

THE SECOND ANNUAL

RESEARCH APPRENTICESHIP PROGRAM FALL SYMPOSIUM

NOVEMBER 18-19

2019

 West Virginia University
OFFICE OF UNDERGRADUATE RESEARCH



PRESENTATION INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Oral Sessions	
Monday November 18th, 6:30	
Oral Session I	Triggers of The Past Isaiah Hardy*, Radhica Ganapathy, Ph.D
Oral Session I	Social Media and the Relationship Zachary Hlatky*, Liesel Sharabi, Ph.D
Oral Session I	Children's Theatre; A Research Endeavor Peyton Bosley*, Michele Schmitz*
Tuesday November 19th, 6:30	
Oral Session II	Development of an electrochemical sensor for detecting naltrexone using screen-printed carbon electrodes Sara L. Kuberski*, Colby E. Ott, M.S., and Luis E. Arroyo, Ph.D.
Oral Session II	Assessment of the CCN4 Gene's Effect on Tumor Environment Alyssa Brashear*, Sarah Jenness*, Thomas Ogershok*, and David Klinke, PhD
Oral Session II	Trigger Warnings Riley Barriger, Dr. Radhica Ganapathy
Oral Session II	Economic Inequality, Downward Mobility, and the American Dream Sarah Ihlenfeld* and William Franko, Ph.D.
Poster Sessions	
Monday November 18th, 5:30 pm	
Poster 1	Anthropogenic Land Use Effects on Body Condition of Painted Turtles in West Virginia Danielle M. Canning*, Donald J. Brown, Ph.D, Joel L. Mota, Darien N. Lozon, Alissa L. Gulette, M.S., Thomas K. Pauley, Ph.D.
Poster 2	DNA Extraction, Amplification, and Analyzes from a Reintroduced Fisher (Pekania pennanti) Population Linsey A. Fain*, Caroline E. Harms, M.A., Amy Welsh, Ph.D.
Poster 3	Quantifications of IL-34 expression in the brain following ischemic stroke Jennifer R. Gillert*, Shokofeh Rahimpour, Wen Zheng, and Edwin C.K. Wan, PhD.
Poster 4	Association between social behavior and face responsiveness in autistic and healthy brains Savannah P. Hays*, Runnan Cao, Shuo Wang
Poster 5	The role of chronic stress on cerebrovascular function in obese mice. W. Jent*, E. Burrage, K. Marshall, M. Parsley, A. Tice, E. Aboaziza, A. Clay, JC Frisbee, E. Kelly, PD. Chantler
Poster 6	Generation of a Mammary Tumor Ghrelin KO using CRISPR Cas9 Raegan M. Kvadas*, William H. Walker II, Ph.D., James C. Walton, Ph.D., Randy J. Nelson, Ph.D., and A. Courtney DeVries, Ph.D.,
Poster 7	Potential Classification of Chemical Immunological Response Based on Gene Expression Profiles Caitlin Mickles*, Rachel Baur, Ewa Lukomska, Hillary L Shane, Lisa Weatherly, and Stacey E Anderson
Poster 8	Characterizing Sex-Specific Wigglesworthia Gene Expression in Tsetse Flies

PRESENTATION INDEX: 2019 2nd ANNUAL RAP Fall Symposium

	Dylan Richmond*, Miguel E. Medina, Rita V.M. Rio <i>Department of Biology, West Virginia University, Morgantown, WV 26505</i>
Poster 9	Gender Disparities in the Etiology and Treatment Outcomes of Stroke Wama Shaalan*, Amelia Adcock, M.D., and Jessica Frey, M.D.
Poster 10	Stomatal Responses to Drought Stress in Sugar Maple and Black Oak Molly Sherlock*, Dr. Brenden McNeil, Dr. Eddie Broztek
Poster 11	Role of Ghrelin in Metabolic Disruptions in Non-Metastatic Tumor-Bearing Mice Emma C. Speck*, William H. Walker II, Ph.D., James C. Walton, Ph.D., Randy J. Nelson, Ph.D., and A. Courtney DeVries, Ph.D.
Tuesday November 19th, 4:30 pm	
Poster 1	Examining dlx5/6 Expression in gsx1/2 Zebrafish Mutants Abreanne Andlinger*, Lexie R. Schmidt, Rebecca A. Coltigerone, Sadie A. Bergeron, Ph.D.
Poster 2	Sequencing of the Sex Determining Gene in Populus and Salix Lauren O. Barbee*, Lakyn R. Sanders, Stephen P. DiFazio
Poster 3	The Relationship Between Parental Warmth, Child Disclosure, and Adolescent Depression Cierra Bedard*, Sloane Strauss, M.A., Aaron Metzger, Ph.D.
Poster 4	Classifying Morphine Addiction And Naloxone-like Drug Effects in C. elegans Nour Foual*, Jacob Boos, Werner J. Geldenhuys, Ph.D.
Poster 5	Filament Formation of the Liver Isoform of Phosphofructokinase-1 Increases Enzyme Activity Katelyn E. Frock* and Bradley A. Webb
Poster 6	Picking favorites: Differential activation of phosphofructokinase-1 by biphosphorylated sugars Morgan J. Glass* and Bradley A. Webb, Ph.D.
Poster 7	Adherence to NCCN Guidelines for Genetic Testing of Appalachian Women with Epithelial Ovarian Cancer Kristen J. Hudgins*, Alaina M. Zappas, Deborah M. Moore, Megan R. Yoho, Kourtne R. Mcquillen, MD, Sijin Wen, PhD, and Valerie B. Galvan-Turner, MD
Poster 8	The Development of an Aquatic Reduced-Exertion High-Intensity Interval Training Exercise Protocol Olivia Naylor*, Anna Jenkins, Victoria Corsi BS, Miriam Leary PhD, Lori Sherlock EdD
Poster 10	Coronary Artery Risk Detection In Appalachian Communities Katherine Sauvageot*, Sam Zizzi*, Eloise Elliott*
Poster 11	Varying Oleylamine :Dibenzyl Ether Ratio for Fine-Tuning Manganese Oxide Nanoparticle Diameter and Controlled Release Celia Martinez de la Torre, Jenna Vito*, Alexander Pueschel, Margaret Bennewitz, Ph.D.
Tuesday November 19th, 5:30 pm	
Poster 1	Variations of the Fibularis Quartus – Review of Variants and a Rare Discovery of the Fibulotalocalcaneus (Peroneotalocalcaneus) Muscle.

PRESENTATION INDEX: 2019 2nd ANNUAL RAP Fall Symposium

	Allison Angilello*, Jesse Burkett, H. Wayne Lambert
Poster 2	Enzyme Immobilization Within a Hyaluronic Acid Matrix Jackie R. Arnold*, Madewa V. Adeniyi*, Jordan S. Chapman, B.S., Cerasela Zoica Dinu, Ph.D.
Poster 3	Identifying Ancient Trees Using the Law of Superposition Kayla Bailey*, Shawn Cockrell, M.A., Amy Hessel, Ph.D.
Poster 4	Peregrination: The Pilgrim's Long and Winding Road Grace Belknap*, Janet Snyder, Ph.D.
Poster 5	Effects of High-Fat Diet on Traumatic Brain Injury Deficits Alyssa Blancke*, Michelle Frankot, Bryan Rodriguez, and Cole Vonder Haar, Ph.D.
Poster 6	Morphological and Physiological Responses to Drought Stress in Sorghum bicolor Emmelia J. Braun*, Melissa A. Lehrer, and Jennifer S. Hawkins
Poster 7	LKB1 Negatively Regulates MHC class I Gene Expression in Astrocytoma Cells Rylee N. Cisney * and Gordon Meares, Ph.D.
Poster 8	Baseline IMPACT Testing for College Hockey Athletes Amanda Acord-Vira, EdD, OTR/L; Diana Davis, PhD, OTR/L; Camille Flamm*
Poster 9	Active Learning: Why is this effective teaching technique not used more often? Olga Hawranick*, Vicki Sealey, Nicole Engelke, Lori Ogden, and Keith Gallagher
Poster 10	Effects of Prenatal and Early Childhood Interventions on Low SES Families Erin McGowan*, Amy Root, Ph.D.
Poster 11	Total Land Disturbance and Energy Output of Wind Turbines in the Appalachian Region Sofia Nunez*, Shawn Grushecky, Ph. D.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Oral Session I:

