



West Virginia University®

OFFICE OF UNDERGRADUATE RESEARCH

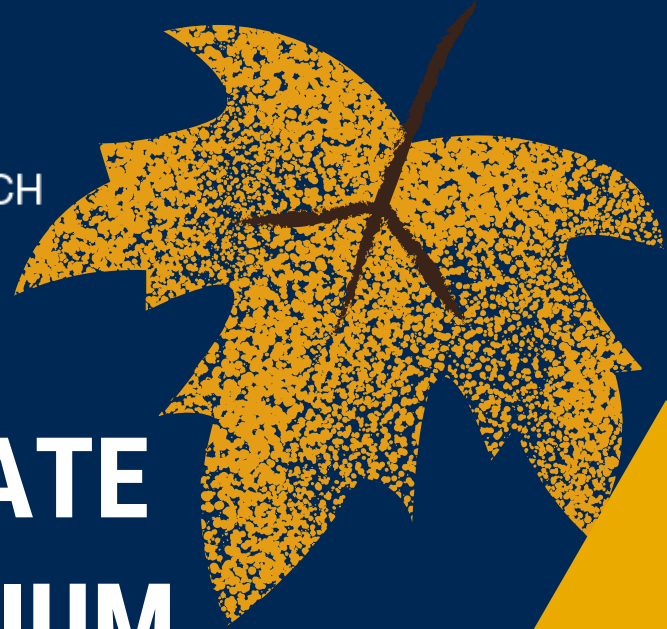
3rd Annual FALL UNDERGRADUATE RESEARCH SYMPOSIUM

- Discussion Panel
- Poster presentations
- Oral presentations
- Performing Arts presentations



**Virtual Conference
Experience**

**Interactive
November 14, 2020
1 to 4:30 P.M.**



“Virtual” Fall Undergraduate Research Symposium 2020
West Virginia University

I. SCHEDULE OF EVENTS

Saturday, November 14, 2020

11:00 a.m. onward

Symposium Opens - Presentations available from 11:00 am onward and for a minimum of one week. All welcome: parents, research mentors, graduate and undergraduate students, and members of the public.

Saturday, November 14, 2020

11:00 a.m. to 2:00 pm: Presentation Judging

Judging of presentations in all categories.

Saturday, November 14, 2020

1 p.m. to 2:00 p.m.: Panel

WVU researchers, from different fields, discuss how they are responding to the ongoing COVID-19 pandemic.

Saturday, November 14, 2020

2 p.m. to 4:30 p.m.: Synchronous Commenting

Presenters will monitor and respond to questions and comments posted within their YouTube channel presentations in real-time.

Monday, November 16, 2020

Awards Announced

Top presenters in each presentation category will be posted on the Symposium website.

Monday, November 16 to November 20

Presenters will continue monitoring comments and questions posted to their presentations and responding in an asynchronous mode.

II. PANEL

“How WVU researchers are responding to the ongoing COVID-19 pandemic.”

WVU professors, from different fields, present their recent funded research projects addressing the COVID-19 pandemic and respond to undergraduate researchers’ questions.

Dr. Brad Price, Ph.D., Assistant Professor, College of Business and Economics

Project: *Investigating Personal Protective Equipment Usage During Pandemics*

Personal protective equipment (PPE) has become a topic of national interest during the COVID- 19 pandemic. The surge of COVID-19 patients in metropolitan areas has put a strain on supply chains and made PPE scarce in many states. The core of this project lies in studying the differences in the matriculation of different populations requiring PPE usage. Understanding the change in these populations over time can shed the light on the impact of social distancing measures and PPE usage. A previously developed model used by this research team to forecast PPE demand will be further expanded for use in pandemic situations such as COVID-19.

Dr. Ivan Martinez, Ph.D., Associate Professor, WVU Cancer Institute, WVU School of Medicine

Project: *Importance of Viral and Host MicroRNAs in the Pathogenesis of SARS-CoV-2*

Identifying the molecular interactions between SARS-CoV-2 and the human host cell is the main focus of this research project. The goal is to discover new viral-host molecular interactions that will lead to future prognostic and/or therapeutic tools urgently needed to fight this viral pandemic.

Dr. Jamie Shinn, PhD, Assistant Professor, Department of Geology and Geography

Project: *Social impacts of life in the time of COVID-19*

Approaching the pandemic from a humanistic perspective, this research project will use photography to understand how COVID-19 is impacting people and communities in rural West Virginia. The site for this project is Rainelle, WV. This study will include approximately 20 participants. Each person will be provided with a digital camera for documenting sources of hope and sources of hardship resulting from COVID-19.

Kym Scott, DMA, Assistant Professor, School of Music

Project: *The masked singers*

As a Choir Director, Dr. Scott composed the perfect masks for performance art. She recognized the limitations of singing and performing in masks from the onset of the COVID-19 pandemic. So she designed a different type of mask to solve a problem unforeseen by non-entertainers.

III. UNDERGRADUATE PRESENTERS AND FACULTY RESEARCH MENTORS

We want to take this opportunity to thank our undergraduate presenters. This year, we welcome presenters from not only the Research Apprenticeship Program, but also the Honors EXCEL Program and the Beckman Scholars Program, to present their research and creative efforts. These students’ willingness to present and discuss their scholarly activities in virtual format is appreciated.

In addition, special thanks to our faculty research mentors. We know that involving students with limited or no research experience takes additional effort, and for this we are grateful for your willingness to foster student learning in this intimate way. We highly value the mentorship you are providing to student researchers and your promotion of a culture of strong undergraduate research at WVU.

A. Human Engagement (Oral Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Nathanael Turner	1	BM in Violin Performance	Mitchell Arnold	Goldmark, Passim
Kelsey Greene	2	English, Sociology	Ellen Rodrigues	Queer Histories in Morgantown, West Virginia
Paige Wantlin	3	Political Science & Economics	Erik Herron	Evaluation of Ukrainian Response of Coronavirus Pandemic Regarding Political Leadership, Equipment Readiness, and Staff
Jillian Peyton	4	Advertising and Public Relations	Jennifer Harker	Counterfeiting the College Experience: Studying Public Relations Amidst the COVID-19 Pandemic

B. Science & Technology (Oral Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Sakina Ali	5	Biomedical Laboratory Diagnostics	Abbas Ali	Finding the Barriers to Optimal Cardiology Care in Rural America in the 21st century
Meagan Schmuck	6	Nursing	Vincent Setola	Possible Clinical Drug Treatment for Methamphetamine Addiction Recovery through Wakefulness-Promoting Drug, Modafinil
Justin Falwell	7	Sport and Exercise Psychology	Johannes Raabe	Motivation and Basic Need Satisfaction in NCAA Head and Assistant Coaches

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Jarrett Childress	8	Exercise Physiology	Michael Ruppert	Drug Combinations for Targeting Breast Cancer Cell Plasticity
Abreanne Andlinger	9	Biology	Sadie Bergeron	Examining dlx5a/6a Expression in gsx1/2 Zebrafish Mutants
Kelcie Britton	10	Immunology and Medical Microbiology	Daniel Panaccione	Functional and Genetic Analysis of Esterase Genes Involved in Synthesis of Ergot Alkaloids
Kallie Schafner	11	Chemistry	Timothy Nurkiewicz	Vaping Inhalation Consequences on Placental and Pup Weight to Determine Health Effects During Pregnancy
Rachel McNeel	12	Chemistry	Jianhai Du	Loss of IDH3b causes male infertility with normal vision
Amina Irfan	13	Mechanical Engineering	Osama Mukdadi	ISOGE
Ram Zaveri	14	Computer Science and Neuroscience	Gianfranco Doretto	Fine-Grained Visual Classification for Plant Analysis

C. Physical Sciences & Engineering (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Dana Foual	15	Computer Science	Natalia Schmid	Camera Authentication Based on a Gaussian Model for PRNU and a GLRT Detection Rule
Melina McCabe	16	Biomedical Engineering	Jessica Allen	Differences in Stepping Characteristics During the TUG Test with Aging and Neurodegenerative Disease
Mitchell Barna	17	Civil Engineering	Sam Mukdadi	Apparatus Design for Hemodynamic Analysis and Tissue Strain Imaging for Studying Glaucoma
Mara Looney-Sanders	18	Engineering	Margaret Bennewitz	Encapsulation of Manganese Oxide Nanoparticles to Maximize MRI Signal Intensity
Alex Phares	19	Civil Engineering	Kakan Dey	The Impact of Vision Zero Initiatives on Cyclist Safety in New York City
Sonia-Frida Ndifon	20	Biomedical engineering	Jacob Suffridge	Investigating Visual Information Retention in Autism Spectrum Disorder
Hunter Bontrager	21	Mechanical and Aerospace Engineering	Guilherme Pereira	Exploring the Limitations and Development of Long Term Robotics

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Adrienne Hafley	22	Chemistry	Peng Li	Electrophoresis Study for DNA Fragmentation in a Microfluidic Chip
Alexis Ravenscroft	23	Chemistry	Brian Popp	Studies of Organic Transformations Using Operando Spectroscopy and Computational Chemistry
Daniel Price	24	Geology	Graham Andrews	Using StraboTools for Compaction Gradients in Continuous Miocene-Modern Fine-Grained Volcaniclastic Successions, IODP Site U1437

D. Health Sciences (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Serenity McDill	25	Nursing	Ubolrat Piamjariyakul	Coaching Palliative Home Care for Family Caregivers of Heart Failure Patients
Megan Garris	26	Chemistry	Mark McLaughlin	Targeting Immune Checkpoint Inhibitors to Cell-Surface Markers on Tumors
Brooke Driscoll	27	Exercise Physiology	Jean McCrory	Effect of Arch Characteristics on Pain in Recreational Runners
Ashley Linder	28	Biomedical Engineering	Brianna Sheppard	Accountable Health Communities: Addressing Social Needs
Erika Lerfald	29	Biology	Connie DeLa'O	The Effect of Statewide Legislation on Narcotics Prescribing in the Lower Orthopedic Trauma Patient
Andrew Seman	30	Biomedical Engineering	Stan Hileman	The Effects of Chronic Feed Restriction on KNDy Neurons in the Ovine Hypothalamus
Tyler Drummond	31	Chemical Engineer	Eric Tucker	Characterization of Ventricular Volume in JNK Deficient Brains
Lillian Bischof	32	Chemical Engineering	Ming Pei	Comparison of Two Fetal Stem Cells in Proliferation, Trilineage Differentiation, and Influence of Hypoxia
Matthew Hudson	33	Immunology and Medical Microbiology	Mariette Barbier	Characterizing Cell Size-Colony Size Relationships in Heme Oxygenase Mutated <i>Pseudomonas aeruginosa</i>
Autumn Rogers	34	Immunology and Medical Microbiology	Timothy Eubank & Duaa Dakhlallah	Analysis of Circulating microRNAs Targeting DNA Methyltransferases As a Predictor for Treatment Outcome
Rhett White	35	Biology	Jacob Bumgarner	Dim Light at Night Exacerbates Pain Associated with Chemotherapy

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Riley Kane	36	Biochemistry	Werner Geldenhuys	Novel Compound Screening to Combat Huntingtin Protein Aggregation in a Transgenic <i>C. elegans</i> Model.
Raafay Uqaily	37	Biomedical Engineering	Naveena Yanamala	High-Risk Burden Predictors of One Year Mortality Following Transcatheter Aortic Valve Implantation
Brent Zutaut	38	Exercise Physiology	Shari Cui	Surgical Management of Cervical Spondylodiscitis in Intravenous Drug Users: Are we Undertreating?
Skylar Petrone	39	Exercise Physiology	Shipra Gupta	Pediatric Azithromycin Prescriptions in a Healthcare System from 2016-2018
Anna Sharpless	40	International Studies	Connie DeLa'O	Surgical Database: Creating a Tool for Research and Communication Between and Within Hospitals
Olivia Oldaker	41	Sports and Exercise Psychology	Scott Galster	Combating Declines in Parkinson's and Alzheimer's Disease Through Recent Neurological Technologies
Jared Agurto	57	Public Health	Robin Pollini	Measuring Suicide as an Outcome in Psychotherapy Research for Adults with Bipolar Disorder

