houses the second largest plant collection in West Virginia, consisting of approximately 52,000 specimens. From these, 99% of the vascular plants were digitized as part of the SERNEC (Southeast Regional Network of Expertise and Collection) initiative and are available at the online SERNEC portal, which presently hosts 233 herbaria from 14 southeastern states. To allow researchers and the public to search and view information about the specimens, however, it is necessary to transcribe the specimens' labels from the images into the database. Currently, only 40% of MUHW specimens present in SERNEC have been transcribed. Additionally, some of the specimen images require re-digitization, as in some cases, the image might have been cropped, resulting in the online page not showing the entirety of the sheet, cutting off important portions of the label. During the fall of 2022, the authors transcribed a total of 1,260 specimen labels and re-imaged 250 specimens from the vascular plant collection present at MUHW. The work done last fall exemplifies how undergraduate students can significantly contribute to the curation and accessibility of natural history collections.

Keywords: Botany/ Plant Sciences, Taxonomy, Herbarium, Imaging, Curation

Characterization Of 4-Pyrone Thermal Decomposition Products Via Matrix-Isolation FT-IR

College of Science

Undergraduate **UGO-21**

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Oral Presentation

Mentor: Dr. Laura McCunn, mccunn@marshall.edu

Abstract: The characterization of the byproducts of biomass thermal decomposition is a critical part in the development of viable clean biofuels and renewable energy sources. 4-pyrone, (IUPAC name: 4-pyran-1-one) is one of the byproducts observed in the pyrolysis of many forms of biomass, such as wood chips, straw, and cotton husks, but little research exists on its own decomposition pathways. Using the technique of argon matrix-isolation Fourier-Transform Infrared (FT-IR) spectroscopy, the pyrolysis products of 4-pyrone were characterized by passing a diluted sample of 4-pyrone through a heated pyrolyzer tube onto a cold window that captures the products and allows for their analysis spectroscopically. Computational analysis using Gaussian 09 software was also utilized to predict relevant structures, transition states, reaction steps, and energies, and these results were compared to the experimental spectra for product identification. Data collected at temperatures ranging between 900 K and 1400 K indicate the formation of acetylene, vinylacetylene, propyne, carbon monoxide, ketene, and methylketene. The formation of formylketene is also likely, as some peaks have been observed that match computational predictions and experimental data on its pyrolytic precursor. The results of this project will be crucial in guiding the development of 4-pyrone-containing biofuels in industrial settings.

Keywords: Thermal decomposition; matrix-isolation FTIR; 4-pyrone; computational chemistry

Effect of Nothing by Mouth (NPO) On Cases of Cardiac Catheterizations

College of Science

Undergraduate **UGO-22**

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Oral Presentation

Mentor: Frank Annie, PhD, frank.h.annie@camc.org

Abstract: For years, NPO (“nothing by mouth”) has been the standard of care for cardiac catheterization due to the variable risks of gastrointestinal discomfort caused by the chemicals in the procedure. However, as the operation has become more contemporary, researchers are beginning to wonder if evidence for the NPO standard is sufficient for use in the modern day. This study was aimed to provide support to the theory that the NPO standard is outdated by splitting groups of cardiac catheterization patients into parts and assigning a fasting regimen to one group and no fasting limitations on the other. After a query of the Trinetx Research Network, 80,638 cases were identified between the ages of 18 and 90 years with 39,772 that had an emergency cardiac catheterization versus those that had an elective catheterization that had not eaten before the procedure (40,866). Descriptive statistics were used to measure the association between the two groups. A propensity score match of 1:1 was performed to match many covariates (sex, race, Atherosclerotic Heart Disease, HF, Diabetes, etc.). The researchers were able to well match (25,426/25,426) within 1 day or first initial recording of the event. The difference in primary outcomes (i.e., aspiration pneumonitis, asphyxiation) was negligible.

Keywords: Cardiac Catheterization, NPO, Medical Research

Multilayered Metal Oxide Approach to Infrared Light Absorption

College of Science

Undergraduate **UGP-40**

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Poster

Mentor: Xiaojuan Fan, fan2@marshall.edu

Abstract: The primary goal of this project is to fabricate metal-oxide thin films capable of protection from thermal radiation. Multilayered thin films are designed for each layer to correspond to a different portion of the infrared spectrum from solar radiation, each providing protection from their respective portions. Infrared light from the sun is responsible for a significant amount of heating to objects in space. Thin film fabrication uses chemical solution methods by mixing metal chlorides, polymers, and organic solvents. The mixed precursor is deposited onto glass substrates using a spin coater. The sample is then annealed in an oven at 450°C to remove organic residues. The final metal-oxide samples show smooth, uniform surfaces, good coverage, and nanocrystalline structures ready for material property characterization. Microscope imagery demonstrates that the solution method enables the manufacture of high-quality thin film materials in cost-effective and rapid processing. The selection of material can be guided by the intended use case, such as CuO, displaying strong absorption from visible to near-infrared regions in its UV-Vis-NIR absorption spectroscopy, which can be used for thermal protection materials. These low-cost methods may also be directly applicable to large-scale manufacturing and useful for flexible optoelectronic devices.

Keywords: Thermal Protection Materials, Metal Oxides

Determination of the Intracellular Location of MT5-MMP in in vitro Cellular Models

College of Science

Undergraduate **UGP-41**

Presenter: Nicole Liang, liangn@marshall.edu

Poster

Mentors: Dr. Hongjie Wang, wangh@fau.edu; Dr. Gregg Fields, fieldsg@fau.edu

Abstract: Alzheimer's Disease (AD) is the most common form of dementia, affecting over 46 million people worldwide. AD's pathology results from, in part, the proteolytic cleavage of amyloid precursor protein (APP) into neurotoxic fragments. Recent research demonstrates the matrix metalloproteinase MT5-MMP cleaves APP, generating protein fragments sAPP η and η -CTF, detectable in the amyloid plaques of APP/PS1 mice. The enzyme was present in neurites around A β plaques of AD patients, possibly contributing to A β accumulation. AD mouse models deficient in MT5-MMP had reduced A β concentrations and improved long-term potentiation and spatial memory compared to controls. MT5-MMP's possible involvement with AD makes it a viable target for future therapies.

The specific organelles where MT5-MMP is expressed within the cell were largely unknown. We used two cell lines, HEK293T and SH-SY5Y, to ascertain which organelles contain MT5-MMP. Using lipofection, we delivered the MT5-MMP gene along with organelle markers to the cells to observe where the resulting proteins are found. We found that MT5-MMP is in the endoplasmic reticulum, lysosome, and autophagosome in both cell lines. Data gathered from this project about MT5-MMP could provide intracellular locations for therapies treating AD via MT5-MMP inhibition.