Triggers of The Past

Isaiah Hardy*, Radhica Ganapathy, Ph.D

College of Creative Arts, West Virginia University, Morgantown, WV 26505

When attending an event such as a play, musical, or anything dealing with the stage, people often get caught up in the whimsical nature of it all. Others, however, view it as an uncertain place where the unexpected may happen at any moment, good or bad. From this raises the important question of knowing: do people want to be warned in advance about possible triggering material, if so what are these warnings made up off, how may they be defined. This is where my research begins, Trigger Warnings. My job, through the use and annotations of David Leser's women men & the whole damn thing was to take on the topic trigger(s) of sexual content: use, abuse, power struggle, sexism, all these by breaking down the history of women's inequality and taking a detailed look at the hash tag #MeToo movement. To further our understanding we aim to break down all that defines what a warning truly is composed of.

Oral Session I:

Social Media and the Relationship

Zachary Hlatky*, Liesel Sharabi, Ph.D

Communication Studies Department, West Virginia University, Morgantown, WV 26505

The internet, and more specifically social media, has become increasingly intertwined with the dating process. The purpose of this study is to find if there are standardized trends across couples in relationships and their posting habits on Instagram. A secondary goal for the research was later introduced and is now being explored, and that is seeing whether couples, Instagram posting habits can be indicative of how their relationship will turn out in the near future. Participants signed up in pairs, one person and their significant other. Participants, signed up as couples, were interviewed together and individually about their Instagram posting habits as well as the state of their relationship, then recent posts as well as each individual's profile picture were collected from their personal Instagram profiles for analysis. After six months and initial analysis of the interview and collected posts, a second interview was conducted to gauge how the relationship stands after that short time. These secondary interviews are ongoing.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Oral Session I:

Children's Theatre; A Research Endeavor

Peyton Bosley*, Michele Schmitz*

School of Theatre and Dance, West Virginia University, Morgantown, WV 26506

Working in Children's Theatre, albeit providing me with a large learning curve with all things administrative and secretarial, does not prove to be able to be simmered into a research question of what is to come. Overall, as employees of WVU's Children's Theatre, we seek to transform the youth of our program by focusing on skills that are beneficial in and outside of the world of performing arts. First beginning with audition workshops, moving to actual auditions, and continuing through the casting and rehearsal process all the way to closing night, the youth in the program will have accomplished much in the realms of time management, team work, and their performances themselves. So far, we have completed our audition etiquette workshops, auditions themselves, and the casting process. We are now in the beginning stages of helping each child become comfortable in their role so that they are able to personalize them. As Producing Director, my job is to ensure the program is running as efficiently and as organized as possible. This means I, along with my Co-Producing Director, help to keep parents informed with weekly newsletters and ensuring all vital information (emergency forms, contact information, and room schedules) are kept neatly in a database we created for easy access. The purpose of our job, and what we hope will come of it, is a standardization of the program's inner-workings so that it will be easily taken over.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Oral Session II:

Development of an electrochemical sensor for detecting naltrexone using screen-printed carbon electrodes

Sara L. Kuberski*, Colby E. Ott, M.S., and Luis E. Arroyo, Ph.D.

Department of Forensic and Investigative Science, West Virginia University, Morgantown, WV, 26506

The opioid crisis continues to be a major problem across the United States, making the effective treatment of opioid addiction highly important. Naltrexone is a medication that can be used to treat opioid addiction, as well as to help patients overcome alcohol dependence. As such, the ability to measure and monitor the concentration of this drug is important to increase the chance of treatment success and ensure patient compliance. Therefore, the goal of this work was to develop an electrochemical method that facilitates its detection. Electrochemical techniques were selected for this application because they are fast, inexpensive, and can be used for point-of-care (POC) devices. Additionally, screen-printed carbon electrodes (SPCEs) were used because they are small and disposable. The optimal buffer was found to be Britton-Robinson buffer with a pH of 7. Naltrexone demonstrated electroactivity, exhibiting two distinct oxidation peaks in this environment: one at +0.45 V and one at +0.86 V. Square-wave voltammetry (SWV) was optimized and used for detection. Calibration curves were constructed in triplicate over the linear range of 0.50 $\mu\text{g/mL}$ to 10 $\mu\text{g/mL}$ ($R^2=0.9975$). The limit of detection (LOD) was calculated to be 0.24 $\mu\text{g/mL}$. The sensor will be adapted for detection of naltrexone in oral fluid.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Oral Session II:

Assessment of the CCN4 Gene's Effect on Tumor Environment

Alyssa Brashear*, Sarah Jenness*, Thomas Ogershok*, and David Klinke, PhD
*Department of Microbiology, Immunology, and Cell Biology, West Virginia University,
Morgantown, WV 26506*

According to the American Cancer Society, approximately one third of all U.S. citizens will develop cancer during their lifetime and many of those diagnoses end fatally, so the overall goal is to use the findings of this study to improve upon the treatment of cancer. There are a multitude of factors that determine the outcome of any given cancer case. This study in particular is focusing on the CCN4 (cellular communication network factor 4) gene and its role in cancer. Previous studies have shown that the presence of CCN4 is associated with increased rates of metastasis, or the development of a secondary malignant growth away from the primary cancer site. Cyclic immunofluorescence is used to analyze tumor samples from mice that are wild-type (containing CCN4) or knockout (lacking CCN4). This process works by using antibodies, which are Y-shaped proteins that recognize foreign targets, with attached fluorophores. The antibodies mark for specific proteins within a tissue sample and images can be taken and analyzed/compared. Results of this study are still pending, but more immune cells are expected in the knockout samples, and increased proliferation and metastasis is expected in the wild-type samples.

Oral Session II:

Trigger Warnings

Riley Barriger, Dr. Radhica Ganapathy
College of Creative Arts, West Virginia University, Morgantown, WV 26505

Trigger warnings are something that are seen at the beginning of any form of media that may cause offense or problems within someone. Live theatre is something that uses trigger warnings because of the different topics that are touched within theatre. Some of them include but are not limited to: violence, rape, gun shots, etc. A constant question within trigger warnings is that how much is too much and do they actually help the audience understand the severity of the situation they are about to witness. We are looking to understand and answer these questions with surveys that help students understand what a trigger warning is and how much is too much. We plan to look at different types of students and how that impacts their results. Something that is likely to produce is that someone from a theatre background would desire less of a trigger warning than someone that comes from a stem background. With these answers we will be able to future warn and advertise what content will be in the production put on by WVU and if they are too intense for our current student demographic.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Economic Inequality, Downward Mobility, and the American Dream

Sarah Ihlenfeld* and William Franko, Ph.D.