E. Social & Behavioral Sciences (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
Cassidy Wetz	42	Sociology & Anthropology	Erin Hudnall	Legal Opinions on Cannabis In West Virginia
Olivia Thomas-Meager	43	Child Development and Family Studies	Cheryl McNeil	Examining Patterns of Response From Parents on the Brief Child Abuse Potential Inventory (BCAP).
Kailey Basham	44	Psychology & Criminology	Nicholas Turiano	Child Abuse and Perceived Stress in College Students: The Mediating Role of Emotion Regulation
Talia Buchman	45	Anthropology	Susanna Donaldson	Educating the Zoo-going Public: Using Nonhuman-animal Enrichment to Engage and Educate the Public
Serena Roberts	46	Psychology	Cheryl McNeil	Associations Between Parent Characteristics and Invalid Responses on the Brief Child Abuse Potential Inventory

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Kelsey Keen	47	Psychology	Cheryl McNeil	PCIT for Children with Autism: Pre-Post Changes in Parenting Skills and Child Behavior
Sabrina Siegan	48	Immunology and Medical Microbiology	Shari Steinman	Childhood Frequency of Church Attendance Effects on Adulthood Scrupulosity Scores
Jocelyn Mayo	49	Forensic and Investigative Science	Keith Morris	A Comparison of Sensofar S Neox 3D Optical Profiler 2D and 3D Scans

F. Biological Sciences (Poster Presentations)

Presenter Name	Presenter No.	Major	Faculty Research Mentor	Presentation Title
David Brooks	50	Biology	Brian Boone	Inhibition of Neutrophil Extracellular Traps with Chloroquine Reduces Peritoneal Metastatic Tumor Burden
Alec Phelps	51	Biology	Kevin Daly	Morphological Characterization of AHN's at the Level of Synaptic Partnership in <i>Drosophila melanogaster</i>
Leon Wilson	52	Biochemistry	Jennifer Gallagher	Identifying Physiological Factors and Genes Involved in <i>Saccharomyces Cerevisiae</i> Susceptibility to Ricin-induced Apoptosis
Christopher Hughes	53	Biology	Edward Brzostek	Measures Taken by Oak and Maple Trees to Mitigate Drought in Temperate Forests
Megan Tenney	55	Wildlife and Fisheries Resources	James Anderson	Wetland Soil Texture Analyses for Improved Understanding of Turtle Habitat and Distribution
Emilee Fisher	56	Animal and Nutritional Sciences	Joe Moritz	The effect of Dacitic Tuff Breccia (Azomite®) in Corn, Soybean, and DDGS Based Diets that Vary in Inorganic Phosphate Source on Mill Throughput and Pellet Quality

IV. ACKNOWLEDGMENTS

A. Personnel

RAP

Cinthia Pacheco – Director
Paige Zalman – Program Coordinator
Carinna Ferguson – Graduate Teaching Assistant
Morgan Simpson - Graduate Teaching Assistant
Stephanie Augustine - Graduate Teaching Assistant
Kaley Vestal - Undergraduate Teaching Assistant
Parker Carte - Undergraduate Teaching Assistant
Raven Forshee - Undergraduate Teaching Assistant

Virtual Symposium

Michelle Richards-Babb
Cinthia Pacheco
Kevin Walden
Paige Zalman

B. Financial Support

Beckman Scholars Program (Director: Michelle Richards-Babb)

Funding provided by the [Arnold and Mabel Beckman Foundation](#).

The Beckman Scholars Program provides in-depth, sustained undergraduate research experiences for exceptionally talented, full-time undergraduate students.

Louis Stokes STEM Pathways and Research Alliance: KY-WV LSAMP (WV PI: David Miller).

Funded by NSF the KY-WV LSAMP is a consortium of colleges and universities working together to create, enhance, and expand programs designed to broaden participation and increase the quality and quantity of students from underrepresented populations who receive degrees in STEM disciplines. One of its focus is undergraduate research experiences.



First2 Network: Initiative funded by the National Science Foundation that aims to increase the persistence of STEM students in their majors, particularly first-generation WV students.



Federal Work Study: A federal student aid program that provides part-time employment while students are enrolled in school to help pay their education expenses. The program encourages work related to the students' course of study, including research.

Federal
Student
Aid



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Oral Presentations Category



**Human
Engagement**

**Science &
Technology**

Presentation #1

Goldmark, Passim

Nathanael Turner*, Mitchell Arnold, DMA, Mikylah Myers, DMA

School of Music, West Virginia University, Morgantown, WV 26506

Broad category: Human Engagement (Oral Presentation)

Presenter’s major: BM in Violin Performance

All that persists of Goldmark’s output in the repertoire today is his A minor violin concerto. Both performers and critics have often made overarching statements about this concerto, which hasn’t recently enjoyed the popularity of some of its romantic cousins. This has allowed such statements to go broadly unexamined. Phillip Huscher, in program notes for the Chicago Symphony Orchestra, invokes Goldmark’s love for Mendelssohn. The liner notes for Vera Tsu’s 1996 Naxos release claim that this work is a “development of the musical language of Mendelssohn,” suggestive of his “idiom,” and that it exists “firmly in [Mendelssohn’s] tradition.” Mendelssohn certainly was a titanic cultural figure during the formative years of Goldmark’s career, however, study of Goldmark’s concerto and memoir indicates less of a great Mendelssohnian influence and more of a wide-ranging network of inspirations in the compositional process. Despite the presence of Mendelssohn-like “turns of phrase,” similar key area/figuration combinations, even quotes, these are present from various sources, and the alleged Mendelssohnian characteristics appear in arguably less convincing ways than the influences of composers whom Goldmark knew, worked with, and admired. Among them, Liszt, Brahms, and Wagner. With such a thick layer of attribution looming over Goldmark in the public consciousness, the task at hand is to elucidate his influences, and not expect that the listener distinguish such influence by “private intuitions, but from a study of [the] musical imagery.” We must examine the “expressive vocabulary” used by Goldmark and seek out the origin of its several contents .

Funding: U.S. Department of Education. Federal Work Study

Program/mechanism supporting research/creative efforts: WVU’s Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #2

Queer Histories in Morgantown, West Virginia

Kelsey Greene*, Ellen Rodrigues, PhD.

LGBTQ Center, West Virginia University, Morgantown, WV, 26505

Broad category: Human Engagement (Oral Presentation)

Presenter’s major: English, Sociology

This research aims to collect the oral histories of the LGBTQ community in and around Morgantown, with the goal of gaining a better understanding of what life in Appalachia is like for individuals within the LGBTQ community. The project has collected these histories through in person (now Zoom), and phone interviews. These interviews will then be transcribed. This research is significant because it is allowing individuals to share their stories, all of which help us to understand the complex and ever-changing lives of individuals within LGBTQ communities across the country. Through this research, the head of the project, Dr. Ellen Rodrigues, hopes to be able to create a network of information, marking spots in Morgantown that are significant to its LGBTQ community’s history. With this information, there is the potential to create a walking tour of the area, showcasing these locations and providing this information to the general public. The project helps to uplift voices that are often silenced and ignored, helping to provide them with a place in our area’s collective history.

Funding: WVU Humanities Center, Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #3

Evaluation of Ukrainian Response of Coronavirus Pandemic Regarding Political Leadership, Equipment Readiness, and Staff

Paige Wantlin*, Erik Herron, PhD.

Department of Political Science, West Virginia University, Morgantown, WV 26505

Broad category: Human Engagement (Oral Presentation)

Presenter’s major: Political Science & Economics

Due to the recent prevalence of the coronavirus pandemic, a need for a comprehensive understanding of the information surrounding the virus has also emerged. While much of the focus has been on countries with the largest outbreaks (e.g., the United States), understanding how governments around the world have responded to the pandemic is important. This study focuses on Ukraine, a large Eastern European country with a substantial coronavirus outbreak and seeks to gather a comprehensive expectation of the coronavirus response in the country. The study relies on a unique and highly detailed dataset, compiled by Ukraine’s government, on hospital-level infections and capacity, including information on staff, ventilators, and other PPE equipment. With this information, we hope to cross-examine infection rate with available equipment while also evaluating political leadership and response within Ukraine. What we expect to find is that more rural communities are more at risk from the spread of coronavirus in Ukraine from a lack of available staff and equipment while transmission rates are lower. Urban areas, on the other hand, are better equipped to handle cases of coronavirus while the transmission rate is higher. Additionally, we also expect conservative leadership to handle the pandemic situation similarly to conservative leadership in the United States of America with lower restrictions and a lesser need to call for emergency.

Funding: Minerva Research Initiative

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #4

**Counterfeiting the College Experience: Studying Public Relations Amidst the
COVID-19 Pandemic**

Jillian Peyton*

Reed College of Media, West Virginia University, Morgantown, WV 26506

Broad category: Human Engagement (Oral Presentation)

Presenter’s major: Advertising and Public Relations

The Public Relations Society of America defines the professional practice of public relations as “a strategic communication process that builds mutually beneficial relationships between organizations and their public” (About Public Relations, n.d.). Public relations is vital to the success of a business or brand. Moreover, an organization is much less likely to accept the recommendations of public relations practitioners if they are not perceived as well-informed practitioners who know their practice well (Nolte, 1979). Coinciding with the sudden transition to online classes in early 2020, higher education students who lived on campus before the outbreak generally found it difficult to adjust to online learning (Blankstein et al., 2020). Consequently, it is reasonable to assume that this adjustment to an online format for higher education classes has the potential to negatively impact students, including those who are studying public relations. To analyze the general ramifications of COVID-19 on public relations students, I recorded daily notes detailing my perspective and my experiences as a public relations student at West Virginia University during the fall 2020 semester, the second semester to be drastically affected by the pandemic. These qualitative findings will be analyzed and represented through auto-ethnography, a personal experience method of social science purposed with capturing “those elements that make life conflictual, moving, problematic” (Lincoln and Guba, 2005). Utilizing this method, I hope to illustrate the challenges I face and my progress as an aspiring public relations practitioner during a global crisis.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #5

Finding the Barriers to Optimal Cardiology Care in Rural America in the 21st century

Sakina Ali*, Abbas Ali, MD, Syed Jafri, Ph.D

WVU Medicine, West Virginia University, Morgantown, WV 26505

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Biomedical Laboratory Diagnostics

Cardiovascular conditions are one of the leading causes of mortality and morbidity in America. A disparity in cardiovascular care and outcomes exists between rural and urban areas. In this paper, we describe important features of the rural population, hospitals, and health care issues related to access physician factors, taking West Virginia as a case study. We will explore future projections as well as propose solutions. Although the physician workforce has grown in the last twelve years, access to cardiologists were consistently observed to be lower in rural areas. Besides access issues, our study also discover that patients are more vulnerable by the presence of comorbidities such as overweight or obese, smoking habits, excess alcohol consumption and limited physical activity. Typically, patients travel long distances to access care. Moreover, the treatment of life- threatening situations in rural areas is suboptimal, and the lack of cardiologists negatively projects on the quality of life in rural communities. Finally, this paper explores strategies to bridge these gaps such as telemedicine and incentivizing physicians to practice in rural areas.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #6

**Possible Clinical Drug Treatment for Methamphetamine Addiction Recovery
through Wakefulness-Promoting Drug, Modafinil**

Meagan Schmuck*, Vincent Setola, Ph.D.

