Summer Undergraduate Research Symposium

Thursday, August 11th
12:30 pm - 3:30 pm
UNLV Student Union
Second Floor
Room 208
Welcome to Summer Research!

Thank you all for participating in OUR’s First Annual Summer Undergraduate Research Symposium. This is a very special event to showcase the novel work of our undergraduate summer researchers and their faculty research mentors. We are particularly excited about our venture into sharing ideas and projects through “lightning talks.” This is a valuable skill for sharing work at professional events beyond UNLV and crafting the skill of translating your research to anyone you may meet—even in an elevator! I am so proud of you all for the research you have dedicated yourselves to, and for your fearless passion to develop a new professional skill.

Dr. Liam Frink
Director of the UNLV Office of Undergraduate Research

Did you know?
Research is not just added value to your education—it is your education!
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#Summer16Symposium
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   **Faculty Research Mentor:** Jennifer Rennels, Ph.D.  
   Department of Psychology  
   MANYBABIES REPLICATION STUDY

2. **Kajol Shrestha**, Georgetown University, Department of Human Science  
   **Coauthor:** Barbara St. Pierre Schneider  
   **Faculty Research Mentor:** Barbara St. Pierre Schneider Ph.D., RN, CNE  
   School of Nursing  
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   Department of Psychology  
   BIASED ATTENTIONAL PROCESSING IN INDIVIDUALS WITH DEPRESSIVE AND MANIC SYMPTOMS

7. **Matthew Khumnark**, School of Life Sciences  
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   **Coauthors:** Li Lin, John Baur, & M. Ronald Buckley,  
   Department of Management, Entrepreneurship & Technology  
   **Faculty Research Mentor:** John Baur, Ph.D.  
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Did you know?
A “lightning talk” is a micro-presentation or pitch that is typically 2-3 minutes in length.
Scientific reproducibility and replicability has recently gained substantial attention in the scientific community, and in the field of psychology in particular. Although replication studies are important for validating claims, answering methodological questions, and improving generalizability, these studies remain relatively rare in psychological research. Specifically, in the field of developmental psychology, where power is typically low due to challenges recruiting and retaining infant participants, minimal research has assessed the replicability of major findings. This large-scale collaborative study aims to assess the replicability of the widely accepted phenomenon of infants’ preference for infant-directed speech relative to adult-directed speech—a preference thought to be critical for infants’ language development. To establish a high-powered estimate of the effect size of this phenomenon and analyze the problem of population and methodological variability in infant research, approximately 20 labs will recruit 1500 participants between 3 and 14 months of age. Voice stimuli will consist of female voices describing familiar and unfamiliar objects using either infant-directed speech or adult-directed speech. Analyses will include multi-level logistic regressions and meta-analysis.

An acute skeletal muscle injury is most often the result of natural disasters, excessive exercise, and other traumatic events. The repair of injured muscle depends on intrinsic processes, which sometimes does not lead to complete recovery. Over the past two decades, our understanding of the way that the immune system responds to such an injury has grown. For example, we know that different types of immune cells, including macrophages, are involved in this response by accumulating in the connective tissue surrounding injured muscle fibers or invading injured muscle fibers. However, the characteristics of macrophages localized in the center of injured muscle fibers have not been well-studied. Therefore, the objective of this project is to determine the characteristics of these macrophages. One hypothesis is that these centrally-located macrophages have distinct characteristics from those macrophages located along the periphery of the injured fiber or present in clusters spanning the fiber cross-sectional area. To test this hypothesis, the methods will include the use of both transverse and longitudinal muscle sections and histochemistry and immunohistochemistry. In addition, imaging software will be used to analyze macrophage characteristics. The findings of this project may increase our understanding of the intrinsic processes that are critical for the recovery of injured muscle. Results are pending.

This research was supported by the Department of Defense, Air Force (Grant #: FA7014-10-2-0001). Review of material does not imply Department of the Air Force endorsement of factual accuracy of opinion.
TEMPERATURE EXERTS STRONG CONTROL ON MICROBIAL COMMUNITY STRUCTURE AND FUNCTION IN TERRESTRIAL GEOTHERMAL SYSTEMS

Cale O. Seymour¹, Senthil K. Murugapiran¹, Jeremy A. Dodsworth², Timothy A. Alba¹, Gisele B. Goertz², Scott C. Thomas¹, Hilairy E. Hartnett, Haijiang Dong, & Brian P. Hedlund¹,⁵

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² California State University San Bernardino, Department of Biology
³ Arizona State University, School of Earth and Space Exploration
⁴ Miami University, Department of Geology and Environmental Earth Sciences,
⁵ University of Nevada, Las Vegas, Nevada Institute of Personalized Medicine