Keywords: neurobiology, Alzheimer's, transfection

Histone 3.3 Genes Regulate Telomere Length Homeostasis in the Model Plant Arabidopsis thaliana

College of Science

Undergraduate **UGO-23**

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Oral Presentation

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Abstract: Telomeres are repetitive DNA sequences at the ends of eukaryotic chromosomes that play a crucial role in preventing genome damage. Telomere length deregulation can also lead to cancer and a number of human genetic disorders of premature aging. Proper telomere length set point is species-specific and is controlled genetically, but the nature of these genetic factors is largely unknown. To identify evolutionarily conserved genes establishing proper telomere length, we utilize the model plant *Arabidopsis thaliana*. Previously, our lab used a genome-wide association study (GWAS) in 653 *Arabidopsis* lines (strains) to identify several candidate genes involved in telomere length control. One of the identified candidates is a histone H3.3 gene HTR10. HTR10 is a male-gamete-specific histone whose known role involves chromatin remodeling upon fertilization. To define the role of this candidate gene in telomere biology, we obtained the HTR10 knockout strain and analyzed its telomere phenotypes. Using genomic DNA extraction and Southern Blotting analysis we have shown that inactivation of HTR10 gene in *Arabidopsis* causes a ~20% decrease in telomere length. *Arabidopsis* genome harbors three additional H3.3 genes: HTR4, HTR5, and HTR8. We are currently analyzing knockouts of these genes to establish their effects on telomere maintenance. In conclusion, our data indicate that histone 3.3 genes regulate telomere length maintenance in plants. Since humans also have H3.3 histones and the main principles of telomere biology are conserved throughout eukaryotic evolution, our research in *Arabidopsis* opens new avenues to explore H3.3 roles in human telomere biology.

Keywords: Telomere, Histone, Southern Blotting

The Role of Peroxiredoxin (PRDX6) in Cannabinoid-Induced Antinociception

College of Science

Undergraduate **UGP-42**

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Poster

Mentor: Daniel Morgan, morganda@marshall.edu

Abstract: Blocking peroxiredoxin (PRDX6) activation has been shown to attenuate the development of morphine tolerance. PRDX6 activation in morphine tolerance is at least partially mediated through c-Jun N-terminal kinase (JNK) activation. JNK signaling also mediates tolerance to the antinociceptive effects of delta-9-tetrahydrocannabinol (Δ 9-THC). As such, the purpose of this study was to determine whether blocking PRDX6 would alter Δ 9-THC-induced antinociception and/or tolerance. Male and female PRDX6 knock-out (KO) and wildtype (WT) mice were assessed across a range of doses (0 to 100 mg/kg) of Δ 9-THC for differences in acute antinociception (via tail flick) and hypothermia. Consistent with previous findings in our lab, male mice were, overall, more sensitive to the antinociceptive effects of Δ 9-THC than female mice. Across both sexes, KO mice were more sensitive to the acute antinociceptive effects of Δ 9-THC compared to their WT counterparts. Hypothermia did not differ as a function of genotype. Male B6 mice were also assessed for differences in Δ 9-THC-induced antinociception and hypothermia following pretreatment with the PRDX6 antagonist, MJ33. Our results revealed that blocking PRDX6 activity decreased Δ 9-THC-induced antinociception. These results suggest that PRDX6 likely plays a role in Δ 9-THC-induced antinociception, and future studies should examine whether these changes are mediated through JNK-dependent pathways.

Keywords: THC, antinociception, PRDX6, MJ33

Antibacterial Activity From a Model Moss Ceratodon Purpureus

College of Science

Undergraduate **UGP-43**

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Poster

Mentor: Dr. Eugene Shakirov, shakirov@marshall.edu

Abstract: The emergence of bacterial drug resistance is often viewed as the next great health crisis of our time. While more antimicrobial agents are urgently needed, very few new antibiotics are currently in the production pipeline. Here, we aim to identify and characterize novel antimicrobial natural products from a model dioicous moss, *Ceratodon purpureus*. We collected secreted moss exudate fractions from two *C. purpureus* strains, male R40 and female GG1. Exudates from the female *C. purpureus* strain GG1 did not exhibit inhibitory activity against any tested bacteria. However, exudates from the male moss strain R40 exhibited strong inhibitory properties against several species of Gram-positive bacteria, including *Staphylococcus aureus* and *Enterococcus faecium*, though they also did not inhibit growth of Gram-negative bacteria. Antibacterial activity levels in *C. purpureus* R40 exudates significantly increased over four weeks of moss cultivation in liquid culture. Size fractionation experiments indicated that the secreted bioactive compounds have a relatively small molecular weight of less than 1 kDa. Additionally, the R40 exudate compounds are thermostable and not sensitive to proteinase K treatment. Overall, our results suggest that the bioactive compounds present in *C. purpureus* R40 exudates can potentially add new options for treating infections caused by antibiotic resistant Gram-positive bacteria.

Keywords: Bryophyte, Antibacterial Activity, Exudate, Moss, Plant Metabolite

Hate Crime: The Origins and Impacts

College of Science

Undergraduate **UGP-44**

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Poster

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Abstract: Every day in the United States, a range of different crimes are committed. According to the FBI as of 2019, there were violent crimes committed every 26.3 seconds, murders every 32.1 seconds, rape every 3.8 minutes, a robbery every 2.0 minutes, and aggravated assaults occurred every 38.5 seconds. Many of these crimes are targeted, and in many cases target specific human beings based off their race, gender, disabilities, religion, etc. When someone is specifically targeted, this would fall under the category of a hate crime, also known as bias-motivated crimes, which are crimes that target victims and their property based on the victim being a part of a particular group (Rennison & Dodge, 2022). Within the presentation regarding hate crimes, the origins, definitions, case examples, and policies of the changes within hate crime will be discussed.

Keywords: CJ Hate Crime Origins

Using Unmanned Aerial Vehicles (UAV) to More Efficiently Estimate Above Ground Biomass (AGB)

College of Science

Undergraduate **UGP-45**

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Poster

Mentor: Dr. Rick Gage, gager@marshall.edu

Abstract: With the unsettling rise of climate change and the ensuing devastation that accompanies these changes, it is becoming increasingly important to find ways in which humanity can stem the encroachment of this global catastrophe. One of these ways is through carbon sequestration, a process that allows the capture of the harmful greenhouse gas CO₂. Estimating above ground biomass (AGB) has long been a principal approach to assessing carbon stocks held in mature forests, but traditional measurement methods are time-consuming. However, the technological boom of the last few decades has allowed researchers to utilize cutting edge technology to measure AGB and carbon stocks more efficiently. Among the newer methods that have been gaining traction is the use of unmanned aerial vehicles (UAVs) and satellite imagery to observe these forests. The purpose of this study was to develop methods for using UAVs to efficiently assess total AGB in mature Appalachian hardwood forests. Nine test plots were identified and conventional estimates of AGB were calculated. Then a UAV was utilized to take canopy pictures and derive predicted DBH and from that AGB. Results of our research indicate no significant differences between UAV estimates of AGB and conventional measurements.

Keywords: drones, forestry, above ground biomass

Functionalization of Polycarbonate Membranes with Anionic Azo Dyes

College of Science

Undergraduate **UGP-46**

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Poster

Mentor: Dr. Sean P. McBride, mcbrides@marshall.edu

Abstract: Annually, nearly 300,000 of the 7×10^5 metric tons of synthetic textile dyes produced, such as those used in fabric dyeing for clothing, are discharged into the environment causing devastating effects to the surrounding ecosystem. Recent research shows that polycarbonate filters functionalized with anionic azo dyes, have the potential to enhance charged based rejection and obtain purified water during the filtration process as a result. This azo-dye-functionalization provides an elegant solution to water pollution by textile dyes, demonstrating that the textile dyes, thus the contaminants, are part of the solution to the problem. Specifically, this work aims to decipher if properties such as chemical structure of the azo dyes contribute to varying functionalization rates. An Azo dye series with an intrinsic charge of negative two at $1000\mu\text{M}$ shows there is a large variance in functionalization rate based on dye structure and functional end groups. Direct red 28 and direct red 37 have been shown to have the highest potential as functionalizing dyes with the largest rate of functionalization. These dyes will be used in future research to try and help determine what parameter is responsible for the functionalization process.