Health Sciences Center, West Virginia University, Morgantown, WV 26506

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Nursing

Methamphetamine (METH) is one of the most addictive and widely used drugs of abuse worldwide. METH is so addictive because of its actions on the brain’s reward system. METH, through a series of mechanisms, results in markedly increased activity of the neurotransmitter dopamine, the brain’s “feel good” molecule. Chronic METH use is related to psychosis, malnutrition, cardiovascular problems, chronic fatigue, and disturbed sleep patterns, among other health issues. Those recovering from METH use may receive a variety of behavioral treatments to help them get through withdrawal and resist relapse. However, there are no FDA-approved drugs for medically assisted withdrawal treatment. Addiction recovery treatments engaging both behavioral and medically based approaches have been effective for other drugs of abuse (e.g., opioids, nicotine), so the possibility for medically assisted METH cessation would address an urgent unmet clinical need. Modafinil, a drug approved by the FDA for narcolepsy and for daytime sleepiness due to sleep apnea or shift working, also exerts its wakefulness-promoting effects by boosting dopamine neurotransmission in the brain. However, because modafinil is far less potent than METH, it has a very low (if any) potential for abuse, and its chronic use is not associated with any of the ill effects of long-term METH use. Here, we review the literature on modafinil as a potential treatment for METH cessation. We describe clinical studies in humans and pre-clinical studies in rodents suggesting that modafinil may have clinical utility not only for narcolepsy/daytime sleepiness, but also for persons recovering from METH use.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #7

Motivation and Basic Need Satisfaction in NCAA Head and Assistant Coaches

Justin Falwell*, Johannes Raabe, Ph.D, Kim Tolentino, M.S., Tucker Readdy, Ph.D

College of Physical Activity and Sport Sciences, West Virginia University, Morgantown, WV 26505

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Sport and Exercise Psychology

The current project is aimed at exploring the antecedents, mediators, and consequences of National Collegiate Athletic Association (NCAA) coaches’ motivation through the satisfaction and frustration of their basic psychological needs. Previous research regarding basic psychological need satisfaction in a sports setting has largely ignored coaches as a population to be explored yet there is a growing belief that coaches should be looked at as performers in their own right. A population of approximately 300 NCAA coaches will be recruited to complete an online survey that will include measures to allow assessment of basic psychological need satisfaction and frustration, as well as measures of perfectionism, workaholism, and general coping style. Additionally, assistant coaches will complete a questionnaire to measure the perceived influence their head coaches have on their basic psychological need satisfaction. The results from this project will help to provide coach educators and coach developers with an empirically-grounded foundation for the cultivation and maintenance of optimal psychological functioning among coaches.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #8

Drug Combinations for Targeting Breast Cancer Cell Plasticity

Jarrett Childress*, Michael Ruppert, M.D., Ph.D.

WVU Cancer Institute Research Laboratories, West Virginia University, Morgantown, WV 26505

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Exercise Physiology

Cancer cell plasticity is promoted by cross-talk between three major embryonic stem cell (ESC)-like transcription factor networks: Core, Myc, and PRC2. These three major transcription factor networks are conserved between normal stem cells and cancer cells, suggesting a potential strategy for targeting the stem-like properties of cancer cells. These three networks are especially highly conserved in human cancer types that express strong ESC signatures such as basal-like breast cancer. When cancer cells are exposed to a variety of therapeutic agents, ranging from conventional chemotherapy to molecularly-targeted small molecules, they rapidly develop resistance through a type of epigenetic reprogramming. We propose that the three conserved transcription factor networks play a critical role in this process, conferring plasticity to cancer cells and leading to tumor cell survival and recurrence. By co-targeting these three networks we will address the functional redundancy that is common in ESC signaling. We have developed a strategy to rapidly screen all possible three-drug combinations from a set of 12 agents. We anticipate that specific combinations of drugs will induce differentiation, growth arrest and/or cell death.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #9

Examining dlx5a/6a Expression in gsx1/2 Zebrafish Mutants

Abreanne Andlinger*, Rebecca Coltogirone, Sadie Bergeron, Ph.D.

Department of Biology, West Virginia University, Morgantown, WV 26506

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Biology

Neurological disorders such as autism and schizophrenia are in part the result of mutations in the genes that control neurodevelopment. The purpose of this experiment was to determine if Gsx1/2 transcription factors regulate the expression of the genes dlx5a/6a. Zebrafish were used as the model organism for this experiment. Zebrafish heterozygous for the gsx1/2 TALEN mutation were crossed to get a pool of sibling embryos of various genotypes, including mutants, wild types, and heterozygotes. These embryos were fixed at 30 hours post fertilization. The embryos were then stained through in situ hybridization to visually compare the expression of dlx5a/6a in the brains of the wild type and mutant embryos. It is expected that the gsx1/2 mutants will have decreased expression of dlx5a compared to the wild types because these embryos have a mutation in their gene sequence of gsx1/2 that likely causes these transcription factors not to be able to bind to their specific binding sites on other genes. Gsx1 does not have any known binding sites for the gene dlx6a, so it is expected there will be no change in expression between the wild types and gsx1 mutants. This research is still ongoing, but preliminary research shows Gsx1/2 regulates expression of dlx5a. By exploring the connections between transcription factors and genes in zebrafish, this research could be a model for the way these genes contribute to neural development in humans.

Funding: The Arnold and Mabel Beckman Foundation

Program/mechanism supporting research/creative efforts: Arnold and Mabel Beckman Foundation

Presentation #10

Functional and Genetic Analysis of Esterase Genes Involved in Synthesis of Ergot Alkaloids

Kelcie N. Britton*, Chey R. Steen, Jessi K. Sampson, Daniel G. Panaccione, Ph.D.

Division of Plant and Soil Sciences, West Virginia University, Morgantown, WV 26505

Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Immunology and Medical Microbiology

Ergot alkaloids are unique nitrogenous metabolites produced by several species of fungi that have been associated with many adverse historical events, including the Salem Witch Trials. Despite their toxicity, modified and appropriately dosed ergot alkaloid derivatives are effective pharmaceutical treatments for dementia, migraines, and hyperprolactinemia. Pathways to some ergot alkaloids have been studied both biochemically and genetically, but critical steps in the synthesis of lysergic acid amides remain elusive. These gaps are significant because many of the pharmaceutically relevant ergot alkaloids are semi-synthetically derived from lysergic acid amides. Lysergic acid α -hydroxyethylamide (LAH) is the ergot alkaloid produced by the fungus *Metarhizium brunneum*. We hypothesize two genes, named *easP* and *estA*, encode esterases involved in the final step of LAH biosynthesis. To test this hypothesis, CRISPR mutants were engineered with *easP* alone mutated and with both *estA* and *easP* mutated. The product of *easP* has a significant effect on the production of LAH; the *easP* mutant only accumulated half of the LAH measured in wild type. The quantity of LAH in strains was normalized relative to fungal biomass as estimated by measuring the fungal metabolite ergosterol by liquid chromatography-mass spectrometry. The double mutant has been prepared, and the effects on ergot alkaloids will be measured in ongoing experiments. The hypothesized activity of *EasP* as an esterase is being tested by heterologously expressing the protein in *E. coli*. The phenotype of our CRISPR mutant demonstrates that *easP* is an integral part of the pathway to LAH.

Funding: The Arnold and Mabel Beckman Foundation, NIH

Program/mechanism supporting research/creative efforts: Arnold and Mabel Beckman Foundation

Presentation #11

Vaping Inhalation Consequences on Placental and Pup Weight to Determine Health Effects During Pregnancy

Kallie J. Schafner*, Elizabeth C. Bowdridge, Ph.D., Timothy R. Nurkiewicz, Ph.D.

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Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Chemistry

With the new popularity of electronic cigarette use there has been a corresponding increase of use during pregnancy. This increase is associated with the marketing strategy that e-cigs are safer than regular cigarettes. While advertisements for e-cigs promote them as healthier than regular cigarettes, research has shown that e-cigs still carry health risks. This research aimed to demonstrate the consequences of vaping during gestation on placental and pup weight. The hypothesis is that there will be a lower average pup and placental weight in the JUUL exposed rats. Dams were exposed 6 times between gestational day(GD) 10-19. One puff was released every 120s for a total of 30 puffs. The mean chamber concentration was 3.49×10^6 #/cc with a count median diameter of 3.49nm per particle. Dams were sacrificed 24hours after the last exposure on GD 20. Average pup weight was lower in JUUL exposed dams (3.61 ± 0.11 g; n=5 litters; n=44 pups) compared to the sham-air control group (5.72 ± 0.10 g; n=11 litters; n=81 pups). Placental weight was not different between the JUUL exposed dams and the control group (0.72 ± 0.02 g and 0.87 ± 0.03 g, respectively). Placental efficiency was lower in the exposed than the control group (5.11 ± 0.16 vs. 7.10 ± 0.26 respectively). There was also an average increase in reabsorption sites within the JUUL exposed dams compared to the control (1.33 ± 0.33 and 0.67 ± 0.67 respectively). At this time, we conclude that the use of e-cigs during pregnancy has adverse maternal and fetal health effects that may contribute to the developmental origins of health and disease.

Funding: NIH

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #12

Loss of IDH3b causes male infertility with normal vision

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Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Chemistry

Isocitrate dehydrogenase 3 (IDH3) is responsible for catalyzing the irreversible conversion of isocitrate into alpha-ketoglutarate and CO₂ in the mitochondrial Krebs cycle. IDH3 is comprised of beta (IDH3B) subunits and alpha (IDH3A) subunits, which are essential for assembly and cooperative function. Mutations of IDH3b are reported to be associated with recessive retinitis pigmentosa, the neurodegeneration of rods and cones in the retina that eventually results in blindness. We found that the deletion of the IDH3b gene in mice had normal visual function and retinal morphology. Unexpectedly, the male IDH3b knockout mice were infertile. Results from sperm counts and immunohistology showed that there were almost no elongated spermatozoa in the epididymis from the IDH3b knockout mice. Furthermore, IDH3b knockout mice had disorganized flagellum in their sperm. Metabolite analysis data showed that the substrates and upstream intermediates including isocitrate were accumulated more than 10-folds in the testes of the IDH3b knockout mice. In conclusion, IDH3b gene is dispensable for vision but essential for sperm development.

Funding: WVUMedicine, BrightFocus Foundation, NIH, Retina Research Foundation

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #13

ISOGE

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Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Mechanical Engineering

What is Glaucoma? Glaucoma is a disease that damages your eye’s optic nerve. It usually happens when fluid builds up in the front part of your eye. That extra fluid increases the pressure in your eye, damaging the optic nerve. There are two major types of glaucoma Primary open-angle glaucoma and Angle-closure glaucoma. In Primary open-angle glaucoma, It happens gradually, where the eye does not drain fluid as well as it should (like a clogged drain). This is the most common type of glaucoma. The objective of this research is to Image segment the glaucoma patient's eyes images to study and research on the inner part of the eye to better understand the results. The eyelashes and eyelids come into the way and it's hard to see the nerves in the eyes. There is not any treatment for glaucoma until today’s date and many physicians and scientists are researching it. That is what the goal is to come up with ideas to figure out a way to treat it. The articles were read to understand the disease. The videos were watched to find software that eliminates eyelashes and eyelids and just focuses on the inner part of the eye. The software that was tried is Image j, 3-D Slicer, Paint. The 3-DSlicer did not work very well with Jpeg Images. The images were cropped using Paint.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #14

Fine-Grained Visual Classification for Plant Analysis

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Broad category: Science & Technology (Oral Presentation)

Presenter’s major: Computer Science and Neuroscience

Object classification from images is a standard problem in computer vision. State of the art techniques are based on deep learning, a subfield of machine learning. While they perform well for generic object classification such as determining whether there is a cat or a dog in an image, there are application domains where they still fall short. One of them is the automated classification of plant species. This is a case where different plants might sometimes look very similar in pictures, while the same plant can appear very differently, because of the concurrent effects involved in the image formation process, which involve the shape of the scene, its material properties, the illumination conditions, and the viewpoint. We regard this scenario as a fine-grained visual classification problem. To address it, we are curating a new large-scale dataset. We developed a tool for annotating plant images, which we use for labeling the visible plant organs. The dataset will serve as a benchmark for training different fine-grained visual classification techniques based on deep learning and establish their potential for image species classification.