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

The American Dream - the idea that anyone can come to the United States, work hard, and be successful - has been a principle at the core of the country since its founding, but during a time in which inequality is increasing and prospects for upward economic mobility are decreasing, one wonders whether belief in the American Dream has been affected. This research examines how experiences with economic mobility affect preferences for redistributive policy and belief in the American Dream. Previous research finds that belief that the American economy is one of equal opportunity causes people to be less supportive of redistribution. Specifically, this study tests whether movement up or down the income ladder from childhood to adulthood, intergenerational mobility, affects preferences for redistribution. In order to analyze this, previous survey data from sources such as the General Social Survey is examined to determine how information about intergenerational mobility is gathered, especially how to distinguish between relative and absolute mobility. The next step will be to conduct a pilot survey to gather data about people's economic situation as children compared to as adults as a measure of relative mobility, as well as information about preferences for redistribution. Eventually, this will be used to launch a larger survey of a nationally representative group of Americans. From this data, we expect to find that experiencing downward mobility increases support for redistribution and decreases belief in the American Dream.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Poster Session I:

DNA Extraction, Amplification, and Analyzes from a Reintroduced Fisher (*Pekania pennanti*) Population

Linsey A. Fain*, Caroline E. Harms, M.A., Amy Welsh, Ph.D.
*Davis College of Agriculture, Natural Resources and Design, West Virginia University,
Morgantown, WV 26505*

The Fisher (*Pekania pennanti*) is a mid-sized carnivorous mammal in the Mustelid family whom is native to North America. Throughout the 1800s into the mid-1900s fisher populations declined dramatically due to overharvest and habitat destruction. By 1920 Fisher were extirpated from West Virginia. During the winter of 1969 Fisher were reintroduced, since there have not been any studies completed to evaluate population diversity. When a reintroduction occurs, the species of concern is translocated and released in the historical range. In this study, we received hair and tissue samples from trappers around West Virginia with the help of the West Virginia Division of Natural Resources (WVDNR). The Qiagen DNeasy Blood & Tissue Kit was used to bind, wash and elute samples to provide a final DNA product. After performing polymerase chain reaction (PCR) the sample was sent to WVU Genomics Core Facility for sequencing. This allowed us to complete allele calls and evaluate population diversity compared to the source population from New Hampshire. Although this study is currently ongoing, it will provide wildlife biologist and managers with data to improve or alter current management implications and possibly harvest regulations.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

The role of chronic stress on cerebrovascular function in obese mice.

W. Jent*, E. Burrage, K. Marshall, M. Parsley, A. Tice, E. Aboaziza, A. Clay, JC Frisbee, E. Kelly, PD. Chantler

Department of Exercise Physiology, West Virginia University, Morgantown, WV 26505

Previous studies detail an association between chronic stress and cerebrovascular diseases such as Alzheimer, Ås disease and strokes. It has been determined that chronic stress reduces the function of cerebrovasculature in rats due to the increase of oxidative stress. However, the source of oxidative stress hasn, Åt been identified. For a total of 8 weeks, mice were subjected to chronic stress via the Unpredictable Chronic Mild Stress (UCMS) protocol with and without a xanthine oxidase inhibitor, febuxostat. After the completion of the chronic stress protocol, mice were euthanized and vascular function was analyzed using the middle cerebral arteries (MCA) via a pressure myography chamber. Additionally, Immunohistochemistry (IHC) staining was utilized to determine cytokine levels of the brain tissue. Dilation of the MCAs to acetylcholine, a vasodilator, decreased in UCMS mice compared to the controls. Furthermore, TNFCE±, a proinflammatory cytokine, increased 1000-fold supported by a decrease in anti-inflammatory phenotype of macrophages within the brain of UCMS vs. control mice. Chronic febuxostat treatment with UCMS prevented the impaired MCA dilation, and limited the change in the immunological profile of the brain. This suggests that xanthine oxidase plays a key role in the stress induced cerebrovascular dysfunction which could be potentially driven by an immune response.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Potential Classification of Chemical Immunological Response Based on Gene Expression Profiles

Caitlin Mickles*, Rachel Baur, Ewa Lukomska, Hillary L Shane, Lisa Weatherly, and Stacey E Anderson

Allergy and Clinical Immunology Branch, Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Morgantown, WV. 26505

Occupational allergic disease is a serious public health burden that can result in asthma and allergic contact dermatitis and is often a result of exposure to low molecular weight chemicals. The classification of chemical allergens has proven to be difficult since many agents can elicit multiple hypersensitivity pathways. Additionally, studies are also demonstrating a role for exposure to non-sensitizing chemicals such as adjuvants and irritants in allergic disease. However, the complete immunological mechanisms driving these responses are not fully understood. It is increasingly being recognized that the skin plays a major role in the development of allergy due to its complex immunological environment. Preliminary data from our lab and others have shown that cells in the skin can secrete a variety of cytokines and molecules in response to chemical exposure, supporting an important role in immunological responses.

For these studies, BALB/c mice were dermally exposed to representative chemicals (sensitizers, irritants, adjuvants) and the changes in gene expression of cytokines and cellular mediators were evaluated in skin, draining lymph nodes, lung and blood over a period of 7 days. Results identified unique gene expression profiles for select cytokines and molecular mediators. In order to further the development of preventative and therapeutic strategies to combat allergic disease, the underlying mechanisms must be fully understood. Defining unique gene expression profiles could allow us to narrow in on immunological pathways to help with the identification and classification of chemical allergens while optimistically leading to the discovery of novel mediators.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Anthropogenic Land Use Effects on Body Condition of Painted Turtles in West Virginia

Danielle M. Canning*, Donald J. Brown, Ph.D, Joel L. Mota, Darien N. Lozon, Alissa L. Gulette, M.S., Thomas K. Pauley, Ph.D.

School of Natural Resources, West Virginia University, Morgantown, WV 26506

Anthropogenic land use change is often accompanied by landscape-scale alterations with broad impacts on biological diversity, resulting in species winners and losers. Natural landscapes in West Virginia have been modified to support human population growth and prosperity through development of agricultural systems, resource extraction, and creation of infrastructure to support residential and commercial needs. Common effects of anthropogenic land use change include loss of natural vegetation communities (e.g., deforestation), and increased nutrient loading in aquatic ecosystems. However, land use change can also result in new habitat for wildlife species, such as creation of ponds to decorate and provide services on working and recreational lands. On the spectrum of habitat generalists and synanthropic species to sensitive habitat specialists, the painted turtle (*Chrysemys picta*) is a habitat generalist. Thus, we would expect this species to be adaptive and successful in human-dominated landscapes. Our objective was to test this hypothesis by determining whether body condition of painted turtles occupying streams and wetlands in West Virginia is influenced by surrounding land condition and road density. Analyses indicate a negative correlation between BCI and road density, and a positive correlation between BCI and surrounding landscape condition. These results do not support our hypothesis, and suggest that painted turtles have a higher energetic state when surrounding land is less disturbed. Our results indicate that while habitat generalists and synanthropic species are more common in human-dominated landscapes, these environments may be suboptimal for health of individuals.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Characterizing Sex-Specific *Wigglesworthia* Gene Expression in Tsetse Flies