Keywords: Membrane Filtration, Rejection, Flow Rate, Pollution, Azo dye

Using Agnew's General Strain Theory to Examine Gendered Differences in Addiction in Appalachia

College of Science

Undergraduate **UGP-47**

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Poster

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Abstract: A significant body of research exists examining the causes of addiction in the U.S. Research, while available, often does not treat Appalachia as a specific space and cultural region when examining these causes of addiction despite the fact the region faces disproportionate number of addiction related deaths. More so, women are often excluded or minimized in this area of research. This study looks to determine what factors exist that contribute to gendered drug abuse and addiction related death in the Appalachian region. Utilizing Agnew's General Strain Theory, the following seeks to determine the connections between region specific strains and gendered drug abuse. Specifically, this study focuses on the effects of unemployment, poverty, lack of healthcare access, and domestic violence has on the likelihood of drug abuse for Appalachian women. The hope is to outline the disproportionate strain factors in the region and how they create a gendered effect on women that is often not discussed in the creation of policy and support systems.

Keywords: Gender, Addiction, Appalachia, Strain

Investigating the Presence of Rare Earth Element and Yttrium Minerals Using a Scanning Electron Microscope

College of Science

Undergraduate **UGP-48**

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Poster

Mentor: Dr. Aley El-Shazly, elshazly@marshall.edu

Abstract: Rare Earth Elements and Yttrium (REEYs) are an integral to industry and the demand for REEY has increased dramatically. This has led scientists to explore for REEY in sources other than the traditional igneous carbonatites, including fireclays and shales associated with coal seams in West Virginia. We collected and analyzed 68 samples of shales, fireclays, and tonsteins from Pennsylvanian aged units throughout WV. The results show that the Lower and Upper Freeport and Lower Kittanning members of the Alleghany formation collected from the northern panhandle and the Pittsburgh member at the base of the Monongahela Formation of the Milton area contain SREEY values > 350 ppm, making them of some economic potential. To investigate the source of REEY and their host minerals, we analyzed two shales with the highest SREEY values from the Pittsburgh member in Milton using the scanning electron microscope. Results show that the shales consist of detrital kaolinite, illite, potassium feldspar, plagioclase feldspar, and chlorite as well as xenotime, monazite, and apatite with a significant REEY content. EDS spectra indicate that the clay minerals do not contain any REEY. This suggests that REEY were not carried by fluids but as detrital grains.

Keywords: REE, geochemistry, SEM, minerals, yttrium

Generation of bioluminescent Serratia marcescens

College of Science

Undergraduate **UGP-49**

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Poster

Mentor: Lydia Bogomolnaya, bogomolnaya@marshall.edu

Abstract: *Serratia marcescens* is an opportunistic pathogen with increasing clinical importance due to intrinsic resistance to several classes of antibiotics. The gram-negative, red pigmented, bacteria are a member of the order Enterobacterales, where it has largely been recovered from a substantial variety of clinical specimens. *S. marcescens* causes central nervous system diseases such as meningitis, urinary tract infections, pneumonia, bloodstream infections, various respiratory diseases, and many different types of wound infections. The research I participated in took an *Escherichia coli* strain that carried a Tn5 mini transposon that contained promoterless luxCDABE operon from *Photobacterium luminescens* and transferred this construct to *S. marcescens* SM6 strain through the process of conjugation. The luxCDABE operon can be used as a bioluminescent reporter for constitutive and inducible promoters. I screened the resulting bioluminescent strains of *S. marcescens* to identify a conjugate that produced light at an optimal time and magnitude during bacterial growth. I found that *S. marcescens* luxCDABE candidate strain KP8 produced light constitutively throughout bacterial growth. Sequencing results showed that luxCDABE operon has integrated in the promoter region of EG355_RS21810 locus of *S. marcescens* KP8 genome. To ensure that the resulting strain will be competitive with its environment, and therefore, will be suitable for the animal studies, I completed fitness experiments between KP8 and the wild type strain *S. marcescens* using minimal medium with limited nutrients. The results of these experiments suggest that the mutant strain could be used to study *S. marcescens* pathogenesis in mice.

Keywords: Generation of bioluminescent *Serratia marcescens*

Silver Nanoparticle Exposure Increases Abnormally Hyperphosphorylated Tau Tangles in Striatum of Rats

College of Science

Undergraduate **UGP-50**

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Poster

Mentor: Nadja Spitzer, spitzern@marshall.edu

Abstract: Silver nanoparticles (AgNPs) have been widely used in a variety of products such as toys, water filters, and surgical tools due to their unique antimicrobial properties. However, AgNPs can shed ions and bioaccumulate in tissues, causing damage to cells. AgNPs are also known to pass the blood brain barrier easily due to their unique physical properties. We previously found that they disrupt cytoskeletal organization and neurite extension in cultured neural cells. Tau is a microtubule-associated protein that organizes tubulin. P-tau can aggregate in the brain, causing cells to lose signaling capabilities and eventually undergo apoptosis. P-tau tangles can spread via prion-like mechanisms, and their presence in striatum or primary motor cortex is associated with neurodegenerative diseases including Alzheimer's and Parkinson's Disease. Because AgNPs disrupt cytoskeletal organization and dynamics, we hypothesized that exposure would increase abnormally hyperphosphorylated tau (p-tau) tangle formation. To test our hypothesis, we used immunohistochemistry to label p-tau in brain sections from rats that received oral exposure to AgNPs. We found a significant increase in the number of p-tau tangles in the striatum of rats exposed to AgNPs compared to control. These data suggest that AgNP exposure could lead to neurodegeneration.

Keywords: neurodegeneration, environmental contaminant, cytoskeleton

Na/K-ATPase alpha1 is required for human cardiac myocyte hypertrophic remodeling

College of Science

Undergraduate **UGP-51**

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Poster

Mentor: Dr. Sandrine Pierre, pierres@marshall.edu

Abstract: The Na/K-ATPase (NKA) protein complex has been established as both an ion pump and a signaling membrane receptor. NKAalpha1 serves the NKA isoform-specific function of interacting with Src kinase to create a signaling complex, which impacts metabolic and oxidative signaling in numerous cell types across species. However, the impact of this NKA isoform-specific role in human cardiac myocytes is unknown. Given the importance of oxidative and metabolic signaling in cardiac hypertrophic remodeling and heart failure, we generated a clinically relevant model to investigate this issue, using CRISPR-Cas9-mediated KO of NKAalpha1 in human ventricular cardiomyocytes (AC16). Western blot analysis revealed a substantial decrease of NKAalpha1 expression compared to WT (65%, $p < 0.05$, $n = 3$). Cellular hypertrophic response was examined through treatment of cells with alpha-adrenergic agonist phenylephrine (50 μM for 24h) followed by immunocytochemistry using phalloidin staining and cell area measurement using Image J software (100 cells/group). Unlike WT cells, NKAalpha1 KO cells did not respond to treatment with an increase in cell area (2243 vs 3520 μm^2 for WT, $p < 0.05$, $n = 3$; 2454 vs 2563 μm^2 for KO, $p > 0.05$, $n = 3$). This suggests that NKAalpha1 is required for cardiac hypertrophy. Future treatments targeting this NKA isoform may be a viable option upon further research.