Funding: National Science Foundation (NSF)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course



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Presentation #15

**Camera Authentication Based on a Gaussian Model for PRNU and a GLRT
Detection Rule**

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Computer Science

The ability to determine an image’s origin using a camera’s unique digital fingerprint is an effective well-developed approach in image forensics known as camera identification. This method, originally established by Lukas, Fridrich and Goljan, involves obtaining the fingerprint in the form of multiplicative noise called the Photo Response Non-Uniformity (PRNU), which is attributed to manufacturing imperfections. The PRNU is estimated using the normalized difference images that are attained by subtracting a denoised image from the original and then dividing the difference pixel by pixel. To identify a camera based on a single image of an unknown origin, the PRNU of each camera is correlated against the PRNU estimate of the query image. In the original technique, the PRNU was treated as a deterministic signal, and the additive noise was modeled as a Gaussian random signal. While it was shown that this model was highly effective, the recently introduced heteroscedastic Gaussian model has demonstrated improved results. In this work, we model the PRNU as a random Gaussian signal with zero mean and unknown variances for the vector components. Using this model, a Maximum A Posteriori (MAP) estimate of the PRNU was developed. This new estimate was initially compared against Fridrich’s PRNU by evaluating the correlation results. Considering the Gaussian model for the PRNU, we developed a new Generalized Likelihood Ratio Test (GLRT) for the problem of camera identification. The GLRT results indicated that the MAP estimate improved the PRNU. This implies that our method is more efficient compared to Fredrich’s method.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #16

Differences in Stepping Characteristics During the TUG Test with Aging and Neurodegenerative Disease

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Biomedical Engineering

Underlying factors such as aging and disease can affect walking performance and ability. We investigated how foot placement during the Timed-Up-and-Go (TUG) test is modulated with aging and neurodegenerative disease. Five healthy young adult subjects, one middle-aged adult subject, and one middle-aged adult subject with diagnosed Multiple Sclerosis (MS) performed a series of walking trials. Subjects each completed a minimum of 8 (avg: 14.1 ± 7.2) trials of the TUG test, which involves standing from a chair, walking 3m, turning, and walking back to the chair. We examined how the subject’s step length, width, and variability differed between the groups. Preliminary data suggest that step length and width were not significantly different between the three groups. However, step length and width variability were significantly increased in the middle-aged subject and middle-aged subject with MS as compared to the healthy young adults. This study is the first step towards understanding how walking performance and gait variability differ due to aging and underlying neurodegenerative disease, which may lead to an increased fall risk or unsteady gait in people with these conditions.

Funding: SURE Program

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #17

**Apparatus Design for Hemodynamic Analysis and Tissue Strain Imaging for
Studying Glaucoma**

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Civil Engineering

Glaucoma is a leading cause of blindness around the world. The causes of this disease are unknown and many researchers around the world are attempting to find ways for earlier detection and prognosis. The purpose of this research project is to design and create various apparatuses to accommodate experiments at the WVU Eye Institute in the study on glaucoma. My research goal is two-fold. Initially, we worked on the design and development of a microfluidic device for hemodynamic analysis for retinal blood flow through the optic nerve. However, due to the COVID-19 pandemic, our focus has shifted for this semester. The second task of this research project is to design and develop and container for tissue strain analysis as it relates to glaucoma. This container must be properly aligned to ensure stability during experiments, specifically to eliminate any motion artifact when using imaging techniques such as ultrasound or OCT. For glaucoma tissue analysis, the eye is pressurized, imaged, then the results are analyzed using an algorithm to see how the tissue deforms at different pressures. Our first design has been created so that the eye is stable, centered, and does not encounter exterior forces that may otherwise deter results, and modifications will be done as necessary once we have experimental data.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #18

Encapsulation of Manganese Oxide Nanoparticles to Maximize MRI Signal Intensity

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Engineering

Breast cancer is one of the most common cancers affecting women worldwide. To detect breast cancer early, magnetic resonance imaging (MRI) currently uses gadolinium (Gd) chelates as the main contrast agent. However, Gd chelates do not differentiate between malignant and benign tumors, which leads to false positives (misdiagnosed benign breast tumors), and cancer may be missed (false negatives). Manganese oxide (MnO) nanoparticles (NPs) have superior MRI signals and show potential in targeting malignant tumors using pH sensitivity, where the contrast will turn “ON” after internalization by the cancer cells. The ultimate goal of our research is to develop a contrast agent to reduce false positive and false negative imaging results associated with current breast MRI. Two methods were tested to make the MnO NPs hydrophilic: 1) MnO NPs were encapsulated with poly(lactic-co-glycolic) acid (PLGA) polymer using an oil-in-water emulsion procedure or 2) MnO NPs were coated with phospholipid micelles. Based on transmission electron microscopy (TEM), dynamic light scattering (DLS), and Fourier transform infrared spectroscopy (FTIR), PLGA encapsulation resulted in smaller NP diameters. As smaller particles have a higher surface-area-to-volume ratio, they were expected to dissolve faster in low pH conditions. PLGA MnO NPs were incubated at three pHs over 24 hr including pH 7.4 (blood pH), 6.5 (pH of tumor extracellular space), and 5 (endosome/lysosome pH). Significant MRI contrast and reduced T1 values were only observed at pH 5, meaning that PLGA MnO NPs need to be targeted inside cancer cells to create a robust bright signal.

Funding: Federal Work Study, WVU Department of Chemical and Biomedical Engineering

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #19

The Impact of Vision Zero Initiatives on Cyclist Safety in New York City

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Civil Engineering

Despite modern safer vehicles, improved transportation infrastructure, advanced traffic signals, and safety countermeasures, more than 35,000 Americans die from traffic crashes every year. With the goal of reducing traffic fatalities to zero, New York City (NYC) adopted Vision Zero (VZ) in 2014 and has been deploying many initiatives aimed at increasing roadway safety. In order to evaluate the success of the VZ initiatives, NYC traffic fatality data was analyzed to measure the impact of VZ programs. Both motorist and pedestrian yearly fatalities declined after VZ initiatives, while cyclist yearly fatalities increased. This reveals that current VZ efforts to increase safety in New York City are not effective for safety of cyclists. The potential reason could be inadequate facilities/initiatives to accommodate bicycle travel (e.g., narrow bike lanes, unsafe turns for cyclists, drivers’ underestimating the safety of cyclists). As a result, a comprehensive assessment of VZ initiatives’ effectiveness to improve cyclist safety is critical for its success. Using NYC Vision Zero spatial data (e.g., bicycle crash data, bike priority areas, enhanced crossings, street improvement corridors and crossings, neighborhood slow zones, presence of bike lane), a difference-in-difference method will be applied to the treatment and control areas with before and after VZ implementation statistics to evaluate the effectiveness of VZ components to improve cyclist safety. Based on the findings of the analysis, potential safety initiatives and policy suggestions will be developed to improve cyclist safety in NYC.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #20

Investigating Visual Information Retention in Autism Spectrum Disorder

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Biomedical engineering

Humans by nature are social beings, constantly interacting with others. Visual attention is critical to the early development of language and communication skills and also influences our thoughts, decisions, memory, and actions. However, people with autism spectrum disorder (ASD) tend to show profound impairments in visual attention, especially to social stimuli. To further study the difference in visual attention for individuals with ASD and neurotypical people, our lab utilizes real-time eye tracking. We incorporate the well-documented OSIE dataset of over 5000 annotated objects across 700 unique images. In addition to recording the movement of the eyes, a simple memory task is incorporated after every image presentation to assess whether the participant remembers viewing the presented image. The images are presented across both a learning and recognition session, separated by 15 minutes, in which certain images can be viewed a total of one, two or even three times. The results of this new experiment will help us determine not only how the images are viewed but also how memory can affect these visual patterns. Normally, those with ASD tend to experience difficulties with memory and remembering information. For this reason, we expect to see a significant difference in the number of images an individual with ASD will recall when compared to controls.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #21

Exploring the Limitations and Development of Long Term Robotics

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Mechanical and Aerospace Engineering

This research project explored the development of long-term robotics through the construction and testing of a robot that can work for several hours or days. The purpose of the project was to explore the limits of a long-running robot, mainly pertaining to sensory development and independent operating time without having to recharge or stop in any way. The research that is being conducted is important in the development of robotics, as over the years we have seen robots take a bigger role and as they transition into longer times of service they will need to adapt in order to make sure that they are not a liability but an asset. The project was conducted upon an iRobot Create. Throughout the course of the project, the robot was upgraded to have better sensors, in order to give it the capability to effectively scan and map a large environment. The data that would be gathered by the robot’s sensors would then be used to give the robot a good amount of data on the environment, which can be used to navigate the robot throughout different spaces. Up to this point, we have upgraded the sensors and hardware of the robot to increase capabilities. We have also been working on simulations for the robot in ROS and Gazebo so that we can test out code in real time. This project is far from over, as in the future the project will continue by testing out battery supply, hardware upgrades, and software development.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #22

Electrophoresis Study for DNA Fragmentation in a Microfluidic Chip

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Chemistry

Biological testing efficiency has become increasingly important as researchers begin to address the need of quicker and simpler testing methods. Bulky and expensive machinery limits the reach of the laboratory, but smaller, more cost-effective testing devices can reach a wider population (creating an emphasis in point-of-care diagnostics). However, no method is effective if the results obtained are unclear or invalid. My research this semester is focused on working with Dr. Peng Li's research group in their endeavor to fragment DNA through a sharp-tip vibrating capillary. To validate the effectiveness of the fragmentation, gel electrophoresis is used to measure fragment size. By learning the different elements of gel electrophoresis and through experimentation, we were able to optimize the gel electrophoresis to give clear measurements that can test the Li group’s method of fragmentation. By studying various analytical techniques the research group uses, I am able to learn about the functions of the lab and the process the group uses to enhance and create biological testing technology.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #23

**Studies of Organic Transformations Using Operando Spectroscopy and
Computational Chemistry**

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Chemistry

Modern synthetic chemistry development is guided by understanding the specific details of the chemical transformation. The RAP experience has offered opportunities to learn how to use experiment and computation to better understand chemical reactions and structural changes.

Acid-catalyzed esterification reactions were studied using in situ infrared spectroscopy. The impact of sulfuric acid catalyst was assessed by observing reaction progress. Through subsequent data analysis, kinetic parameters and the rate law were determined. A collaboration with the Wang group provided an opportunity to use computational chemistry to understand a new macrocyclic organic molecule prepared in their laboratory. They observed by ¹H NMR spectroscopy that the macrocycle composed of two 2,7-dibromophenanthrene (DBPhen) and two dibenzylamine linkages adopted a single stable conformation at room temperature in which the DBPhen units adopt unique, fixed geometries. At higher temperatures (ca. 90°C) the PBPhen units interconvert between the 2 planes freely with observed coalescence of NMR signals. To understand this temperature-dependent behavior, computational studies were performed with Gaussian 19 on the WVU Thorny Flat high-performance computing cluster. Calculations revealed key details that help to explain the temperature dependent behavior, including energetically favored macrocycle conformations and the interconversion reaction pathway (likely and improbable transition states).