Dylan Richmond*, Miguel E. Medina, Rita V.M. Rio

Department of Biology, West Virginia University, Morgantown, WV 26505

Tsetse flies are the main vector for Human African trypanosomiasis, also known as sleeping sickness. Usually 10,000 new cases arise each year, but many more go unreported. Tsetse flies feed on blood and can transmit trypanosomes through their saliva in the process. The primary bacterial endosymbiont of tsetse flies, *Wigglesworthia glossinidia*, provides crucial B vitamins that are absent from the flies' blood meal, and are necessary for growth, reproduction, and vector competence. Because it is an essential component of tsetse fitness, *Wigglesworthia* symbionts are passed from mother to offspring during uterine development, which is called vertical transmission. Specifically, *W. glossinidia* is transmitted through the milk glands which provides nutrition and seeds the microbiota to developing offspring. We expect *Wigglesworthia* to have a higher expression of certain metabolic genes due to the mother's role in offspring development. We are interested in quantifying the expression of specific *Wigglesworthia* genes from male and female teneral flies by using reverse transcription and quantitative PCR. Preliminary data from Illumina sequencing has shown differential expression of *Wigglesworthia* genes in male and female tsetse flies. This data is verified by quantitative PCR of our genes of interest: *bioA*, *bioD*, *purF*, and *fliA*, which were standardized to the housekeeping gene, *gapDH*. The *bioA*, *bioD*, *purF*, and *gapDH* genes are essential in various metabolic contexts. The *fliA* gene has a role in flagella synthesis, which is hypothesized to play an essential role in the critical vertical transmission of this important member of the microbiota.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Quantifications of IL-34 expression in the brain following ischemic stroke

Jennifer R. Gillert*, Shokofeh Rahimpour, Wen Zheng, and Edwin C.K. Wan, PhD.
Department of Microbiology, Immunology, and Cell Biology; Department of Neuroscience. West Virginia University School of Medicine, Morgantown, WV 26505

Ischemic stroke occurs when blood supply to the brain is blocked, causing brain cells to die within minutes, due to the temporary shortage of oxygen and nutrients, and the subsequent inflammation and tissue damage. Treatments with the tissue plasminogen activator (tPA) following ischemic stroke can restore blood flow to the brain, but it does not resolve inflammation and tissue damage, which can lead to some serious long-term cognitive impairment and disabilities of the patients. Our research goal is to identify immune cell types and mediators that cause inflammation and tissue damage following ischemic stroke. These key players may ultimately become therapeutic targets for post-stroke inflammation. Specifically, in this study, we aim to investigate the role the neuron-producing cytokine interleukin-34 (IL-34) in ischemic stroke. The first step of this study is to determine the level of IL-34 expression in the brain following ischemic stroke. To induce ischemic stroke, we performed transient middle cerebral artery occlusion (tMCAO) in the Il34LacZ/+ mice, in which the expression of IL-34 can be visualized by beta-galactosidase activity. We found that 24 hours following tMCAO, the expression of IL-34 in the cortex is not affected. However, at the 14-day time point, expression of IL-34 is higher in the cortex of the ipsilateral side, compared to the contralateral side of the brain. This data suggests that stroke-induction influences the expression of IL-34 in the brain during the chronic stage post-stroke, but not at the acute phase. Future studies will investigate the function of IL-34 in post-stroke recovery.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Association between social behavior and face responsiveness in autistic and healthy brains

Savannah P. Hays*, Runnan Cao, Shuo Wang

Department of Chemical and Biomedical Engineering and Department of Neuroscience, West Virginia University, Morgantown, WV 26506

Face perception plays a key role in human's social behavior and humans have a dedicated neural system to process faces. However, brain activation strength and patterns within this face-processing system vary substantially across neurotypical individuals and people with autism spectrum disorder (ASD). Although there is a plethora of literature showing atypical face processing in people with ASD, the underlying neural mechanism for this profound social impairment still remains unclear. Furthermore, whether and how individual differences in neural response to faces are related to social behavior remains controversial. Solving these questions is important for unravelling the neural mechanism of face perception and providing new clues for autism diagnosis and early interference. In this study, we first investigated these questions by correlating the strength of neural activity in face-selective areas (i.e., brain areas that specifically respond when participants view faces) with behavioral measurements of social personality traits. Next we compared brain-behavior association between the neurotypical individuals and people with ASD. Our results from neurotypical groups showed a significant correlation between social behavior with 1) activation magnitude in the left amygdala, anterior temporal lobe (ATL), and right anterior superior temporal sulcus (raSTS), 2) size of the rp STS and inferior frontal gyrus (IFG). Preliminary results from autism groups showed a significant negative correlation between behavior and activation magnitude in the lmSTS and laSTS. Our findings suggest that prosocial behavior is achieved by greater brain response to faces in neurotypical individuals and people with ASD but the effected brain areas are not the same.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Generation of a Mammary Tumor Ghrelin KO using CRISPR Cas9

Raegan M. Kvadas*, William H. Walker II, Ph.D., James C. Walton, Ph.D., Randy J. Nelson, Ph.D., and A. Courtney DeVries, Ph.D.,

Department of Neuroscience, West Virginia University, Morgantown, WV 26505

Breast cancer patients exhibit altered sleep and metabolism function, which decrease the quality of life and increase mortality. In a previous study, using 67NR mammary tumor cells in mice demonstrated altered satiety hormonal signaling, glucose metabolism, and sleep. These changes in function were rescued through the use of a Ghrelin Antagonist, which reduced blood glucose levels to normal levels. The current study is focusing on the role of tumor Ghrelin, which is suspected to impact liver metabolism and sleep via orexin neurons. Generating a Ghrelin KO is expected to reveal no changes in metabolic or sleep cycles. The Ghrelin KO was generated using an eSpCas9 plasmid all-in-one vector containing sgRNA, EGFP, and Cas9, which was nucleofected into 67NR cells. The cells were sorted for GFP expression and plated to grow colonies. Once the colonies were grown, the DNA was extracted and PCR was run, along with the visualization of the bands using gel electrophoresis. Cells showing band shifts were subjected to Sanger sequencing and whole genome sequencing for CRISPR event confirmation. To further this study, the whole genome will be studied to determine any off-target effects and use the Ghrelin KO to look at the effects of the KO on metabolism and sleep.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Role of Ghrelin in Metabolic Disruptions in Non-Metastatic Tumor-Bearing Mice

Emma C. Speck*, William H. Walker II, James C. Walton, Randy J. Nelson, A. Courtney

DeVries

*Department of Neuroscience, Rockefeller Neuroscience Institute, West Virginia University,
Morgantown, WV 26506*

Breast cancer patients frequently demonstrate elevated blood glucose concentrations and sleep abnormalities at the time of diagnosis. However, the mechanisms by which these metabolic and sleep disruptions occur are unknown. Previous studies in the lab have demonstrated dysregulated satiety hormones, increased hypocretin cell signaling, and altered metabolic function in non-metastatic tumor bearing animals. We hypothesized that breast cancer production of ghrelin alters glucose metabolism in the liver and increases blood glucose concentrations via hypocretin signaling. Female Balb/C mice received bilateral orthotopic injections of non-metastatic mammary tumor cells (67NR) into the fourth and ninth mammary glands. Beginning fifteen days after tumor inoculation mice received once daily intraperitoneal injections of the ghrelin antagonist (JMV 2959) to attempt to reduce the hypocretin neural activity and restore blood glucose concentrations. Administration of ghrelin receptor antagonists to tumor bearing animals normalized blood glucose concentrations and reduced tumor size. However, there were no significant changes in expression of genes involved in gluconeogenesis and glycolysis in the liver, suggesting ghrelin is likely altering blood glucose through another pathway. Future studies will examine alternative pathways and determine the effects of ghrelin antagonist administration on hypocretin neuronal activity in tumor bearing mice.

Poster Session I:

Gender Disparities in the Etiology and Treatment Outcomes of Stroke

Wama Shaalan*, Amelia Adcock, M.D., and Jessica Frey, M.D.