Keywords: Cardiac Hypertrophy, Na/K-ATPase, Alpha1 Isoform, Heart Failure

Visible Light Photocatalyst for Water Purification

College of Science

Undergraduate **UGP-52**

Presenter: Bryan Vance, vance339@marshall.edu

Poster

Mentor: Dr. Xiaojuan Fan, fan2@marshall.edu

Abstract: This research aims to seek free-standing photocatalytic solids under visible light radiation. We use cost-effective methods to fabricate porous metal oxide monolith materials for photocatalytic activities applied to water purification. Porous free-standing solid monoliths can be constructed by various metal oxides associated with their unique optical properties. Specifically, pure liquid metal alkoxides are explored and employed within the open structures of swollen polymers to produce ideal conditions to extract the solid materials. High-temperature annealing can remove organic polymers, leading to porous metal oxide monoliths. Agarose chunks were used as scaffolds swollen in a mixed solution of CuCl₂, DMSO, and DI water. After three days, agarose pieces filled with Cu ionic solution were taken into an oven for thermal removal of organic residues, resulting in porous CuO monoliths. Various characterization tools conduct measurements on the prepared samples. The absorption spectrum is examined under a UV-Vis spectroscopy meter. To evaluate the catalytic ability of the porous monoliths, the basic blue dye in water is selected as the pollutant, where monoliths are kept stirring inside the beaker under a visible lamp light throughout the experiment. The absorption spectrum of the solution will be monitored every 20 minutes until a significant suppression in the featured spectrum peak is observed. This process demonstrates that porous CuO polycrystalline monoliths are good candidates for enhanced visible light photocatalysts that can be fabricated through a cost-effective method. It will better help future researchers understand the relationships between the production of metal oxide monoliths and photocatalysis, potentially transformable into mass manufacturing.

Keywords: Photocatalytic, Monoliths, Spectrum, Light, Radiation

Type 2 Diabetes Changes Systemic Dissemination of Salmonella

School of Medicine

Graduate **GP-13**

Presenter: Cecilia Sierra, sierra3@marshall.edu

Poster

Mentor: Lydia Bogomolnaya, Ph.D., bogomolnaya@marshall.edu

Abstract: Type 2 diabetes (T2D) is a risk factor for severe extraintestinal Salmonella infections. The mechanism underlying this relationship is not yet understood. In this study, 8-week-old TALLYHO (TH) mice were fed a high-fat (HF) (45% fat) or control diet and monitored for weight gain and blood glucose levels for 8 weeks. At 16 weeks of age, HF diet-fed mice gained more weight and had blood glucose levels in the diabetic range (>300 mg/dL). T2D and non-diabetic mice were then orally infected with Salmonella Typhimurium. Salmonella spread in an unusual pattern in T2D mice had compared to control. Because human metagenomics studies have linked T2D to reduction of butyrate-producing bacteria in the gut, we analyzed the intestinal short-chain fatty acid (SCFA) profile of the TH mice. Concentrations of SCFA, including butyrate, were reduced in the gut of diabetic animals compared to control. Since butyrate is beneficial for gut health and can limit Salmonella invasion, TH mice received oral supplementation of butyrate at the time of infection. Butyrate supplementation reduced the extraintestinal spread of Salmonella in healthy animals but not in T2D mice. Taken together, these findings provide novel insights into the pathogenesis of enteric Salmonellosis in the context of T2D.

Keywords: Salmonella infection, type 2 diabetes

What makes walking behavior 'naturalistic'? Feedback signaling the rate of change of force (dF/dt)

School of Medicine

Graduate **GP-14**

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Poster

Mentor: Sasha N Zill, sensillum@aol.com

Abstract: Animal behaviors can be remarkably fluid and graceful. We have studied how signals from sense organs that monitor forces contribute to feedback control of walking in insects. Sensory activities of receptors that encode forces via strains in the exoskeleton (tibial campaniform sensilla, CS Groups 6A and 6B) were recorded extracellularly. Forces were applied to the legs of stick insects using conventional and 'naturalistic' waveforms (joint torques calculated from experiments in freely walking animals). These studies have shown that discharges of sensilla 1) most closely follow increases in the rate of change of force (dF/dt) rather than the force magnitude and 2) show substantial hysteresis to transient force decrements. Discharges of receptors, therefore, form a continuum monitoring force variations in walking, and potentially in other behaviors such as tactile exploration. We have also used these data in tests of a mathematical model of the receptors and replicated the findings for front leg receptors. Our show that tibial campaniform sensilla in all legs monitor the rate of change of force (dF/dt) and support the idea that these signals can be used to adjust muscle contractions to aid in generating the smooth accelerations and decelerations characteristic of 'naturalistic' movements that occur in walking.

Keywords: FORCE ; PROPRIOCEPTION ; INSECT

Vaping Flavoring Agents Induce Cellular Stress Responses in Human Proximal Tubule Epithelial Cells

School of Medicine

Graduate **GO-15/GP-15**

Presenter: Ashley Cox, saunders29@marshall.edu

Oral Presentation and Poster

Mentor: Monica Valentovic, valentov@marshall.edu

Abstract: Cinnamaldehyde (CIN) is a popular flavoring additive used in vaping e-liquids that has been shown to induce cytotoxicity. We evaluated CIN cytotoxicity using human renal proximal tubular cells (HK-2). Cells were plated, equilibrated for 48 h, and treated with 0 (DMSO) or 5-100 uM cinnamaldehyde for 24 or 48 h. Western blot analysis probed for cell stress markers: CHOP, Caspase-3, and OXPPOS cocktail. Results were from at least 4 independent experiments using different cell passages. Statistical differences between groups were analyzed using One Way ANOVA followed by post hoc Tukey test at a 95% confidence interval. By 48 h, CHOP was induced by CIN concentrations of 75 uM or less and significantly decreased ($p<0.05$) relative to vehicle control at 100 uM CIN. Apoptosis probing showed cleaved caspase-3 was increased ($p<0.05$) by 100 uM CIN at 24 h. Mitochondrial respiration complex probing showed that complex V was significantly decreased ($p<0.05$) by 100 uM CIN at 24 and 48 h, and complex II expression was significantly decreased ($p<0.05$) at 100 uM compared to non-control groups at 48 h. These results indicate that CIN induces cellular stress mechanisms and mitochondrial changes within HK-2 cells. Funded by NIH Grant P20GM103434.

Keywords: Vaping, Cellular Stress, E-liquid, Kidney

Identification And Analysis Of Antimicrobial Compounds From A Model Moss Ceratodon Purpureus

School of Medicine

Graduate **GO-16/GP29**

Presenter: Ashley Dague, dague3@marshall.edu

Oral Presentation and Poster

Mentor: Dr. Eugene Shakirov, shakirov@marshall.edu

Abstract: To increase the arsenal of tools in the fight against bacterial drug resistance, we aim to identify and characterize novel antimicrobial natural products from a model moss *Ceratodon purpureus*. *C. purpureus* is a model moss species that has a male (R40) and a female (GG1) strains. These strains were grown in a liquid medium and moss secondary metabolites were collected from secreted moss exudates. Metabolites from moss exudates were tested using a qualitative test, the disk diffusion method (DDM), and a quantitative test, the broth microdilution method, to determine Minimum Inhibitory Concentration (MIC). Exudates from the female *C. purpureus* strain GG1 did not exhibit inhibitory activity against gram-positive or -negative bacteria. However, exudates from the male moss strain R40 exhibited strong inhibitory properties against several species of gram-positive bacteria, though they did not inhibit growth of gram-negative bacteria. Antibacterial activity levels in *C. purpureus* R40 exudates significantly increased over four weeks of moss cultivation in liquid culture. Size fractionation experiments indicated that the secreted bioactive compounds are very small, less than <1 kDa, suggesting that its chemical nature can be relatively simple. Furthermore, thermostability and sensitivity to proteinase K assays indicated that these secreted bioactive compounds are unlikely to have proteinaceous nature. Our analysis identified potentially useful antimicrobial compounds from the moss *Ceratodon purpureus* (strain R40) that exhibit specificity against gram-positive bacteria. The chemical nature of these compounds remains to be determined. Overall, our results suggest that bioactive compounds present in model moss exudates can potentially be used for treating infections caused by antibiotic resistant bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA) or vancomycin-resistant Enterococci.