Funding: NSF CAREER (BVP) CHE-1752986

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #24

**Using StraboTools for Compaction Gradients in Continuous Miocene-Modern
Fine-Grained Volcaniclastic Successions, IODP Site U1437**

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Broad category: Physical Sciences & Engineering (Poster Presentation)

Presenter’s major: Geology

The IODP Expedition 350 recovered 1,800-m thick drill cores of volcaniclastic sediments from the Izu-Bonin rear arc (IODP Site U1437) in Japan. These deep ocean volcanic ashes and muds serve as a valuable record to study compaction gradients as they relate to the process of lithification and diagenesis. The core deposits are fragile, being especially soft in the upper 400-m areas. Because of this, the methods used to extract and segment the cores for thin sections may have disturbed the material. Initial naked-eye observations have attempted to account for any changes and deformations in the fabric of the cores resulting from manual manipulation. These observations were followed by a more quantitative analysis. StraboTools is a geologic app used in this study to identify deformations, striations, and other strain markers. By taking photos of thin sections and uploading them to the app, the app’s Edge Fabric tool placed an ellipse with a circle in the middle around deformations. To prepare the thin sections for the app, images of the 1,800-m cores were divided into segments, then were cropped into subsections. These subsections were uploaded to StraboTools where they were screen captured with the measurements made by the app. Each subsection was reassembled back to their segments. This is the current stage where this research lies. After data collection is complete, the data will be combined with initial observations to derive compaction gradients. These gradients will be used to understand the rates at which volcanic sediment lithification occurs.

Funding: Louis-Stokes Alliance for Minority Participation (LSAMP)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #25

Coaching Palliative Home Care for Family Caregivers of Heart Failure Patients

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Nursing

Heart failure (HF) afflicts 6.5 million Americans with devastating consequences to patients and their family caregivers especially during severe symptoms in the advanced stage (NYHA III or IV). West Virginia has the highest HF death rates in the U.S. HF patients and their caregivers in rural settings lack sufficient guidance for managing HF symptoms at home. The goal of home palliative care for HF is to help patients live better by relieving major symptoms (breathlessness, fatigue, depression and/or anxiety) and improving quality of life (QoL). Palliative care can be provided along with routine HF treatment, regardless of the stage of illness. Studies show that when patients and family members are educated about the typical progression of their symptoms and in-home treatment options, patients have less depression and anxiety and are less likely to readmit to the hospital. The overall objective of this clinical trial study is to test whether the nurse-led palliative home care coaching intervention (FamPALcare) will improve home health outcomes for advanced HF at the 6-month follow up. Standard care patients have been receiving routine HF care while, FamPALcare patients received standard care and 5-weekly coaching sessions in managing the HF symptoms and discuss selecting HF specific treatment options based on their preferences. Outcomes include improving QoL for patients and their families and decreasing unwarranted hospitalizations, improving quality of life for patients and their families. Students have opportunity to engage in the research process. This presentation is a continuation of research presented in the Spring of 2020 symposium.

Funding: Federal Work Study, National Institute Of General Medical Sciences (NIGMS) and National Institute Of Nursing Research (NINR)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #26

Targeting Immune Checkpoint Inhibitors to Cell-Surface Markers on Tumors

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Chemistry

Immune checkpoints consist of regulatory and inhibitory pathways that maintain the immune system’s ability to recognize self-produced antigens as nonthreatening and regulate the immune response. These pathways allow the immune system to respond to infection and cancerous cells. In cancer patients, negative T cell regulatory pathways are activated by malignant cells and anti-tumor immune responses are inhibited, allowing cancer cells to grow and spread throughout the body. Numerous research studies have been conducted on targeted immune checkpoint therapy to treat cancer and many have been approved for use in treatments, most commonly the use of inhibitors targeting cytotoxic T-lymphocyte antigen 4 (CTLA-4) and programmed cell death-1 (PD-1). Immune checkpoint inhibitors block these pathways to enhance the body’s immune response against cancerous cells but can also cause adverse effects and increase the toxicity of the system. Most of the current immune checkpoint inhibitor therapies are not tumor targeted. Targeting the immune checkpoint inhibitor to cell-surface markers on the tumor should concentrate the conjugate in the microenvironment of the tumor and enhance the immune response in the tumor while reducing the dosages of treatment needed, resulting in overall lower systemic toxicity.

Funding: WVU HSC Bridge Funding Grant

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #27

Effect of Arch Characteristics on Pain in Recreational Runners

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Exercise Physiology

With the growing popularity of distance running, injury rates of the lower extremity are becoming increasingly common in recreational runners. It is known that foot structure influences foot function, which indicates arch structure and arch rigidity may play a role in injury susceptibility; however, no clear relationship exists between arch height index (AHI), arch rigidity index (ARI), and running-induced pain. The PURPOSE of this study was to examine self-reported pain in the lower limbs in recreational runners with various AHIs and ARIs. METHODS: Following consent, 49 experienced runners completed a visual analog scale (VAS) about pain in five common sites: knee, ankle, calf, shin, and foot. AHI was categorized as high, normal, and low. ARI was categorized as rigid, normal, and flexible. A series of 2-factor chi-square analyses determined if AHI-type was related to overall and site specific pain ($\alpha=0.05$). Additional analyses determined if ARI-type was related to pain ($\alpha=0.05$). RESULTS: Approximately half of the subjects reported pain in at least one location. No significant differences were found between arch height and lower limb pain and arch rigidity and lower limb pain. CONCLUSIONS: Results for site-specific pain in runners with high/low or flexible/rigid arches are inconclusive.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #28

Accountable Health Communities: Addressing Social Needs

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Biomedical Engineering

Purpose: The purpose of this study was to evaluate the Accountable Health Communities Model implementation at an Awardee organization in West Virginia. **Methods:** The Model requirements consisted of screening emergency room patients in-visit for core health-related social needs (housing stability and quality, utility needs, food security, transportation, and personal safety) and supplemental needs (physical and emotional disability). Patients were eligible to participate if they were considered community-dwelling Medicare, Medicaid, or CHIP beneficiaries. Beneficiaries who screened positive for one or more core needs and had visited the emergency room twice in the past twelve months were considered high-risk. 30% of the high-risk beneficiaries were randomized into the control group, 70% into the intervention group. The control group received a Community Resource Summary (CRS) containing personalized referrals to community resources. The intervention group was sent a CRS and contacted by a navigator who assisted them in addressing identified needs. **Results:** Of the 265 eligible beneficiaries screened from January 2019 to April 2020, 59 were considered high-risk. The most common need cited was reliable transportation. Lack of housing/poor housing conditions and food shortages were the next most common. At the end of this evaluation period, 58% of identified needs were resolved in navigation cases, 29% of cases remained open, 10% were unresolved, and 3% of needs were identified by clients who could not be reached. **Conclusions:** This implementation of the Accountable Health Communities Model successfully identified high-risk patients, allowing future studies to analyze the patterns of beneficiaries’ cited needs.

Funding: U.S. Department of Health & Human Services, Centers for Medicare & Medicaid Services

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course and Partners in Health Network

Presentation #29

**The Effect of Statewide Legislation on Narcotics Prescribing in the Lower
Orthopedic Trauma Patient**

**Connie DeLa'O, MD, Michelle Braemer, MD, David Hubbard, MD, Julie Glener, MD, Christina
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Broad category: Health Sciences (Poster Presentation)

Presenter's major: Biology

On June 7, 2018, the Opioid Reduction Act was passed into law in West Virginia in order to combat the state's opioid epidemic. The law intended to limit the ability of healthcare practitioners to overprescribe opioids by setting restrictions on the amount of medication, number of refills, and duration of supply they are allowed to prescribe. Additionally, it required prescribers to discuss the inherent risk of addiction in taking opioids with patients. This research sought to determine the effect of this law on prescribing patterns in the lower trauma injury population at Ruby Memorial Hospital in West Virginia. If this law was effective in inhibiting the prescribing of refillable opioid prescriptions in these trauma patients, and the prescription patterns before and after the law was passed were compared, then the amount of prescribed and refilled prescriptions will have decreased after the law was passed in 2018. This study is conducted through retrospective chart review of an ACS verified level I trauma center including a population of trauma patients who were admitted prior to and after the implementation of the Opioid Reduction Act. For all patients in the study, a multi-state board of pharmacy report was obtained, as well as data on opioid prescriptions filled 3 months prior to admission and other contextual data. This data was compared using t-tests and chi-square analysis to determine if a significant change in opioid prescribing patterns occurred. Though this study has not yet been concluded and data are currently being collected, the results will be significant as they indicate whether the enactment of the Opioid Reduction Act successfully reduced opioid prescriptions in the state of West Virginia.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #30

The Effects of Chronic Feed Restriction on KNDy Neurons in the Ovine Hypothalamus

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Biomedical Engineering

Undernutrition has a negative impact on reproduction in several species. The neural mechanisms whereby food restriction suppresses fertility are not completely known. Neurons located in the arcuate nucleus of the hypothalamus that coexpress kisspeptin, neurokinin B (NKB), and dynorphin (i.e. KNDy neurons), are critical for the secretion of gonadotrophin releasing hormone (GnRH), a decapeptide that directly controls reproduction. Kisspeptin and NKB stimulate GnRH release, thus this study will test the hypothesis that reductions in GnRH secretion that occur in response to chronic feed restriction will be associated with decreased expression of kisspeptin and NKB. Female lambs of about 6 months of age were assigned to either normal feed intake (n=8) or fed to lose 15%-20% of their body weight over 9 weeks (n=9) Animals were bled every two weeks to measure luteinizing hormone (LH) secretion as a peripheral surrogate of hypothalamic GnRH release. Hypothalami were then collected and are being assessed for kisspeptin and NKB cell numbers within the arcuate nucleus via immunocytochemistry. We predict to find reduced numbers of kisspeptin and NKB immunopositive neurons. These results would further support the idea that undernutrition inhibits reproduction through a reduction in stimulation of GnRH release by KNDy neurons. Metabolic changes have been documented to have a significant impact on the reproductive process. Results from this study will provide novel information on the neural pathways linking metabolism and reproduction

Funding: USDA

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #31

Characterization of Ventricular Volume in JNK Deficient Brains

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Chemical Engineer

The c-Jun N-terminal kinase (JNK) signaling cascade regulates cellular growth, death, and migration in the developing brain. Loss of JNK function is associated with several neurodevelopmental disorders, including autism spectrum disorder and schizophrenia, but the mechanisms leading to these brain disorders are unknown. To elucidate the roles of JNK signaling in mammalian forebrain development, our lab created a conditional triple knockout (cTKO) mouse model that conditionally removes *Jnk 1* from the *Dlx5/6* territory of *Jnk 2/3* double knockouts in order to completely eliminate JNK function in the ventral forebrain. Using this model, we have found evidence for structural malformations in the cTKO brain, including enlarged ventricles. In this study, we have developed a quantitative approach to measure ventricular volumes in order to determine the extent of hydrocephaly in JNK deficient brains. Whole heads from postnatal day 0 control and cTKO mice were scanned by microcomputed topography and 3D volumes were rendered in Seg3D. In order to segment the resulting images, the ventricular system was manually traced in the sagittal plane. After creating 3D masks of the ventricles, image scaling measurements were applied to calculate ventricular volumes. We are currently using this method to compare the overall ventricular volume, as well as individual compartment volumes of the lateral, third, and fourth ventricles, between genotypes. Our preliminary findings indicate that ventricular volumes are enlarged in cTKO brains. Overall, the results from this project will help define JNK’s role in brain development, which is important for elucidating the etiology of complex neurodevelopmental disorders.

Funding: NIH

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #32

**Comparison of Two Fetal Stem Cells in Proliferation, Trilineage Differentiation,
and Influence of Hypoxia**

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Chemical Engineering

Articular cartilage possesses a limited ability to self-repair. Although autologous chondrocyte implantation is an established method to treat cartilage defects, there are several limitations to this method. Thus, the continued study of cell therapies such as cartilage tissue engineering may provide a novel approach to regenerative medicine. Synovium-derived stem cells (SDSCs) provide a promising source for cartilage tissue engineering as they have been shown to display good chondrogenic potential and less hypertrophic differentiation than other mesenchymal stem cells. Nuclear pulposus cells (NPCs) may prove to be another approach to cartilage tissue engineering. In this study, we hypothesized that fetal SDSCs and fetal NPCs would possess distinct differentiation potential, particularly for chondrogenic differentiation, and a hypoxic environment would improve the chondrogenic potential of fetal stem cells. Human passage 3 fetal SDSCs and fetal NPCs were cultured via standard protocol on plastic flasks and evaluated for adipogenic, osteogenic, and chondrogenic potential, as well as proliferation capacity using flow cytometry. Hypoxia (5% O₂) environment was assessed for its influence on chondrogenic differentiation with normoxia (21% O₂) as a control. As the study is in progress, we expect that both fetal stem cells exhibit distinct differentiation capacity and hypoxia will improve chondrogenic capacity.