Department of Neurology, West Virginia University, Morgantown, WV 26505

Stroke care has advanced in the United States and in the developed world, yet little attention has been dedicated to researching the differences in stroke outcomes in men versus women (Reeves et al., 2008). It is known that strokes affect women differently than men. Men have a higher age-specific stroke rate while women have a higher stroke incidence at older ages (Hiraga, 2017). Women also experience more frequent stroke events, postulated to be due to their longer life expectancy. The research gaps this study aims to explore are how 1) stroke etiology, 2) patient outcomes and 3) endovascular procedures may differ in men and women and how these differences are potentially explained. We propose accomplishing these goals by conducting a retrospective review of patients' demographics, underlying etiology, and outcome measures among a population of WVU ischemic stroke patients for the last 5 years.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session I:

Stomatal Responses to Drought Stress in Sugar Maple and Black Oak

Molly Sherlock*, Dr. Brenden McNeil, Dr. Eddie Broztek

WVU Department of Geology and Geography, West Virginia University, Morgantown, WV
26505

Shifting water availability and increasing drought stress due to climate change will likely alter our terrestrial biosphere, leading to forest degradation and modifications in forest composition. Detailed knowledge of how trees respond to decreases in water availability is necessary to predict how forests will cope with the frequent drought conditions in the future. The objective of this project is to gain a better understanding of tree responses to drought stress by examining isotopic concentrations of leaf carbon ($\delta^{13}\text{C}$) in black oak (*Q. velutina*) and sugar maple (*A. saccharum*). Isotopic concentration of leaf carbon provides a measure of stomatal conductance which can offer insight into transpiration rates and photosynthetic capacity of a given tree, allowing us to compare drought response between experimental and control groups. Forested plots containing the aforementioned tree species were selected within Elizabeth's Woods Nature Preserve. Control plots received no treatment while experimental plots underwent a synthesized drought stress via through-fall-exclusion treatment. Foliar samples were collected during the summer over the course of four years and analyzed to compare the concentrations of $\delta^{13}\text{C}$. Upon analyzing average concentration of isotopic carbon for the month of July, we found significant differences between control and treatment plots for sugar maple from 2018 to 2019, while no significant differences occurred across plots for black oak. This would suggest that sugar maples may be sensitive to drought conditions and exhibit greater stomatal regulation than black oaks, which may have differing drought stress responses that don't involve stomatal regulation.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Picking favorites: Differential activation of phosphofructokinase-1 by biphosphorylated sugars

Morgan J. Glass* and Bradley A. Webb, Ph.D.

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

Dysregulation of glucose metabolism contributes to the initiation and progression of disease, yet our understanding of the molecular mechanisms leading to these processes is incomplete. Our research focuses on „Äthe gatekeeper,Äù of glycolysis, phosphofructokinase-1 (PFK-1), the enzyme catalyzing the step committing glucose to breakdown. We ask how regulation of PFK-1 by biphosphorylated sugars affects its activity and therefore glycolytic flux. Fructose-2,6-bisphosphate (F2,6bP) is a strong allosteric activator of PFK-1 while the structurally related fructose-1,6-bisphosphate (F1,6bP), a product of the enzymatic reaction, can only activate the muscle isoform of PFK-1 under physiologic conditions. We sought to determine this unique molecular mechanism by which the enzyme can differentiate these structurally similar sugars. Through activity assays with F1,6bP, PFKM was found to have feed-forward activation. Isoforms PFKP and PFKL showed moderate activation only under specific, non-physiological conditions. After examination of the allosteric sugar-binding site, 4 residues within 5 Å of the binding pocket were identified as unique to PFKM. We predict PFKM to have decreased selectivity because of increased binding site flexibility. To test this hypothesis, we created the mutant PFKM-S654C and predict its increased ability to differentiate these sugars. Future studies include activity testing of the mutant by F1,6bP and structural study of PFK-1 bound to each biphosphorylated sugar to identify differences. Together, these studies will determine how PFK-1 is activated by biphosphorylated sugars, bolstering our understanding of glucose processing. This research provides insight for the innovation of new therapies addressing diseases involving dysregulated glucose metabolism.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Adherence to NCCN Guidelines for Genetic Testing of Appalachian Women with Epithelial Ovarian Cancer

Kristen J. Hudgins*, Alaina M. Zappas, Deborah M. Moore, Megan R. Yoho, Kourtnie R. Mcquillen, MD, Sijin Wen, PhD, and Valerie B. Galvan-Turner, MD
WVU Cancer Institute, West Virginia University, Morgantown, WV 26505

In 2016, the National Comprehensive Cancer Network (NCCN) released a new set of ovarian cancer management guidelines for physicians in order to offer more comprehensive care to these patients. The guidelines include a recommendation for germline genetic testing, in particular for BRCA 1 and BRCA 2 mutations, in women with epithelial ovarian, fallopian tube, or primary peritoneal cancer. Prior to the publication of the NCCN guidelines, the Society of Gynecologic Oncology (SGO) recommended germline genetic testing and genetic counseling for all epithelial ovarian cancer patients as early as 2014. We conducted a retrospective chart review on patients diagnosed with epithelial ovarian cancer in order to evaluate the incidence of genetic counseling and testing at West Virginia University. Our primary objective for the study is to evaluate the adherence to the NCCN guidelines from the years 01/2014-12/2017. Our secondary objective for this study will be to evaluate and identify areas of improvement in order to obtain 100% adherence to the SGO and NCCN recommendations after the addition of a dedicated genetics counselor to the gynecologic oncology department.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Varying Oleylamine :Dibenzyl Ether Ratio for Fine-Tuning Manganese Oxide

Nanoparticle Diameter and Controlled Release

Celia Martinez de la Torre, Jenna Vito*, Alexander Pueschel*, Margaret Bennewitz, Ph.D.
*Department of Chemical and Biomedical Engineering, West Virginia University, Morgantown,
WV, 26506*

The ultimate goal of this research project is to develop a contrast agent to reduce/eliminate the number of false-positive and negative test results associated with current breast cancer diagnosis techniques. The contrast agent in use, gadolinium chelates, are always „Äüon,Äù, meaning they always show a signal regardless of if tumors are present. By utilizing pH-sensitive MnO nanoparticles a contrast agent can be developed that will only signal in the presence of the lower pH of endosomes/lysosomes inside tumor cells. Reducing the size of the MnO nanoparticles increases release of Mn²⁺ and therefore the MRI signal and the effectiveness of the imaging solution. By changing the ratio of reagents, dibenzyl ether (DE) and oleyl amine (OA), involved in MnO core synthesis the average size of the cores varies, impacting the controlled release. The ratios were manipulated as follows: 60 OA : 0 DE, 50 OA : 10 DE, 40 OA : 20 DE, 30 OA : 30 DE, 20 OA : 40 DE, 10 OA : 50 DE. The smallest size of cores, 18 ±5.5 nm, are present when there is a 10 OA: 50 DE ratio, and the largest core size, 38.8 ±14.6nm, appears when a 50 OA :10 DE ratio is utilized. A controlled release experiment was used to analyze the dissociation of the MnO into Mn²⁺ ions on three different pHs: pH 7.4 (normal body pH), 6.5 (around tumor), and 5 (inside endosome/lysosome of tumor cells). Only significant release of Mn²⁺ was obtained at pH 5 (~50% in 24hr).

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Classifying Morphine Addiction And Naloxone-like Drug Effects in *C. elegans*

Nour Foual*, Jacob Boos, Werner J. Geldenhuys, Ph.D.
Department of Pharmaceutical Sciences, West Virginia University School of Medicine,
Morgantown, WV
26505

Addiction is one of the most difficult disorders to treat. It not only takes a major toll on society, but it also affects the addicted individual as well. Chronic drug use causes lasting changes in the brain that could lead to addiction. The possibility of overdosing looms behind addiction. This study highlights the use of *C. elegans* to model drug-induced behavior via morphine administration. To treat overdoses, naloxone is a medication that is typically administered in emergency situations. This study will undergo experimental trials to test out a newly developed naloxone-like drug in order to compare to the actual naloxone drug. The cultivation of *C. elegans* will allow for morphine-trained worms and the control worms to undertake the newly developed naloxone-like drug treatment in order to see the effects. The results are still impending. The goal of this study to allow for testing human function in response to the developed drug and to seek new alternative treatments. In addition to that, we can monitor dopamine and cholinergic system-supported attraction to demonstrate the signals linked with the drug.