Keywords: Fire Moss; Bryophytes; antibacterial activity; plant metabolites

The Effects of Blast Traumatic Brain Injury on the Development of Pain and Affective Behavior

School of Medicine

Graduate **GP-16**

Presenter: Kayla DeSchepper, deschepper@marshall.edu

Poster

Mentor: Dr. Daniel Morgan, morganda@marshall.edu

Abstract: Approximately 50 million Traumatic Brain Injuries (TBIs) occur annually around the world. Between 2001-2018, the U.S. Department of Defense reported 383,947 TBIs with 128,000 of those being blast-type injuries occurring in a military setting. After a TBI, around 43-75% of patients report the development of chronic pain. In addition to chronic pain induced by TBI, 10-77% of TBI patients also experience depression and up to 70% of patients develop anxiety after the injury. The exact mechanisms of how chronic pain and affective behavioral conditions develop are unknown, although previous work suggests the involvement of many post-injury pathophysiological processes one of which is the long-term activation of glial cells in response to the injury. In this study, a blast traumatic brain injury was given using a tube that delivered a high-pressured blast of nitrogen gas to the head. Behavioral and pain tests were performed beginning 30 days after injury to evaluate the development of pain, anxiety, and depression. Preliminary results show female bTBI mice exhibit mechanical hypersensitivity, which is a symptom of neuropathic pain. The results of this preliminary study will provide insight on bTBI-induced pain and affective behavior leading to the investigation of the potential therapeutic use of Cannabidiol (CBD).

Keywords: Blast Traumatic Brain Injury, Pain, Anxiety, Glia, Cannabinoids

Adverse Childhood Experiences in Obese/Overweight patients compared to patients with Substance Use Disorder

School of Medicine

Graduate **GP-17**

Presenter: Joshua Galbraith, galbraith7@marshall.edu

Poster

Mentor: Dr. Todd Davies, daviest@marshall.edu

Abstract: Studies into the correlation between Adverse Childhood Experiences (ACE) and long-term chronic health issues have been studied since the mid 1990s. Correlations have been established between ACEs and such chronic health issues as Depression, Stroke, Coronary Heart Disease, COPD, Asthma, CKD, Cancer, Diabetes, smoking, substance use disorder, and alcohol use disorder. The purpose of the study was to determine if there was a relationship between ACE Survey scores and Obesity. If so, is this a similar relationship between Ace Survey scores and Substance Use Disorder. Ace Surveys were administered to patients diagnosed with Obesity through several medical weight loss clinics in West Virginia. Ace Surveys were also administered to patients diagnosed with SUD through several Licensed Behavioral Health Centers in West Virginia providing Medication-Assisted Treatment for opioid dependence. A Retrospective Correlation Study was then performed to determine if there is a relationship between the scores and the diagnosis. The Ace Survey scores and domain trends were then compared between the two cohorts as well as the general population in the US and the general population in West Virginia. We observed a distinct domain trend between the two cohorts that showed how similar the childhood trauma were between the two patient populations. There was also a drastic difference in the ACE Survey scores of these two cohorts compared to the general population of West Virginia. Our conclusion was that although traditionally viewed as two separate patient populations they were one patient population were different coping mechanisms of previous childhood trauma.

Keywords: Adverse Childhood Experience (ACE) Survey, Obesity, Substance Use Disorder

Chronic Intestinal Inflammation Downregulates Apical Na-bile Acid Co-transporter (ASBT) in Crohn's Ileitis Mouse Model

College of Science, School of Medicine

Graduate **GP-18**

Presenter: Maafi Islam, islam8@marshall.edu

Poster

Mentor: Uma Sundaram, sundaramu@marshall.edu

Abstract: Inflammation is a defense mechanism that is crucial to health. However persistent and uncontrolled inflammation can lead to chronic diseases. Inflammatory bowel disease (IBD) is a chronic inflammatory disorder of the gastrointestinal (GI) tract that can affect people of all ages. An estimated 3 million adults in the United States are diagnosed with IBD. Crohn's Disease (CD) is a form of IBD that has been linked to bile acid malabsorption (BAM). BAM is caused due to failure of absorption of BA from the terminal ileum by ASBT and is associated with disrupted EHC, reduced BA pool size, and dysregulated BA metabolism all of which have been demonstrated to be inversely correlated with CD disease activity. This study used a model of spontaneous chronic ileitis, an excellent in vivo model of IBD, to investigate the mechanisms of regulation of ASBT in the chronically inflamed intestine. We demonstrated that ASBT is inhibited in chronic ileitis secondary to a decrease in both the co-transporter numbers as well as the affinity of the co-transporter for bile acids. Further studies will be performed to determine the molecular regulation of ASBT in chronic intestinal inflammation.

Keywords: IBD, BAM, ASBT, CD.

Thymidine phosphorylase is a potential target for reducing SARS-CoV-2-associated thrombosis and inflammation

School of Medicine

Graduate **GO-17/GP-19**

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Oral Presentation and Poster

Mentor: Wei Li, liwe@marshall.edu

Abstract: COVID-19 is a thrombotic and inflammatory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which uses its spike protein (SP) that binds to angiotensin converting enzyme 2 (ACE2) to invade host cells. Scattered studies suggest that SP may drive the thrombotic and inflammatory pathology, however, the exact mechanism is unknown. Thymidine phosphorylase (TYMP), an intracellular protein implicated in Src family kinase (SFK) signaling, is highly expressed in platelet and facilitates platelet activation and thrombosis. Several studies, including ours, have found that TYMP is significantly increased in the plasma and lungs of COVID-19 patients, suggesting that TYMP may play a role in the development of the prothrombotic or proinflammatory states in COVID-19. Using the ferric chloride-induced carotid artery injury thrombosis model and K18-hACE2TG mice, we found that SP treatment dramatically enhanced thrombus formation, which was inhibited by tipiracil hydrochloride, a selective TYMP inhibitor. Treating BEAS-2B, a human bronchial epithelial cell line, with SP significantly increased TYMP protein expression and activation of signal transducers and activators of transcription 3 (STAT3) signaling. The knockdown of TYMP using siRNA downregulated SP-induced STAT3 expression. Altogether, these data suggest TYMP mediates SARS-CoV-2 SP-associated thrombosis and inflammatory signaling and could be a potential therapeutic target.