Funding: National Institute of Arthritis and Musculoskeletal and Skin Diseases

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #33

**Characterizing Cell Size-Colony Size Relationships in Heme Oxygenase Mutated
*Pseudomonas aeruginosa***

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Immunology and Medical Microbiology

Pseudomonas aeruginosa is among the leading Gram-negative organisms associated with nosocomial infections, responsible for a sizable amount of hospital-acquired pneumonia and urinary tract infections. The Centers for Disease Control and Prevention identified Gram-negative bacilli, such as *P. aeruginosa*, as a paramount threat to global health, citing the species’ high intrinsic rates of antibiotic-resistance. Currently, no vaccine exists for *P. aeruginosa*. As antimicrobial resistance continues to evolve, the need for a vaccine for this bacterium only increases. Our laboratory has an overarching goal of developing vaccines targeting bacterial acquisition of iron, a nutrient necessary for cellular and metabolic processes. We partnered with collaborators to examine the result of disrupted heme acquisition through the deletion of the heme oxygenase gene. The mutant strain did not infect as well as the parental strain and resulted in the formation of small colony variants during murine infection. The small colony variants did not grow as well as the parental strain, forming smaller colonies. We hypothesized that if the mutant strain formed smaller colonies and there was a relationship between cell size and colony size, then the mutant strain would yield smaller cells. Scanning electron microscopy allowed for the analysis of cells in both strains for comparison. Results indicate that the aforementioned hypothesis was not supported, as there was no relationship between cell size and colony size in heme oxygenase mutated *P. aeruginosa*. Further research can aid in identification of underlying causes for such results.

Funding: NIH

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #34

**Analysis of Circulating microRNAs Targeting DNA Methyltransferases As a
Predictor for Treatment Outcome**

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Immunology and Medical Microbiology

Epigenetic pathways can alter gene expression without modifications in the genetic code. These alterations occur naturally during aging but are also observed in cancers and other diseases. DNA methylation is mediated by DNA methyltransferases (DNMTs) which add methyl groups to 5’ carbons of cytosines at cytosine-guanine dinucleotide (CpG) within the gene promoter to inhibit transcription. DNMT-3A and -3B are de novo methyltransferases that mediate new methylation patterns, while DNMT-1 resides at the DNA replication fork and preserves methylation. microRNAs (miRNAs) are non-coding RNAs that silence mRNA targets. Dysregulation of miRNAs lead to altered levels of target mRNAs available for translation into proteins. We recently reported differences in circulating DNMT mRNAs isolated from patient plasma who were critically ill and non-septic, or varying severities of sepsis. We hypothesize that circulating levels of specific DNMT mRNAs can predict patient resiliency by transcriptionally regulating genes essential in recovery or regulate failure in treatment of cancer. We collected 10 mL whole blood from cancer patients with no previous radiation or chemotherapy. We isolated the leukocyte cellular compartment and total RNAs from the serum. cDNA was synthesized from this RNA pool, including mRNAs and miRNAs. We then performed qPCR analysis for miRNAs targeting DNMTs. We aim to correlate specific miRNA expression with patient outcomes, and confirm functionality using the RNA fraction for presence/absence of their target DNMT mRNAs in the patient-matched samples. Finally, we will use the cellular DNA fraction to confirm DNMT activity using bisulfite treatment analysis for global methylation and RNA-Seq for transcriptional gene regulation.

Funding: First2 Network, National Cancer Institute, WVCTSI (GM104942; West Virginia State Startup Funds) (T.D.E), NIH, and Ruby Distinguished Fellowship to (K.J.S).

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #35

Dim Light at Night Exacerbates Pain Associated with Chemotherapy

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Biology

Circadian rhythms are endogenous physiological processes that cycle across the 24-hour day with rhythms of approximately 24 hours. These rhythms are synchronized to precisely 24 hours by environmental cues, the primary of which is light during the day. Disruption of circadian rhythms by exposure to dim light at night (dLAN, ~5 lx) has been linked to a range of negative health effects, including peripheral and central inflammation and altered immune function. Our lab recently demonstrated that dLAN exposure exacerbates pain behavior in mice. Because of these findings, we sought to examine how dLAN may affect pain behavior associated with chemotherapy-induced peripheral neuropathy. We hypothesized that dLAN exacerbates pain behavior associated with chemotherapy induced neuropathy in mice. Female CFW mice received a 5-day injection regimen of either paclitaxel (2mg/kg/day) or vehicle and were placed in dark nights (LD) or dLAN conditions starting on the first night of injections. Pain behavior was assessed using three different assessments prior to and following treatment with chemotherapy. We observed that dLAN exacerbated the allodynia associated with paclitaxel treatment, but not warm and cold thermal challenges. Following behavioral testing, the periaqueductal gray (PAG) and rostral ventromedial medulla (RVM) were dissected for qRT-PCR analysis. This behavior was correlated with an observed upregulation of Il-6 expression in the RVM. These findings represent a crucial step in expanding our understanding of how disruption of circadian rhythms impacts pain. Further, our results suggest that future pain management strategies should consider the effects of disrupted circadian rhythms on patient outcomes.

Funding: NIH

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course, NIH

Presentation #36

Novel Compound Screening to Combat Huntingtin Protein Aggregation in a Transgenic *C. elegans* Model.

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Biochemistry

Huntington’s Disease (HD) is a progressive, neurodegenerative disorder currently affecting nearly 30,000 people in the United States, while another 200,000 are genetically predisposed to disease development. The average age of onset is around 30-50 years of age, with patients presenting clinical symptoms that include cognitive impairment, uncontrollable movements (chorea), behavioral disturbances, and dementia. Hallmark pathology of HD includes aggregation of the huntingtin protein (Htt) due to increased polyglutamine repeats. In HD, Htt proteins aggregate within the striatum, substantia nigra, varying layers of the cerebral cortex, hippocampus, cerebellum, and parts of the hypothalamus and thalamus. Htt aggregation increases brain oxidative stress, thus killing neurons and progressing the disease. While there is no cure for HD, this study aims to screen novel compounds using a transgenic *Caenorhabditis elegans* model of HD that expresses various lengths of the Htt protein, examining the effects of our compounds on lifespan, Htt aggregation, and neuronal death.

Funding: NIH

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course, NIH

Presentation #37

High-Risk Burden Predictors of One Year Mortality Following Transcatheter Aortic Valve Implantation

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Biomedical Engineering

Transcatheter Aortic Valve Replacement (TAVR) is a minimally invasive procedure designed to replace a damaged aortic valve, primarily due to Aortic Stenosis (AS). This procedure is considered a viable alternative for patients with intermediate to high risk of complications from a surgical aortic valve replacement. The objective of this research project is to evaluate the relationship of certain demographic and high-risk factors along with their association with one year mortality (all-cause) in patients who received a TAVR implant. Various parameters such as age, sex, pre-existing medical conditions, and history of cardiovascular illnesses were taken into consideration. In this retrospective research study, patients were divided into two categories: living and deceased. Then, correlations among the defined parameters between the two groups were determined using both relative risk and odds ratio. Preliminary results within the patient cohort showed that the odds of patient mortality were notably higher in the presence of high-risk factors such as prior aortic valve, prior stroke, and diabetes. Patients with an increased disease burden and high STS risk score also had an increased likelihood of 1-year mortality. Additionally, the data demonstrated that deceased patients spent nearly twice as many hours in the ICU, possibly due to increased post-procedural complications. These findings suggest that high-risk factors such as pre-existing medical conditions and history of cardiovascular illnesses can help predict mortality rates in patients. Next steps include conducting further analysis on the occurrence of other post-procedural outcomes such as stroke and aortic regurgitation between both patient cohorts.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #38

**Treatment of Severe Cervical Spondylodiscitis with Combined Anterior and
Posterior Surgical Instrumentation: Case Series**

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Exercise Physiology

Purpose: Cervical spondylodiscitis (CS) is a condition recognized for significant morbidity and disability. Surgical treatments vary based on the presence and extent of neurologic compromise and structural instability. Severe cases often require combined anterior and posterior (AP) surgical intervention. This case series describes one institution’s experience with treatment of CS with AP surgery. Methods: A retrospective chart review was performed to identify patients treated with AP surgery for cervical spine infection at Ruby Memorial Hospital between 2011 and 2019. Exclusion criteria included noninfectious etiologies and ages under 18. Demographics, comorbidities, lab results, surgical data, and the need for revision were collected for each patient. Descriptive statistics, logistic regression, and chi-square analysis were performed on the data. Results: Eighteen patients met inclusion criteria. The average age was 48.8 +/- 11.5 years. Eleven were male and seven were female. Eight patients actively used intravenous drugs, six had diabetes, and six had hepatitis C. Five patients required revision for prior surgeries: two for postoperative infection of cervical hardware and three for failed prior stand-alone anterior surgery. One patient with index AP surgery required revision for recurrent infection. Conclusion: CS is a complex condition affecting patients with multiple comorbidities. In this series, all AP operations demonstrated structural and neurological durability while three revisions of prior stand-alone anterior surgery were required. A more biomechanically stable construct at the index surgery may be preferable to prevent failure. More work is needed to compare risk factors for failure and specific outcomes of combined AP procedures for CS.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #39

Pediatric Azithromycin Prescriptions in a Healthcare System from 2016-2018

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Exercise Physiology

Background: In 2017, the Centers for Disease Control and Prevention (CDC) estimated that 30% of all antibiotics prescribed in outpatient clinics are unnecessary. Among those antibiotics being prescribed, azithromycin is one of the most commonly prescribed antibiotics, with children receiving more antibiotics than any other age group. Methods: We reviewed azithromycin prescribing data of children 0 to 19 years of age who visited West Virginia University (WVU) Health system between January 2016 and December 2018. The primary visit diagnosis associated with the visit was reviewed. Results: There were 29,983 visits identified during which antibiotics were prescribed during the study period and azithromycin was prescribed in 40.6% of those visits. There were 11,934 unique patients identified and only 26.5% of these patients were marked as allergic to penicillin (PCN) or amoxicillin. The age group of 11-19 years had the highest azithromycin prescription rate (38.7%) and the most common diagnosis for this group was pharyngitis. Acute otitis media (AOM) was the most common diagnosis (23.6%). Conclusion: Acute otitis media and pharyngitis accounted for almost half of the diagnoses associated with azithromycin prescriptions. Treatment guidelines for both conditions recommend PCN-based therapy as first-line treatment unless there is a history of PCN allergy. Only a quarter of the patients had allergy documented to PCN or amoxicillin and, therefore, azithromycin would be considered a suboptimal antimicrobial choice. These results provide us with a stewardship opportunity to nudge providers to select an appropriate antimicrobial based on diagnosis and history of allergy.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #40

Surgical Database: Creating a Tool for Research and Communication Between and Within Hospitals

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Broad category: Health Sciences (Poster Presentation)

Presenter's major: International Studies

In 2010 alone, 51.4 million inpatient procedures were performed in hospitals located in the United States. These procedures, most often falling under the category of general surgery, are essential to the health of society. However, there is no country-wide practice for databases concerning surgeries. Currently, hospitals are forced to create a database themselves if they want to utilize the tool that not only keeps track of surgeries performed in the hospital, but also allows them to conduct research more easily due to the digitized information already being sorted. This study was conducted by the surgical unit in Ruby Memorial Hospital in order to create a surgical database for all previous and current patients. First, the database itself had to be created using the program Redcap. Then criteria for each entry needed to be established, while also de-individualizing data and adhering to HIPPA rules. Data was then entered on a patient-by-patient basis, organized based on procedure and specialty. There are no current conclusions as the database is currently still undergoing development, but once up, it will make physicians' research run more smoothly. The creation of a surgical database is important, especially for a large hospital such as Ruby Memorial, because it allows doctors to notice problem areas within procedures, potential complications, and potential links between previous health issues and the need for certain procedures.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #41