Poster Session II:

The Relationship Between Parental Warmth, Child Disclosure, and Adolescent Depression

Cierra Bedard*, Sloane Strauss, M.A., Aaron Metzger, Ph.D.
Department of Psychology, West Virginia University, Morgantown, WV 26506

Parental warmth in the parent-adolescent relationship has been found to directly influence adolescent depression, such that higher adolescent reports of perceived parental warmth are associated with lower reports of adolescent depression. Furthermore, there is also research to suggest that maternal warmth has different implications for adolescent depression than paternal warmth. The purpose of the current study was to examine the impact child disclosure has on the relationship between parental warmth and adolescent depression while controlling for gender and age. The sample consisted of 161 adolescents from 12-18 years old ($M_{age} = 14.42$, $SD = 1.73$; 80.7% Caucasian; 59.6% female) from a mid-Atlantic state. Measures included adolescent reports of depression, maternal warmth, paternal warmth, and disclosure of information to parents. Parental warmth was calculated by averaging the teen's report of maternal and paternal warmth. Each measure of warmth was individually tested as a predictor of adolescent depression. Gender and age were included in all models, but never reached significance in predicting adolescent depression. In a second step, each type of warmth was tested as a predictor of depression. Maternal, paternal, and parental warmth were all significant predictors of adolescent depression, such that as perceived warmth increased, depression decreased. The third step of the hierarchical regression tested child disclosure as a moderator between each type of support, controlling for gender and age. Child disclosure did not moderate any of the tested relationships. The results of this study contribute to the research examining maternal and paternal warmth as unique factors on adolescent development.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Filament Formation of the Liver Isoform of Phosphofructokinase-1 Increases Enzyme Activity

Katelyn E. Frock* and Bradley A. Webb

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

Dysregulation of glucose metabolism contributes to disease progression. Phosphofructokinase-1 (PFK-1) plays a crucial role in glycolysis by catalyzing the step committing glucose to breakdown. We have previously shown that the liver isoform of PFK-1, PFKL, forms filaments of stacked tetramers through amino acids in the intra-tetramer interface (INTF). Previously, a filament incompetent PFKL (INTF1) was formed by mutating all of INTF, which suggested that filaments increase enzyme activity and affinity for fructose 6-phosphate. The INTF is comprised of four distinct regions, which we called INTF1A to D. To determine the importance of each region to filament formation we assessed their size and impact on enzyme activity. Wild type and mutants were expressed and purified using a baculoviral expression system. The size of wild type and mutants were determined by dynamic light scattering. We found that INTF1C and INTF1D had particles around the size of tetramers, significantly smaller than PFKL, suggesting that they were unable to form filaments. To determine if INTF1C and INTF1D altered activity and regulation, in vitro kinase assays were performed, concluding they had similar affinity for sugar and inhibition compared to wild type. Our results conclude that INTF1C and INTF1D do not impact activity, indicating that filament formation does not regulate enzyme activity and regulation. Future studies include continuing to characterize the regions of INTF that will aid us in determining what the function of filaments is in cells, leading to a better

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Coronary Artery Risk Detection In Appalachian Communities

Katherine Sauvageot*, Sam Zizzi*, Eloise Elliott*

*College of Physical Activity and Sport Sciences, West Virginia University, Morgantown, WV
26506*

The Coronary Artery Risk Detection in Appalachian Communities (CARDIAC) Project is a chronic disease risk factor surveillance, intervention, and research initiative aimed to combat the significantly high percentages of cardiovascular diseases and obesity rates in West Virginia. In 2018-2019, type 1 schools were chosen from 19 high risk counties to be involved in the screenings. Of these schools, 8,256 students who were in either kindergarten, 2nd, and 5th grade were screened with both passive and active consent. In two phases, these students were screened for height, weight, and BMI, along with 5th graders receiving additional screenings in phase 2 for blood pressure testing and family history. The screening results showed that over half of these high risk grade schoolers are overweight or obese, and a tenth of these children show signs of prediabetes. Following the results, interventions were implemented in the school system and community to change eating and physical activity behaviors. These interventions are aimed to target the schools as a whole, as well as offer individual intervention for flagged, at-risk students.

Poster Session II:

The Development of an Aquatic Reduced-Exertion High-Intensity Interval Training Exercise Protocol

Olivia Naylor*, Anna Jenkins, Victoria Corsi BS, Miriam Leary PhD, Lori Sherlock EdD
Division of Exercise Physiology, WVU School of Medicine, Morgantown, WV 26506

Reduced exertion high-intensity interval training (REHIIT) requires the lowest exercise volume (10 minutes with three 20 second maximal efforts) that produces benefits in health and performance similar to steady state exercise. While aquatic exercise is recommended for many populations, REHIIT in an aquatic setting has not yet been investigated and/or compared with land-based REHIIT exercise training. This is perhaps in part because water, which buoyancy makes generating maximal effort challenging. Therefore, this pilot study sought to determine a protocol to elicit maximal effort in the water with the goal of implementing it in a comparison study of land-based and aquatic REHIIT exercise. In the pilot study, ten young, healthy participants completed maximal effort squat jumps with the top of the water at the level of the navel (N) or xiphoid (X) process of the sternum with (R) or without ankle resistive devices to determine which combination (N, N+R, X, or X+R) required the greatest effort. Physiological effort was determined by heart rate and subjective effort was determined by the Ratings of Perceived Exertion scale (RPE) and participants self-reporting the hardest trial. The N+R trial elicited the highest heart rate (160 \pm 19 bpm) and RPE (13 \pm 3) and 60% of participants ranked it the hardest combination. This pilot study determined that performing maximal effort squat jumps starting with the water level at the navel while wearing ankle resistive devices is recommended for generating maximal effort and this combination will be used to compare aquatic with land-based REHIIT exercise.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session II:

Examining dlx5/6 Expression in gsx1/2 Zebrafish Mutants

Abreanne Andlinger*, Lexie R. Schmidt, Rebecca A. Coltigerone, Sadie A. Bergeron, Ph.D.
Department of Biology, West Virginia University, WV 26506

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 dlx5/6. Zebrafish were used as the model organism for this experiment. Zebrafish heterozygous for the gsx1/2 mutation were crossed to get a pool of sibling embryos of various genotypes, including mutants, wild type, 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 dlx5/6 in the brains of the wild type and mutant embryos. In addition, transgenic zebrafish with GFP expression in dlx5/6- expressing neurons were also used. 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.