Keywords: TYMP, SAR-CoV-2, thrombosis, inflammation, COVID-19

Mechanism of stimulation of Na glutamine co transporter, B0AT1, in high fat diet induced obesity

School of Medicine

Graduate **GP-20**

Presenter: Vivian Wellington, wellington3@marshall.edu

Poster

Mentor: Uma Sundaram, sundaramu@marshall.edu

Abstract: Obesity remains a global health issue and may be caused by a confluence of genetic and diet induced factors. The adipose tissue secretes a range of adipocytokine hormones and growth factors while also ensuring the storage of excess nutrients. Glutamine is the preferred metabolite of enterocytes and is transported across the brush border membrane (BBM) of villus cells via the Na-glutamine co-transporter (B0AT1/SLC6A19). In Zucker rats, glutamine uptake via B0AT1 is stimulated secondary to an increase in the number of co-transporters in the BBM. However, the effect of diet-induced obesity on B0AT1 remains unknown. Our results show that B0AT1 mediated glutamine uptake was stimulated in whole villus cells from HFD rats. However, Na-K-ATPase activity was significantly diminished in villus cells from HFD rats. Glutamine uptake was significantly increased in HFD villus cell BBMVs. In vitro, treatment with ADS from HFD, but not CD, stimulated B0AT1 mediated glutamine uptake. Furthermore, HFD-ADS treatment decreased Na-K-ATPase activity in IEC-18 cells. Western blot analysis of villus cell BBM from HFD and CD-ADS-treated IEC-18 cells showed a significant increase B0AT1 expression. In conclusion, both in-vitro and in-vivo models of HFD-induced obesity, ADS appears to mediate B0AT1 stimulation secondary to an increase in co-transporters number.

Keywords: Obesity, B0AT1, Glutamine, Diet

New insights into the role of the IGF-1 pathway in diet-induced bone elongation

School of Medicine

Graduate **GO-18/GP-21**

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Oral Presentation and Poster

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Abstract: We have shown that a high-fat diet accelerates bone elongation rate and upregulates pathways in insulin-like growth factor-1 (IGF-1) bioavailability. Immunostaining has shown that IGFBP-4, a major IGF-1 inhibitor in bone and cartilage, is reduced in high-fat diet growth plates. Pregnancy-associated plasma protein A (PAPP-A) is required to cleave IGFBP-4 freeing IGF-1 for biological activity. We tested the hypothesis that a high-fat diet increases PAPP-A expression in rapidly elongating juvenile mouse bones.

Female 3-week old C57BL/6 mice were fed control or high-fat diets. After one week, some high-fat diet mice were switched to a control diet. At 6-weeks old, proximal tibiae were bisected and used to quantify tibia elongation rate using an oxytetracycline label. The other half was stained with a PAPP-A antibody. Statistical testing was performed using ANOVA with Tukey's post-hoc testing, Kruskal-Wallis, and Spearman's one-tailed tests.

PAPP-A fluorescence in the epiphyseal marrow of high-fat diet mice were nearly three-fold greater than those of the intervention mice ($p < 0.05$). PAPP-A fluorescence was also positively correlated with tibial elongation rate. This suggests that IGF-1 bioavailability in the growth plate could be regulated in adjacent tissues providing unique insight into diet induced IGF-1 pathway regulation that could underlie skeletal growth acceleration.

Keywords: IGF-1, IGF binding proteins, bone elongation, growth plates

Protection Of Renal Damage Mediated By Reactive Oxygen Species Generated By Cancer Chemotherapy Agents

School of Medicine

Undergraduate **UGO-24/JGP-53**

Presenter: Alexis Buckley, Buckley31@marshall.edu **Oral Presentation and Poster**

Mentor: Monica Valentovic, valentov@marshall.edu

Abstract: Doxorubicin and cisplatin are two cancer chemotherapy agents that produce irreversible nephrotoxicity. The mechanism of cytotoxicity is not totally known but part of the mechanism is increased oxidative stress and diminished mitochondrial function. Prior research has determined that resveratrol reduces renal cytotoxicity caused by doxorubicin and cisplatin. This study investigated mitochondrial function following exposure to the reactive oxygen species, hydrogen peroxide in the presence or absence of resveratrol in a human renal proximal tubular epithelial cells (HK-2). HK-2 cells were grown for 48h. Cells were pre-incubated for 1h with 0-10 μ M resveratrol or vehicle followed by a 24h co-incubation with 0-2000 μ M hydrogen peroxide. Cell viability was tested with MTT and Trypan Blue. Protein expression of TRAP1, PGC1, SIRT1, and cleaved/uncleaved caspase3 were measured in cells to analyze whether the mechanism of resveratrol protection is through modifying mitochondria protein levels. All experiments were a minimum of 3 independent experiments with different cell passages. Following this, western blot analysis was conducted to analyze protein expression. Comparisons between groups were analyzed using the Prism statistical software package. This study determined that mitochondrial expression of SIRT1 and PGC1 were not altered by resveratrol or hydrogen peroxide. (Supported by NIH Grant P20GM103434).

Keywords: Nephrotoxicity, Resveratrol, Mitochondria, Hydrogen peroxide,

Investigations Into Sex-Differentiated Astrocytic Regulation of Synaptogenesis

School of Medicine

Undergraduate **UGP-54**

Presenter: James (Clinton) Williamson, williamso219@marshall.edu **Poster**

Mentor: Dr. W. Christopher Risher, risherw@marshall.edu

Abstract: Astrocytes, the major type of non-neuronal central nervous system (CNS) cells, were once believed to be largely supportive in function. Further research has elucidated their critical role in regulating synaptogenesis, the process by which neurons form junctions allowing for communication throughout the CNS. Our lab has previously shown this process to be in part sex-differentiated, although the exact mechanism is not fully understood. Here, we set out to probe astrocytes cultured in the presence or absence of neuron-conditioned media for eight distinct astrocyte-secreted synaptogenic proteins. These levels were quantified and analyzed for sex differences. An important family of such proteins, the thrombospondins, have been shown to function through the neuronal calcium channel subunit $\alpha 2\delta$ -1. We recently showed that one such interaction between TSP2 and $\alpha 2\delta$ -1 may be inhibited by elevated or reduced levels of estrogen in vitro. Our project sought to better understand this interaction using in vivo models. This was achieved using daily injections of E2 (the biologically active form of estrogen), letrozole (an estrogen inhibitor), or saline into both wild-type and regional $\alpha 2\delta$ -1 KO mice P7-P40 \pm 2. Excitatory synapses were then fluorescently labeled and visualized with confocal microscopy.

Keywords: astrocyte, neuron, synaptogenesis, estrogen, sex differences

Trends and Opportunities in Rural Healthcare

School of Pharmacy

Graduate **GP-22**

Presenter: Sohini Bose, bose4@marshall.edu

Poster

Mentor: Brittany Riley, warrick2@marshall.edu

Abstract: Access to high quality healthcare in rural locales is a serious problem. Our research aims to identify the priority healthcare needs of rural Appalachians and to identify programs or initiatives pharmacists can employ to help meet the priority healthcare needs of people living in these disenfranchised areas.

We conducted a literature review to determine social, economic, and technological trends in rural Appalachia healthcare. Once these trends were identified, we identified programs and initiatives that have been used in other rural areas of the United States or internationally to help meet the needs of people living in those rural areas.

Major needs identified were: expanded access to healthcare, optimization of transitions of care, medication optimization through improved education and health literacy, and improved vaccination rates. Strategies identified to meet these needs include expanded offerings of pharmacy services, policy reform to incentivize rural access to healthcare, collaborative practice between physicians and pharmacists, and electronic health record (EHR) access for rural pharmacies.

The primary implication of improved access to quality health care in rural Appalachia is by initiating an improved health-related outcome in underrepresented patient populations and decreasing the financial burden of disease progression on state and federal payers.