**Combating Declines in Parkinson's and Alzheimer's Disease Through Recent
Neurological Technologies**

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Broad category: Health Sciences (Poster Presentation)

Presenter's major: Sports and Exercise Psychology

Nearly 1 in 6 of the world's population suffer from neurological disorders and have detrimental declines in brain function. Parkinson's Disease (PD), a disease that invades nerve cells in the basal ganglia and the substantia nigra, is one that commonly comes to mind. Most patients with PD experience shaking, stiffness, and balance and coordination problems, which gradually worsen over time. Alzheimer's (AD) is another common neurological disease that people experience. The disease is rooted in the hippocampus and can move into the cerebral cortex in later stages. These patients experience memory loss, challenges in problem solving, confusion, and difficulty in completing everyday tasks. Over time, the Rockefeller Neuroscience Institute (RNI) has developed, utilized and researched technologies that can help combat these mental and physical declines in patients. HumanTrak and DARI movement assessment technologies have showed progression in PD and other technologies like Dynavision have helped AD patients. HumanTrak uses a 3D camera with wearable inertial sensors to help assess movements of patients, while DARI movement uses a 3D kinematic and kinetic motion analysis without the use of sensors. Dynavision aids in combating perceptual motor decline by initiating brain fitness. It evaluates and trains visual, cognitive and motor functions. There have also been studies with the Oura Ring which monitors heart rate, movement, and temperature for example. Lastly, if these do not achieve the desired results, clinical procedures can be used as a last resort. These include a focused ultrasound treatments, transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS).

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #57

**Measuring Suicide as an Outcome in Psychotherapy Research for Adults with
Bipolar Disorder**

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Broad category: Health Sciences (Poster Presentation)

Presenter’s major: Public Health

Suicide is growing issue throughout the world and quickly becoming more and more a major public health crisis. According to the CDC, suicide rates have gone up an entire 30% from 1999-2016 which has brought more attention on being able to make treatment more accessible and effective. However, there is a certain group of people who are affected by suicide more than any other citizen which are those who suffer from bipolar disorder. Within this community people are often led to deal emotions and actions they can’t control. Throughout this study we were able to find the suicidality rates for people with bipolar disorder to see how common and serious the rate of suicide is. We reviewed articles from studies where the suicide rate for people with bipolar disorder was high, here we began to truly understand this issue at its core.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #42

Legal Opinions on Cannabis In West Virginia

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Sociology & Anthropology

High rates of incarceration for cannabis possession may be due to social misconceptions of the plant and its effects. To exemplify this disproportionate trend in criminal justice related to convicting cannabis-related crimes: In 2018, 46% of drug possession charges were for marijuana. This research assesses cannabis conceptions of legal professionals to determine how legal (1) practitioners understand the current legal precarity of the substance. Garnering a better understanding surrounding this plant, and bridging the gap between the public and academics, will involve interviewing legal professionals of West Virginia. The study’s research methods will involve conducting in-depth interviews and using thematic analysis and coding of those interviews. This process will provide a greater insight into West Virginia’s relationship to the legality of cannabis, coming directly from legal professionals who reside here. Gaining insights from this specific population is beneficial because they have first-hand experience and knowledge that the general public may not otherwise have access to. Understanding the reasons why cannabis may have such negative connotations and breaking down those misconceptions would aid in a better understanding of the plant and its potential benefits.j (1) Drug War Statistics (2018). Retrieved February 28, 2020, from <http://www.drugpolicy.org/issues/drug-war-statistics>).

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #42

Examining Patterns of Response From Parents on the Brief Child Abuse Potential Inventory (BCAP).

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Child Development and Family Studies

The issue of child abuse and maltreatment is one that faces many children around the world and in order to more effectively study it we need to examine the ways it is assessed. One way to examine this problem is by using measures such as the CAPI and the BCAP which both screen for potential child abuse risk. The Child Abuse Potential Inventory (CAPI) is a 160 item measure from which the 34 item Brief Child Abuse Potential Inventory (BCAP) developed. Because of the negative connotation surrounding the issue of child maltreatment both measures include a lie scale score which is used to indicate if participants respond in a way that replicates the answer they think is desired. This index however has only been explored in the CAPI and has not yet been examined in the BCAP. Since this pattern of “faking good” responses has the power to invalidate data and lessen the quality and utility of the measure, it is important that we take a closer look at these behaviors. This study examined 91 child-parent dyads from Sydney Australia and seeks to understand the rates of valid and invalid responding with the use of the BCAP. By studying the prevalence of these responses with this measure we seek to better understand both why parents engage in these behaviors as well as how to improve the utility of measures such as this one that rely on self reporting from parents in order to identify risk for child maltreatment.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #44

**Child Abuse and Perceived Stress in College Students: The Mediating Role of
Emotion Regulation**

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Psychology & Criminology

Adverse childhood experiences (ACEs) refer to the physical, emotional and sexual maltreatment children may experience. ACEs have been shown in multiple studies to be correlated with maladaptive outcomes across childhood and adulthood, including increased stress, depression and post-traumatic stress disorder. The current study sought to build on prior work by examining whether sub-optimal emotion regulation skills mediated the association between ACEs and perceived stress in college students at West Virginia University. We hypothesized that those experiencing more adversity would utilize more suppression and less reappraisal techniques to deal with emotions, ultimately leading to higher levels of perceived stress. The sample for the current study consisted of 769 (Mage = 18; 50% female) incoming students from the College Student Transition Study. ACEs were quantified by 15 questions assessing the presence of emotional, physical and sexual adversities during childhood. Emotion regulation was measured via the emotion regulation questionnaire utilizing mean scores for emotional suppression and reappraisal (Gross & John, 2003). Perceived stress was indexed by the perceived stress scale (Cohen, Kamarck & Mermelstein, 1983). Baseline analyses confirmed that adverse childhood experiences were significantly correlated with both suppression ($r = 0.11$; $p < .05$) and reappraisal ($r = -0.15$; $p < .05$) and perceived stress ($r = 0.38$; $p < .05$). Suppression ($r = 0.15$; $p < .05$) and reappraisal ($r = -0.40$; $p < .05$) were also significantly correlated with perceived stress. Initial analyses find support for a possible mechanistic role of adversity being associated with stress levels via emotional regulation strategies.

Funding: Federal Work Study, National Institute of General Medical Sciences

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #45

**Educating the Zoo-going Public: Using Nonhuman-animal Enrichment to Engage
and Educate the Public**

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Anthropology

Zoos use enrichment to add variety to nonhuman-animals’ lives and encourage interaction with their surrounding(s). The design of new enrichment focuses on maintaining nonhuman-animal safety while encouraging natural behaviors. Enrichment can range from physical objects to scents to visual stimuli. The qualifying feature of enrichment is that it must cause the nonhuman-animals to interact or react. As much as enrichment items are designed to spur reactions from nonhuman-animals, these items also encourage the public to interact with zoo exhibits. This study uses autoethnographic and zoological methods to examine the effect of enrichment on both humans (the zoo-going public) and nonhuman animals under human care. There is a knowledge gap among the zoo-going public. However, educating the public has become increasingly challenging because of the commodification of zoo attendance and a resulting expectation of entertainment. This study explores enrichment targeted on nonhuman-animal(s) as a convenient way of meeting the demand for entertainment while also engaging and educating the public. This study argues enrichment improves the lives of non-human animals’ under human care and contributes to reducing the knowledge gap among the zoo-going public.

Funding: WVU Honors College, Honors EXCEL Program

Program/mechanism supporting research/creative efforts: Honors EXCEL Program

Presentation #46

**Associations Between Parent Characteristics and Invalid Responses on the Brief
Child Abuse Potential Inventory**

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Psychology

Child abuse is an extensive problem, affecting millions worldwide (Stoltenborgh et al., 2015). It is critical to understand parent-level factors associated with child abuse potential to inform effective prevention strategies. The widely-used Brief Child Abuse Potential Inventory (BCAP; Ondersma et al., 2005), which identifies parents at risk for child abuse, produces a “faking-good” score that indicates patterns of socially desirable responding (i.e., lying). Parents’ responses are invalidated when this Lie score is elevated and have largely been excluded from current research. However, such responses identify a potentially critical subset of parents that may be at elevated risk for child abuse due to their efforts to portray themselves more positively. This study seeks to understand key aspects of parenting stress (i.e., from their parental role, perception of their child as difficult, and dysfunctional parent-child interactions) as they relate to differences between parents with valid and invalid BCAP responses. In a sample of 84 caregiver-child dyads, parents with invalidated profiles ($n = 43$) had significantly higher risk for child abuse ($p < .001$) than those with valid responses ($n = 41$). Parents involved in a larger treatment study completed the Parenting Stress Index (PSI; Abidin, 2012) and the BCAP during the pre-treatment assessment. This study examines the under-researched invalid responses on the BCAP and levels of parenting stress within this at-risk group of parents to further our understanding of why parents may respond in this way and to improve the utility of self-reported data on key parenting behaviors implicated in child abuse.

Funding: Not funded

Program/mechanism supporting research/creative efforts:

Presentation #47

PCIT for Children with Autism: Pre-Post Changes in Parenting Skills and Child Behavior

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Psychology

Autism spectrum disorder (ASD) affects approximately 1 in 54 children across the country (CDC, 2020). Among children with ASD, 25% have a comorbid disruptive behavior disorder (Kaat & Lecavilier, 2013). Parent-Child Interaction Therapy (PCIT) is an evidence-based treatment that aims to reduce disruptive behaviors in young children by improving the caregiver-child relationship and increasing child compliance (McNeil & Hembree-Kigin, 2010). Although originally designed to treat children with disruptive behavior disorders, PCIT has demonstrated effectiveness in treating a number of emotional and behavioral issues (Lieneman et al., 2017). In recent years, there has been a growing body of evidence that supports the use of PCIT with children on the autism spectrum (Masse et al., 2016). The current study seeks to contribute to the extant literature on PCIT for children with ASD by examining pre-post changes in parenting skills and child behavior among a community-based sample. The study sample consisted of 10 parents and their children, all of whom had a diagnosis of autism spectrum disorder and were referred to a community-based clinic for PCIT. Parenting skills, coded using the Dyadic Parent-Child Interaction Coding System (Eyberg et al., 2013) and parent-reported child disruptive behavior on the Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999) were measured at pre-treatment and post-treatment. Paired t-tests will be used to examine pre-post differences in parenting skills and disruptive behavior, and implications for treatment of disruptive behaviors in children with ASD will be discussed.

Funding: Not funded

Program/mechanism supporting research/creative efforts:

Presentation #48

**Childhood Frequency of Church Attendance Effects on Adulthood Scrupulosity
Scores**

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Immunology and Medical Microbiology

Approximately 2.2 million adults and half a million children suffer from Obsessive Compulsive Disorder (OCD) in the United States. OCD is a heterogenous disorder with many types of obsessions and compulsions. Religious OCD, also known as scrupulosity, is a subtype of OCD in which individuals are preoccupied with religious or moral issues like going to Hell, committing a sin, purity, and behaving morally. Current research suggests a positive correlation between symptoms of scrupulosity and negative views of God (e.g. viewing God as punishing, wrathful, fearsome, etc.). However, limited research exists on how early church attendance impacts adult symptoms of scrupulosity. The aim of the current study is to explore how differing frequencies of childhood church attendance impacts symptoms of scrupulosity in adulthood. Individuals for this study were recruited from Turkprime and were part of a larger study seeking to determine how thought-action fusion and scrupulosity symptoms were impacted by differing beliefs about God. We will be running linear regressions and exploratory moderated regression analyses to determine any correlation between the frequency of childhood church attendance and pious scores. Implications of the results will be discussed.