Poster Session II:

Sequencing of the Sex Determining Gene in Populus and Salix

Lauren O. Barbee*, Lakyn R. Sanders, Stephen P. DiFazio
Department of Biology, West Virginia University, Morgantown, WV 26505

The Salicaceae family is a family of flowering plants that include willows (*Salix* spp.), poplar aspen, and cottonwoods (*Populus* spp.). Plants in the Salicaceae family are used commercially for industrial pulp production. Typically, plants are hermaphrodites meaning they have both male and female sex organs. Recently in evolutionary history, *Populus* and *Salix* moved away from hermaphroditism and became dioecious. They are used to model recent evolution of sex chromosomes as well as the switch from XY, where the sex-specific chromosome is in males, to ZW where it is in females. It is believed that spRR11 is a master regulator gene of sex-related gene expression based on genetic mapping in *Populus* and *Salix*. We are attempting to confirm this by performing sequencing of the spRR11 gene in eight species of *Populus* and *Salix*. We have done PCR amplification of spRR11 in two *Salix* and two *Populus* species and they have been sequenced using Illumina MiSeq. Results are pending analysis of sex specific polymorphisms. This project will help establish whether the response regulator has a central role in sex determination pathways across the Salicaceae.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

Peregrination: The Pilgrim's Long and Winding Road

Grace Belknap*, Janet Snyder, Ph.D.

*Art History; School of Art and Design, College of Creative Arts, West Virginia University,
Morgantown, WV 26506*

The medieval pilgrimage was a journey that was as ambitious as it was dangerous. It was a devotional journey that expressed both spiritual and tangible faith. This research found that some places and objects could be perceived as being so much holier than others that many religious pilgrims were motivated by a strong desire to be in the presence of the most holy when they set out to visit shrines and experience far away destinations such as Jerusalem and Rome. It was a goal during the Middle Ages to make physical contact with the holy – to pray at a shrine or touch a relic – producing a transformative experience. The dangers of long-distance, overseas travel further enhanced the power of holy places, making the journey itself the essence of pilgrimage. This research explored the limitations of pilgrimage to the Holy Lands and sought to discover how those limitations influenced the pilgrims' difficult journey in the Medieval Ages.

Poster Session III:

Effects of Prenatal and Early Childhood Interventions on Low SES Families

Erin McGowan*, Amy Root, Ph.D.

College of Education and Human Services, West Virginia University, Morgantown, WV 26506

Making programs designed to help mothers in situations of economic disparity is vital to helping to bring individuals, families, and entire regions out of poverty. To help streamline this process in producing clearly visible results, it is necessary to determine how these programs can be made to be as efficient as possible. Without doing so, programs can often fall fate to the same bureaucratic processes as the one being studied here has suffered, resulting in loss of funding from the government. Analyzing the data gathered from the mothers-to-be and new mothers who were enrolled in the Maternal Infant Health Outreach Worker (MIHOW) Program and comparing the various aspects of their lives surveyed (economic status, addiction, viewpoints on breastfeeding, etc.) over time in the program will allow certain trendlines to form. Through this research it is hoped that new correlations in type of assistance and change in behavior will emerge, and some program aspects with little to no impact on families can be altered to improve effectiveness of future programs designed for similar purposes.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

Variations of the Fibularis Quartus – Review of Variants and a Rare Discovery of the Fibulotalocalcaneus (Peroneotalocalcaneus) Muscle.

Allison Angilello*, Jesse Burkett, H. Wayne Lambert

*Pathology, Anatomy and Laboratory Medicine, West Virginia University, Morgantown, WV
26506*

The fibularis (peroneus) quartus muscle is a variant muscle located in the lateral leg compartment that, when present, resides posterior to the fibularis longus and brevis muscles. Only found in approximately 11.5% of legs, the fibularis quartus arises from the lower one-third of the fibula and descends to wrap posteriorly around the lateral malleolus.¹ Confusion in the nomenclature arises due to the variations seen in regards to the distal insertion point of this variant leg muscle. The fibularis quartus can insert into the foot at a variety of locations, leading to many variations in the naming of the subtypes of this muscle.¹⁻³ If the fibularis quartus muscle inserts into the retrotrochlear eminence and fibular (peroneal) trochlea of the calcaneus, it is called the fibulocalcaneus externus, which are the most common insertion sites.¹⁻³ More distally, the fibularis quartus can insert into the cuboid bone, which is called the fibulocuboideus, though this variant is seen less frequently.¹⁻⁴ Even further into the foot, a variation of the fibularis quartus may insert into the fifth metatarsal of the foot, changing its name to the fibularis digiti minimi (quinti).^{1,3} In this study, we examined the lateral leg compartment to see if a fibularis quartus may be present. In three of 20 legs (15%), a fibularis quartus muscle was identified. The first two examples were the more common fibulocalcaneus externus variant, in that this muscle inserted into the calcaneus. The third example was unique in that its distal tendon split to insert onto the calcaneus as well as the talus bone. The rare example of a fibulotalocalcaneus (peroneotalocalcaneus) muscle has only been reported once in the literature, by Tubbs et al, (2008).^{1,5} This rare variant of the fibularis quartus is only the second known example of this exceedingly rare fibularis quartus variant. This finding is important clinically due to the presence of a fibularis quartus muscle being related to chronic lateral ankle pain and ankle instability.^{1,2} It is also important for radiologists, surgeons, and clinicians to be aware of these lateral leg muscle variants when looking at radiological imaging or in advance of surgical procedures in the lateral leg or foot.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

Effects of High-Fat Diet on Traumatic Brain Injury Deficits

Alyssa Blancke*, Michelle Frankot, Bryan Rodriguez, and Cole Vonder Haar, Ph.D.
*Department of Psychology, Rockefeller Neuroscience Institute, West Virginia University,
Morgantown, WV 26506*

Traumatic brain injury (TBI) is an inflammatory pathology that can cause motor impulsivity and risky decision making. A high fat diet (HFD) may increase the symptoms of TBI by worsening brain inflammation. The aim of the study was to characterize the long-term effects of HFD-consumption on TBI-induced cognitive deficits. 36 male Long Evans rats were fed either an HFD or low-fat diet. They were trained on the Rodent Gambling Task (RGT), a behavioral paradigm that involves nose poking in operant chambers. The rats could choose among 4 holes that were associated with different probabilities and magnitudes of reinforcement (sugar pellets) and punishment (time outs). Some holes were risky, and others were optimal. Rats had to withhold responses for 5 seconds between trials. The number of premature responses was used to measure motor impulsivity, and the number of risky responses was used to measure risky decision making. Half of the rats received a bilateral frontal brain injury. Behavioral testing on the RGT continued for 9 weeks post injury. Thus far, diet has not affected motor impulsivity or risky decision making. Previous TBI effects were replicated; fewer optimal choices and increased motor impulsivity. A lesion analysis and immunohistochemistry for microglia quantification will be conducted post-mortem. We expect an increase in expression of microglia, an inflammatory marker, for the TBI rats given the HFD. If the HFD successfully upregulated inflammation in the brain without exacerbating behavioral impairments after TBI, inflammation may not play an integral role in driving deficits after brain injury.

Poster Session III:

Enzyme Immobilization Within a Hyaluronic Acid Matrix

Jackie R. Arnold*, Madewa V. Adeniyi*, Jordan S. Chapman, B.S., Cerasela Zoica Dinu, Ph.D.
*Department of Chemical and Biomedical Engineering, West Virginia University, Morgantown,
WV 26505*

Enzyme immobilization is being widely considered for biomedical applications such as biosensing and drug delivery. For such applications, enzymes need to be immobilized onto biocompatible matrices to ensure their functionality in a synthetic environment as well as their increased stability for implementation. In this project, we developed a strategy to allow for enzyme immobilization in biocompatible hydrogels. For this, the activity of the enzyme glucose oxidase (GOx) was assessed and optimized when loaded in a hydrogel comprised of dodecylamine and hyaluronic acid (dod-HYA). The activity of the immobilized enzyme was compared with the activity of an equivalent concentration of free enzyme. Immobilization conditions were optimized to ensure maximum functionality at the hydrogel interface. This projectability to allow biocompatible interface integration, as well as ease of scale-up, is expected to extend upon enzyme applicability in user-controlled fashion.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

Identifying Ancient Trees Using the Law of Superposition

Kayla Bailey*, Shawn Cockrell, M.A., Amy Hessel, Ph.D.