Keywords: Rural healthcare

Trends and Opportunities in Rural Healthcare

School of Pharmacy

Graduate **GP-23**

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Poster

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Abstract: Understanding and adapting to the rapidly changing world is critical for both personal and professional success. Marshall University School of Pharmacy with the University of Findlay School of Pharmacy developed an international APPE to India for 4th year students. This is a 5 SCH experiential course and is an immersion into the health care system in India. Students will visit Vignan College of Pharmacy, a public and private hospital, and a community pharmacy. As part of the course, we will assess student perspectives related to healthcare delivery before and after the course to understand how the experience met student expectations. We will also look at whether the experience improved their ability to work with other healthcare team members and changed their approach to care delivery. Surveys assess student perceptions and experiences using the Qualtrics survey tool. There are 22 questions pre- and 26 questions on the post-survey. Survey results will be compared to identify changes in perspectives, such as, empathy, interprofessional learning opportunities and to ensure students meet course objectives. Students will also be required to complete a structured reflection paper detailing their experience and a presentation on the Indian healthcare system or a disease state encountered.

Keywords: International healthcare, APPE, India, Student Perspectives, Empathy

Western Diet Induces Bone Marrow Cytokine Signatures That Increase Cell Frequency In MDS-susceptible Mice

School of Pharmacy

Graduate **GO-19/GP-24**

Presenter: Meredith Kesler, kesler10@marshall.edu

Oral Presentation and Poster

Mentor: Melinda Varney, varney31@marshall.edu

Abstract: Western diet-induced obesity has been associated with hematologic malignancies. Our studies indicate that Western diet contributes to earlier initiation and progression of cancer phenotypes in Tifab^{-/-};miR146a^{-/-} double knock out (DKO) mice. These mice have phenotypes that mimic hematologic malignancies called myelodysplastic syndromes (MDS). We hypothesize that acceleration of disease in DKO mice exposed to a high-fat diet is due in part to the impact of high-fat diet on inducing differential cytokine signatures in the bone marrow microenvironment that ultimately increase bone marrow cell frequency. To test our hypothesis, we subjected DKO mice to a low-fat or high-fat diet for 15 weeks. Additionally, we subjected wild type (WT) mice to a normal chow diet for 15 weeks. Ex vivo experiments were performed such that bone marrow cells isolated from each condition were incubated in bone marrow media isolated from each condition. Our results suggest that all cell types significantly increase in number when incubated in media derived from DKO mice fed a high-fat diet. This media contained significantly altered levels of IL-11 and HGF compared to media derived from DKO mice fed a low-fat diet. Further investigation into modulation of these cytokines may inform future therapeutics for obese MDS-susceptible individuals.

Keywords: Diet-induced obesity, Myelodysplastic syndromes, Cytokines, Cancer

Western Diet Influences Hematopoietic Stem and Progenitor Cell Dynamics and Microenvironment Following Influenza Immunization

School of Pharmacy

Graduate **GP-25**

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Poster

Mentor: Dr. Melinda E Varney, varney31@marshall.edu

Abstract: Obesity is known to increase influenza infection susceptibility and contributes to waning immunity in influenza-immunized individuals. While ongoing research aims to determine mechanisms for waning immunity at sites of infection or in fully differentiated immune cells, little is known regarding the extent to which obesity impacts hematopoietic stem and progenitor cell (HSPC) dynamics upon immunization. Given that immunization and obesity each have independent effects on HSPC dynamics, we hypothesized that obesity alters the type and quantity of immune cells that are produced by HSPCs following immunization. To test this hypothesis, we immunized C57/BL6 mice subjected to a low-fat (control) or high-fat (obese) for 15 weeks. Mice were subjected to caudal muscle injection with PBS (control) or flu vaccine (Flulaval). Our results suggest that high-fat diet flu-immunized mice altered HSPC frequency as measured by flow cytometry when compared to all other groups. Complete blood counts suggest that myeloid skewing also occurs in high-fat diet flu-immunized mice compared to low-fat flu-immunized mice. Further analysis of cytokines in the bone marrow microenvironment provide insight into how obesity may impact HSPC dynamics following immunization. Our long-term goal is to inform the design of future vaccine formulations or co-administered therapeutics provided specifically to obese populations.

Keywords: HSPCs, cytokines, Influenza vaccine, Obesity

Increasing the efficacy of actinomycin D with resveratrol

School of Pharmacy

Graduate **GO-20**

Presenter: Raji Lukmon, raji1@marshall.edu

Oral Presentation

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Abstract: Actinomycin D (ActD) is an FDA-approved anticancer antibiotic used to treat several types of cancers. However, its widespread application for cancer treatment has been challenged by its narrow therapeutic index and dose-dependent damage to rapidly dividing cells. Combining a low-dose toxic drug with a well-tolerated compound having a synergistic anticancer effect is a well-accepted approach in the oncology field to circumvent toxicity. This approach helps combat unwanted adverse effects while optimizing drug efficacy. Resveratrol is a well-tolerated natural polyphenol investigated extensively for cancer prevention and treatment. Our previous study showed that ActD rapidly induces apoptosis by activating the p53 pathway. The current study explored the synergistic anticancer efficacy of low-dose ActD and resveratrol in lung cancer cell lines. We found that resveratrol increased the anticancer efficacy of ActD against lung cancer cell lines H460 and A549, making cells sensitive to a lower ActD concentration. Furthermore, the combination of ActD with resveratrol significantly increased the expression of p21, PUMA, GDF15, and ATF3 mRNA compared to single-agent treatments. Western blot analysis further confirmed the expression of p21, PUMA, GDF15, and ATF3. Taken together, our study suggests that resveratrol increases the anticancer efficacy of ActD by activating p21, PUMA, GDF15, and ATF3.

Keywords: Actinomycin D, Resveratrol, p53, mRNA, Synergistic

Pharmacodynamic Interactions of Vancomycin and Disulfiram (Antabuse®) in Staphylococcus aureus

School of Pharmacy

Graduate **GO-21**

Presenter: Yogesh Meka, meka3@marshall.edu

Oral Presentation

Mentor: Timothy Long, longt@marshall.edu

Abstract: The standard treatment for systemic infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) is intravenous vancomycin (VAN). For MRSA isolates with an intermediate level of VAN resistance [minimum inhibitory concentration (MIC) greater than 1 µg/mL], it is more challenging to attain the pharmacokinetic/pharmacodynamic (PK/PD) target indices for VAN therapy. Prior studies established disulfiram (DSF) can lower the MIC of VAN in MRSA with MICs greater 1 µg/mL. This research evaluated the PD interactions of VAN/DSF combinations using the checkerboard assay, time-kill studies, and flow cytometry experiments. The VAN-intermediate (VISA) strain Mu50 (MIC 8 µg/mL) was used as the primary strain for the studies. The data showed that the addition of DSF can accelerate the killing action of VAN in Mu50 and other MRSA strains. The flow cytometry results further confirmed the enhanced bactericidal effects at the cellular level, while revealing that DSF may counteract the muropeptide fortification mechanism against VAN in VISA.