Funding: Psychology Department of WVU

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #49

A Comparison of Sensofar S Neox 3D Optical Profiler 2D and 3D Scans

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Broad category: Social & Behavioral Sciences (Poster Presentation)

Presenter’s major: Forensic and Investigative Science

The performance of a Sensofar Confocal Microscope will be tested using a set of cartridge cases fired from 42 Luger firearms of the 9 mm caliber. This microscope has the ability to take both 2D grayscale and 3D topography scans. Cartridge case scans are utilized in the discipline of firearm examination in forensic science because they can use the varying depths on a cartridge case to identify individualizing characteristics to make known match comparisons. According to the PCAST Report of 2016, firearm examination should not be admissible in court, due to the subjectivity of identifying the specific location and depths of subclass characteristics to be the same. Current technological advances in microscopes has allowed an increase in the ability to prove less subjective conclusions. This will allow firearm examination to have less false positives, leading to fewer incorrect convictions, and greater admissibility in court. In this study, ROC curves will be generated for each firearm in order to demonstrate the ability of each type of scan to make match to known-match comparisons. Scans will be cropped using MatLab, cropping out the firing pin impression to amplify the breech face. ROC curves and AUC characteristics will be compared in order to determine the true positive rate of success. It is believed that 3D scans will have a higher rate of success due to their ability to examine the entire breech face. It was found in past studies that 3D scans did have a higher success rate, indicated by a larger AUC and ROC ratio comparison. The 3D scans were also found to have a true positive increase, indicating less subjectivity and fewer false positives compared to manual comparison and 2D scans.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #50

**Inhibition of Neutrophil Extracellular Traps with Chloroquine Reduces Peritoneal
Metastatic Tumor Burden**

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Biology

Introduction: Neutrophil extracellular traps, a process in which neutrophils release the contents of their DNA, histones, granules into the circulatory system. They are mainly responsible for eliminating microorganisms that enter the body, engulfing organisms through a specific cell death process, and even initiating certain immune cell responses. NET’s have been involved in the finding of metastatic disease, via progression of cells throughout the circulatory system and becoming the leading cause of death in cancer patients and have yet to have been studied on why. Therefore, NET’s can have a therapeutic target in the formation of metastatic disease and can lead to the prevention of peritoneal carcinomatosis. Methods: Intra-peritoneal injects of murine colon cells were given to 8-week-old Black 6 wildtype mice, and at random selection they were chosen to receive chloroquine or normal drinking water. After a 2-week period the mice were then sacrificed and assessed for their peritoneal tumors. Blood was obtained via cardiac puncture, and murine pancreatic cancer cells were also observed. Plasma Cell free DNA was taken and measured using Quan-iT PicoGreen assay. Results: Peritoneal Tumor burden was markedly reduced with the chloroquine treatment. Peritoneal tumor burden was similarly reduced with the chloroquine treated Pancreatic cancer tumor injected mice as well. Plasma cF DNA was lighter in chloroquine treated mice. This is consistent in inhibition of Neutrophil Extracellular Traps. Discussion: Chloroquine reduces peritoneal metastatic disease along with reducing the circulating cell-free DNA, a marker of NET formation. Finding these provide evidence of the role of NETs in metastatic diseases and highlight a therapeutic target to reduce this peritoneal disease formation. Conclusion: Neutrophil Extracellular traps are going to continue to promote peritoneal metastatic disease by erupting and releasing their contents into the circulatory system. This is no doubt. In the future, we’d like to administer DNase 1, a phosphodiester responsible for eliminating a strand of RNA, to further prevent the formation of NETs.

Funding: American Cancer Society Institutional Research Grant

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #51

**Morphological Characterization of AHN's at the Level of Synaptic Partnership in
*Drosophila melanogaster***

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Broad category: Biological Sciences (Poster Presentation)

Presenter's major: Biology

A corollary discharge circuit (CDC) is a neural pathway from motor control centers to sensory and motor neuropil. CDCs have been observed in nearly every organism and sensory modality studied to date and typically function to disambiguate internally from externally derived stimulus sources in order to elicit an appropriate behavioral response to the environment. We have described a CDC in insects including *Drosophila melanogaster*. They are found in the prothoracic neuromere of the insect ventral nerve cord (VNC) and are called ascending histaminergic neurons (AHN's) because they are histamine immunoreactive and they ascend from the VNC to the brain. The goal of this project is to morphologically identify the AHNs in *Drosophila melanogaster* at the level of synaptic partnerships and identify pre and postsynaptic partners in the VNC. This is achieved through a serial section transmission-electron microscopy (ssEM) connectomics dataset, in which a reconstruction of the *Drosophila* VNC neurons can be generated in three-dimensional volumes to classify neurons by structure, as well as labeling of synaptic input and output and identification of up and downstream partners. Morphological characterization of neurons was achieved by elimination methods. We have now traced our AHNs and several synaptic partners in the prothoracic neuromere. Synaptic partners we traced from the synapse back then characterized as ascending, descending, local or afferent neurons based on specific morphological characteristics. Importantly, by identifying synaptic partners to the AHNs, we can then search Gal 4 driver line databases for functional studies of the relationships between the AHNs and specific partners.

Funding: Air Force Office of Scientific Research

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #52

**Identifying Physiological Factors and Genes Involved in *Saccharomyces Cerevisiae*
Susceptibility to Ricin-induced Apoptosis**

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Biochemistry

Ricin-mediated cell death is not well described. Ricin depurinates the ribosomal active site and reduces translation in all eukaryotic cells. How the ricin-damaged ribosomes are detected is unknown. Reduction of protein synthesis via ricin leads to apoptosis but other chemicals that inhibit protein synthesis do not. An unexpected reduction in the Unfolded Protein Response (UPR) occurs when cells are exposed to ricin. Reduction in the UPR from ricin could occur because ricin may have another target other than the ribosomal active site. Yeast expressing a version of ricin that cannot exit cells will be used to determine UPR by measuring splicing of HAC1 that changes in response to UPR. DTT, which reduces disulfide bonds and changes how proteins are folded, will be used as a control. Ricin-damaged ribosomes stop translation, and stall. An active ribosome that is loaded on the message later will crash into the stalled ribosome leading to a disome. This structure may be what induces apoptosis because damage could prevent disassembly of the stalled ribosome. Hel2 is a protein that ubiquitinates stalled ribosomes that occur normally so that ribosomal subunits can be recycled. These translation initiation factors bind the same location on the ribosome that ricin damages. I will determine if Hel2 can recognize ricin-damaged ribosomes by measuring the growth of yeast cells overexpressing Hel2 while simultaneously expressing ricin and compare them to wildtype yeast. Overall, it is expected that ricin will cause the UPR to be suppressed. While Hel2 overexpression will help cells survive ricin poisoning.

Funding: Not funded

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #53

Measures Taken by Oak and Maple Trees to Mitigate Drought in Temperate Forests

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Biology

Drought is an omnipresent threat for trees, forever looming and striking randomly. It is important to understand how droughts affect these trees so that measures can be taken to preserve them. Trees are a crucial method of climate change mitigation by being a major source of air purification. In order to better understand this a plastic canopy was created using some wooden frames and plastic that could be adjusted to simulate different levels of drought. The growth of the trees was measured with metal rings and root growth and counts were observed via plastic tubes going three feet underground near the tree. Leaf litter was collected and weighed to ascertain if the drought adversely affected the level of leaf litter. Roots were collected from these sites, they were dried, weighed, and run through a scanner to ascertain their diameter, the number of tips, and the crossings of the roots. A similar process was done with the leaf litter. The samples were separated into four groups. Maple and Oak trees were measured with a Treatment and Control collected from Tom’s Run Preserve in Morgantown, West Virginia. Over the course of three years from 2016-2019 and from May to November. This information is extremely important to understanding these tree’s ability to mitigate the effects of drought within their population. This can be learned from and extrapolated in order to better create plans to assist trees. It is important to make an effort to preserve trees and the habitats they create.

Funding: Federal Work Study

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #54

The diversity of tubulin post translational modification in the retinae

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Biochemistry

Post translational modifications (PTMs) increase the diversity of the cellular proteins and play a role in regulating their functions. Examples of protein PTMs are acetylation, detyrosination, and glutamylation. In protein glutamylation, as an instance, a family of enzymes called tyrosine ligase-Like (TLLs) adds glutamate to one of the glutamic residues in the target protein by, and a mutation in one of these enzymes called TLL5 causes blindness in humans. Tubulin protein is subject to different PTMs that modify its properties and its function. However, Tubulin PTMs in the retina is not well established and further research is needed to understand the role of tubulin PTMs in vision. My project aimed to investigate the levels of tubulin PTMs (glutamylation, detyrosination, acetylation) in a WT mouse retinae as a baseline step for future comparison with different mouse models that resembles human blindness.

Funding: Federal Work Study, National Institutes of Health (NIH)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297

Presentation #55

Wetland Soil Texture Analyses for Improved Understanding of Turtle Habitat and Distribution

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Wildlife and Fisheries Resources

Soil texture is one of the most important physical properties of soil because it determines the amount of water, air, and nutrients available for plant growth. This is determined by calculating the relative proportion of sand, silt, and clay within the soil. Wetland soil is differentiated from upland soils due to its water saturation to near or above the soil surface for a significant part of the year. This can lead to the limitations of oxygen diffusion deep in the soil. Different soil textures can influence wetland hydrology, vertebrate distribution, and the growth of plant species. Soil texture is essential in the evaluation of wetland conservation sites as native species are more likely to be found in clay soils and sandy soils can lead to the invasion of exotic species. We are interested in how soil texture influences habitat use and distribution of snapping turtles (*Chelydra serpentina*). However, different methods of soil particle analysis are used to determine soil texture and can vary in terms of accuracy and complexity. To investigate the variability between methods, soil samples from 39 wetlands in north-central West Virginia, will be collected and analyzed utilizing four different methods of soil particle analysis (i.e., sieve, hydrometer, jar measuring, and sieve-hydrometer methods). Soil type will be compared to the United States Department of Agriculture Web Soil Survey for additional comparison. This study will improve our understanding of levels of accuracy across different methods and determine if complexity is necessary to increase accuracy.

Funding: Davis College; George A. Myles Natural Resources Undergraduate Student Enhancement Grant; and the West Virginia University Natural History Museum

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course

Presentation #56

The effect of Dacitic Tuff Breccia (Azomite®) in Corn, Soybean, and DDGS Based Diets that Vary in Inorganic Phosphate Source on Mill Throughput and Pellet Quality

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Broad category: Biological Sciences (Poster Presentation)

Presenter’s major: Animal and Nutritional Sciences

My name is Emilee Fisher, and I am an Animal and Nutritional Sciences undergraduate student at West Virginia University. My research interests include the effects of nutrition in overall animal performance and how nutrition plays a huge role on the health and well-being of animals. My research covers the nutritional consequences of feed manufacturing on poultry production and performance. This research is important as improving feed manufacturing efficacy has a dramatic effect on increasing broiler performance and reducing the environmental impact of poultry feed manufacturing. Research in this field allows for high quality feed and expansion of the poultry industry. Research on manufacturing techniques is important as pellet quality and amino acid absorption are key factors in broiler performance and can be affected by poor manufacturing techniques. The feed additive dacitic tuff breccia (Azomite®) has been shown to improve bird size and improve throughput in feed mills. This study covers the effects of Azomite® in corn, soybean, and ddgs based diets that vary in inorganic phosphate source on mill throughput and pellet quality.

Funding: Louis Stokes Alliances for Minority Participation (LSAMP)

Program/mechanism supporting research/creative efforts: WVU's Research Apprenticeship Program (RAP) & accompanying HONR 297-level course