Department of Geology and Geography, West Virginia University, Morgantown, WV 26506

Paleoclimate records such as tree rings, coral and ice cores provide evidence of climate variation prior to instrumental records. While the Northern Hemisphere has abundant data on past climate variation, there are limited records available for the Southern Hemisphere due to a lack of land area. *Athrotaxis selaginoides* is an endemic tree species of Tasmania, Australia with a lifespan close to a thousand years, making it a potential source of paleoclimate information. This research builds on the existing chronology from Mount Read Tasmania and tests the law of superposition on subfossil, buried logs. I cross dated wood samples against the established chronology to assign calendar dates to each ring. I interpreted observational metadata documenting burial depth of logs prior to excavation. The preliminary results failed to support the law of superposition as relative age was not an indicator of burial depth. Since there are few paleoclimate records for the Southern Hemisphere, my research is working to further our understanding of climate by expanding the records for the region.

Poster Session III:

Morphological and Physiological Responses to Drought Stress in *Sorghum bicolor*

Emmelia J. Braun*, Melissa A. Lehrer, and Jennifer S. Hawkins

Life Sciences Building, West Virginia University, Morgantown, West Virginia 26506

Sorghum bicolor (sorghum), a cereal grain indigenous to Africa, is a staple food crop of the region for its tolerance of arid environments that are drought-prone. Prolonged drought can have detrimental effects on grain yield. We sought to study how drought stress affects sorghum at morphological and physiological levels, which may be used to develop accessions with higher drought tolerance that withstand arid climates while maintaining grain yield. The stay-green accession, TX7078, which exhibits pre-flowering drought tolerance, was studied. Plants were germinated, then transplanted to 5cm x 5cm x 25cm tree pots at the three-leaf stage. After one week of recovery, plants were watered to 100% soil moisture content (SMC) then allowed to dry down to 0% SMC. Plants remained at this level for 2 days (T1); controls were well-watered. After treatment, plants were watered to 100% SMC and allowed to dry down. Plants were measured and harvested after two, four, and six cycles before watering, five minutes, thirty minutes, and six hours after re-watering. Morphological and physiological measurements included height, culm diameter, leaf width, stem biomass, and chlorophyll content (SPAD). Data collected after six cycles was analyzed via one-way ANOVA; it was found that the T1 plants showed shorter height, smaller leaf width, and higher SPAD in the third fully-expanded leaf compared to the controls. There was no difference in culm diameter, stem biomass, and SPAD of the newest leaf between treatments. Collected tissue will be used to evaluate drought stress, recovery, and memory at the transcriptional level.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

Total Land Disturbance and Energy Output of Wind Turbines in the Appalachian Region

Sofia Nunez*, Shawn Grushecky, Ph. D.

Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV 26506

As greenhouse gas emissions increase and cause further environmental harm, the search for reliable, low-carbon energy sources has been ongoing. Alternatives to carbon fuel sources such as wind and solar are often seen as providing reliable low-impact energy. However, surface impacts of alternative energy projects have not been fully investigated in the Appalachian region. To provide insight into the impacts of wind energy versus petroleum development, the characteristics and extent of surface development were quantified in West Virginia, Pennsylvania and Maryland. Data from the U.S. Energy Information Administration (EIA) were obtained to locate wind turbines in the study region. A geographical information system (GIS) was developed using the program ESRI ARCGIS, and X amount of wind turbines in the region were mapped using the National Agriculture Imagery Program's (NAIP) aerial imagery obtained before and after the turbines were installed. EIA information on installed turbine capacity was used to develop estimates on energy output per land area disturbed. Energy output per disturbed area will be used to compare wind systems to petroleum systems found in the region. Impacted acreage and energy production statistics will be calculated for each state in the region. Because the average energy efficiency of a wind turbine is roughly 30%-45%, we expect to see a fairly large amount of land disturbed in relation to low energy outputs from wind turbines.

Poster Session III:

Active Learning: Why is this effective teaching technique not used more often?

Olga Hawranick*, Vicki Sealey, Nicole Engelke, Lori Ogden, and Keith Gallagher
Department of Mathematics, West Virginia University, Morgantown, WV 26506

Lecturing has been the primary approach to instruction since universities were founded in Western Europe over 900 years ago. Recent studies suggest that student performance significantly increases with active learning (ex: group work and discussions that solicit student input) compared with lecturing, where students may be passively listening. It has become apparent that after encouraging the implementation of this teaching style throughout the mathematics courses, that it is not happening as often as wanted. In our qualitative research study, we seek to determine barriers that faculty have encountered concerning the implementation of active learning strategies. So far, we have interviewed experts and graduate students who regularly use active learning to see when they use active learning, why they don,Â use it more often, and some of the obstacles they have encountered. Data analysis is ongoing, but preliminary results indicate that the common obstacles include physical constraints of classroom space, instructors,Â ability to manage large numbers of students, and specific content that may not permit as much exploration.

ABSTRACT INDEX: 2019 2nd ANNUAL RAP Fall Symposium

Poster Session III:

LKB1 Negatively Regulates MHC class I Gene Expression in Astrocytoma Cells

Rylee N. Cisney * and Gordon Meares, Ph.D.
Department of Microbiology, Immunology, and Cell Biology

Liver Kinase B1 (LKB1) is a ubiquitous kinase involved in the regulation of metabolism, cell growth, and inflammatory activation. LKB1 is a known tumor suppressor in cancer models, but the function of LKB1 in neurodegenerative diseases is unknown. LKB1 is known to regulate cellular responses induced by the cytokine interferon gamma (INF-g). INF-g commonly induces the expression of major histocompatibility complex class I and II (MHC). MHC class I presents cytosolic proteins while MHC class II presents extracellular proteins. Our previous data has shown that expression of major histocompatibility complex class II (MHC II) is negatively regulated by LKB1 in response to INF-g. Little is known about how LKB1 regulates the expression of MHC class I genes. Preliminary data suggests that CRISPR-edited 1321N1 astrocytoma cells utilize LKB1 as a negative regulator of human leukocyte antigen A, B, and C (HLAA, HLAB, HLAC) gene expression in response to INF-g. Determining how or if LKB1 regulates MHC class I could help in confirming LKB1 as a negative regulator of adaptive immunity.

Poster Session III:

Baseline ImPACT Testing for College Hockey Athletes

Amanda Acord-Vira, EdD, OTR/L; Diana Davis, PhD, OTR/L; Camille Flamm
West Virginia University, School of Medicine, Department of Human Performance and Applied Exercise Science, Division of Occupational Therapy

Concussions have been shown to affect a person's ability to process and or learn new material. However, this is one of the first times data will be compiled and put into one place for analysis like this research project is doing. It is important to be able to draw analytical conclusions from numerical data that is referring back to return to learn success rates. If concussions affect a person's return to learn rate and all baselines as well as post1/post2 ImPACT tests from West Virginia University's hockey team has been collected and entered into SPSS then the results should show a low success rate (low GPA, low graduation/late graduation rates, etc.) for players suffering from multiple concussions compared to non-concussed peers. To approach this project, all baseline tests and post injury tests for each player is compiled into SPSS. Once all of the numerical data is entered, analyses can be drawn and compared to other findings. Possible pitfalls or limitations may include but is not exclusive to the fact that players may try to report false data or lessen their symptoms in efforts to return to the sport more quickly. The results are currently still pending. The expected results are players with multiple concussions will have much lower ImPACT test scores and it will then reflect on their GPA or school success rates in a more negative way.