Keywords: MRSA, vancomycin, disulfiram, antibiotic

Western diet induces early myeloid skewing, accelerating disease initiation in Myelodysplastic Syndromes-susceptible mice

School of Pharmacy

Graduate **GP-26**

Presenter: Esther Mensha, mensah3@marshall.edu

Poster

Mentor: Dr. Melinda E. Varney, varney31@marshall.edu

Abstract: Myelodysplastic syndromes (MDS) are a group of diverse clonal hematopoietic disorders characterized by ineffective hematopoiesis. Obesity has been correlated with the incidence of MDS/AML. However, there is little data on how diet-induced obesity alters HSPCs, contributing to disease initiation and progression in MDS individuals. To address this shortcoming, we hypothesized that Western diet contributes to early myeloid skewing of HSPCs in MDS-susceptible mice. To test our hypothesis, we utilized a double knockout (DKO) mouse model with a deletion of TIFAB and miR-146a, which makes them susceptible to MDS-like phenotypes. DKO mice were placed on a control low-fat diet or Western high-fat diet for 15 weeks. Bone marrow was extracted from femurs and tibias and stained for flow cytometry analysis of HSPCs. Blood samples were analyzed with a hematological analyzer for complete blood counts. Findings indicate that there was an early increase in skewed myeloid cells in mice fed a high-fat diet compared to those fed a low-fat diet. Study outcomes revealed that high-fat dietary intake induces early skewing of myeloid cell production in MDS-susceptible mice. Further understanding of the mechanisms underlying this phenomenon may inform future therapeutics for MDS-susceptible individuals.

Keywords: Western diet, myelodysplastic syndromes, hematopoietic stem cells

HPV-Day at Marshall University School of Pharmacy (MUSOP)

School of Pharmacy

Graduate **GP-27**

Presenter: Lyndsey Riffe, pauley265@marshall.edu

Poster

Mentor: Dr. Angel Kimble, a.kimble@marshall.edu

Abstract: Objective:

Creating awareness to the HPV vaccine and assessing need or knowledge gap among pharmacy students.

Introduction/Background:

As a mission of Operation Reproductive Health for APhA-ASP, a Valentine's Day themed event, "HPV-Day" was developed to create awareness for the HPV vaccine. The HPV vaccine can prevent up to 90% of HPV-related cancers.¹

Methods:

The initiative began with asking if a local independent pharmacy would offer the HPV vaccine to students. An email to assess the need for the HPV vaccine was sent to only pharmacy students. HPV-day was an event hosted at MUSOP and consisted of two-third year pharmacy students who provided HPV-day cards with HPV vaccine facts.

Results:

Students within the didactic portion of the curriculum (first, second, and third year pharmacy students) were surveyed regarding receiving the vaccine. Only three percent responded to the initial survey. At the HPV-Day, participation was low.

Conclusion:

We acknowledged that the pharmacy school community did not show interest in receiving the vaccine or vaccine facts. This event highlighted that there is a lack of participation in spreading awareness for the importance of receiving the HPV vaccine. As front-line health care workers, pharmacists can help to advocate for their patients to get the vaccine and know the vaccine facts.

Keywords: HPV Vaccine, Awareness, Pharmacy Student

Investigating a Novel Role for GPR68 in Oral Dysplasia

School of Pharmacy

Graduate **GO-22**

Presenter: David Shore, shore1@marshall.edu

Oral Presentation

Mentor: Jeremy P. McAleer, mcaleer@marshall.edu

Abstract: Esophageal cancer is the seventh most common malignancy worldwide and accounts for 3% of cancers in the U.S. Despite advances in therapies, survival rates for SCCHN have not significantly improved in several decades. The tumor microenvironment is associated with acidosis (pH<7.0), which regulates cancer cell growth and survival, as well as inflammation. GPR68 is a proton-sensing receptor that is activated by extracellular acidification, and previously found to be expressed in SCCHN. Here, we studied a potential role for endogenous GPR68 expression in SCCHN progression using a murine model. Age-matched control (GPR68+/+) and GPR68-deficient (GPR68-/-) mice were placed on drinking water containing 4-Nitroquinoline N-oxide (4NQO; 50ug/mL) for 10-12 weeks, followed by normal water for 12 weeks. There were no significant differences in body weight between GPR68+/+ and GPR68-/- mice, although there was a trend towards lower survival rates in GPR68-/- mice prior to week 20. No difference was observed in the total number of tongue lesions beyond week 20; however, histological examination revealed that GPR68-/- mice were more likely to have severe tongue dysplasia (45%; n=20) compared to GPR68+/+ (11%; n=19), suggesting that endogenous GPR68 expression may protect against chemical-induced oral carcinogenesis. To investigate the impact of GPR68 on cell growth in vitro, head and neck cancer cell lines were treated with siRNA targeting GPR68. Our results show that knock down of GPR68 had no significant effect on annexin-V or sulforhodamine B staining, suggesting that severe dysplasia scores were not due to intrinsic effects of GPR68 on tumor growth or survival. Further, pH had no significant effect on GPR68 gene expression in vitro. Overall, our data suggest that GPR68 may protect against oral dysplasia in a tumor-extrinsic manner.

Keywords: Dysplasia, GPR68, Foxp3, 4NQO, squamous cell carcinoma of head and neck (SCCHN)

Effects of Disulfiram on the Metabolome of MRSA

School of Pharmacy

Graduate **GO-23**

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Oral Presentation

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Abstract: Disulfiram (Antabuse) is an oral drug used for the treatment of alcohol dependence. Disulfiram (DSF) also has antibacterial effects, primarily with Gram-positive bacteria, such as methicillin-resistant *Staphylococcus aureus* (MRSA). To investigate the antibacterial mechanism in MRSA, we conducted high-pressure liquid chromatography (HPLC) metabolomics to detect for the influence of DSF on thiamine and amino acid metabolism. Thiamine pyrophosphate (TPP) is one of the essential cofactors for many vital enzymes like transketolase, pyruvate dehydrogenase, and 2-oxoglutarate dehydrogenase involved in carbohydrate metabolism. In bacterial cells, TPP is also used for the biosynthesis of coenzyme A which is believed to be a drug target of DSF in MRSA. Recent studies reported that DSF lowered the intracellular level of coenzyme A in MRSA, and KEGGS pathway analysis revealed the enrichment of genes associated with TPP and coenzyme A biosynthesis. Moreover, transcriptome data revealed changes in amino acid metabolism in DSF-treated MRSA. To corroborate these findings, HPLC was performed using different methods to estimate the TPP and amino acid levels in MRSA. The HPLC results confirmed that DSF increased cellular levels of TPP and some amino acids involved in coenzyme A synthesis.

Keywords: disulfiram, MRSA, coenzyme A, thiamin, HPLC

Role of the pharmacist in decreasing health disparities in rural Appalachia

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Abstract: Consistent access to quality healthcare in rural locales is an issue for many West Virginians. This sizable gap in patient care could be filled by allowing pharmacists to practice at the top of their license. Our research aims to identify the priority healthcare needs of rural Appalachians and to identify strategies pharmacists can employ to help meet the needs of people living in these disenfranchised areas. Social, economic, and technological trends in rural Appalachia helped to determine several priority healthcare needs of the population. We conducted a literature review to identify programs and initiatives that have been used in other rural areas of the United States or internationally to help meet the needs of people living in rural areas. Major needs identified include expanded access to healthcare, optimization of transitions of care, medication use optimization, and improved vaccination rates. Strategies identified to meet these needs include expanded offerings of pharmacy services, policy reform to incentivize rural access, collaborative practice between physicians and pharmacists, and electronic health record (EHR) access for pharmacies. Improving access to quality healthcare in rural Appalachia will improve disease-related outcomes in underrepresented patient populations and decrease financial burden on state and federal payers.

Keywords: Pharmacy, Pharmacist, Rural, Healthcare, Access