Faculty Research Mentor: Brian Hedlund, Ph.D. University of Nevada, Las Vegas, School of Life Sciences

Microbial communities living in extreme environments can provide insight into the physiological and ecological strategies of early life on Earth. In such systems, temperature and taxonomic richness are inversely correlated. However, no systematic study has explored the relationship between temperature and ecosystem function or complexity. Using standard bioinformatics techniques, we analyzed a dataset consisting of 73 paired-end Illumina 16S rRNA samples and associated metadata from Great Basin hot spring sediment and microbial mat communities, paying special attention to taxa with known ecological functions. Comparing the relative abundance of these taxa to temperature showed that Cyanobacteria, capable of oxygenic photosynthesis; Planctomycetes, capable of anaerobic ammonium oxidation; specific taxa within the Euryarchaeota capable of methanogenesis; and various genera of nitrite oxidizing bacteria experienced strong, statistically significant declines in relative abundance with increasing temperature while Thaumarchaeota, capable of aerobic ammonia oxidation showed no significant correlation with temperature. We calculated Spearman’s Rho rank correlation coefficient of the relationship between temperature and the relative abundance of each operational taxonomic unit (OTU), revealing significant relationships in 32% of 80% identity OTUs, suggesting that temperature exerts a strong control on community structure. These results suggest a trend where, with rising temperature, the microbial assemblage loses ecologically significant taxa and complexity as its members are replaced by a less functionally diverse cast of thermophilic and hyperthermophilic specialists.

Funding for this project was provided by NSF EPSCoR Solar Nexus IIA-1301726, NSF PIRE OISE0968421.

THE C-TERMINOME

Alexandria Bragg, Surbhi Sharma, & Nemanja Novakavic
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Faculty Research Mentor: Martin Schiller, Ph.D. University of Nevada, Las Vegas, School of Life Sciences

Proteins perform various actions that allow the cell to function. To do this, minimotifs within the protein are responsible for allowing many different interactions and modifications to occur. Minimotifs are defined as a sequence of 2-15 amino acids. Proteins have an N-terminus at the beginning and a C-terminus at the end. Currently, only 13% of human genes code a C-terminus with a functional minimotif. The goal of the project is to determine what proportion of the remaining 87% also has a function. To do this, we have selected 192 minimotifs based on how often they occur in the proteome (frequency scores). For these motifs, I ligated a synthetic oligonucleotide duplex encoding the minimotif into a plasmid containing a Tandem Affinity Purification (TAP) region. After verification, these recombinant plasmids were transfected into cells. The transfected cells transcribe the DNA to mRNA and translated the mRNA into a chimeric protein expressing TAP tag-minimotif fusion protein. The translated protein will then bind to its unknown binding partner within the cells. To determine the identity of unknown binding partners, we will use an antibody that recognizes the TAP tag to perform pulldown purification. The isolated proteins will be subjected to tandem MS/MS mass spectrometry to identify binding partners. Currently, the experiment is at the stage of building the 192 plasmid library. By collecting this data of protein interactions, we hope that this information can be applied to drug targeting as minimotifs contain the key to how the body functions as a whole.
ANALYSIS OF SEIZURES IN THE BRAIN OF WILDTYPE, HETEROZYGOUS, AND HOMOZYGOUS MICE

Jeong Lim Lee
University of Nevada, Las Vegas, Department of Psychology

Faculty Research Mentor: Dustin J. Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Seizures occur where there is an abnormal electrical activity in the brain. Based on the behavior of the brain activity, seizures can be divided into two main categories: generalized and partial. Generalized seizures involve both sides of the brain — electrical impulses run throughout the entire brain. Generalized seizure is also a symptom of epilepsy. Partial seizures start from a specific area in the brain and may either stay in that area or may spread to the entire brain.

Wildtype (wt) mice, heterozygous (het) mice, and homozygous (homo) mice are induced with a drug (not decided yet) which will result in some of the mice having seizures. These seizures will be recorded through electroencephalogram (EEG), which is a test used to detect abnormalities related to the electrical activity of the brain, and the EEG will be analyzed for seizures. The data of the seizures occurred will summarize into - none of the wt mice have seizures, some of the het mice have seizures and all of the homo mice have seizures. While both het and homo mice have seizures, the difference is that homo mice show an earlier seizure onset than het mice and a more rapid progression toward death.

The results of the three type of mice will provide a model that will be useful in studying and elucidating the type of seizures the mice are having. This will lead to a better understanding of how that specific type of drug can be used therapeutically with seizures.

This research will be presented at the 1st Annual AANAPISI Poster Presentation and Reception. Funding for this project was provided by the AANAPISI Program.

BIASED ATTENTIONAL PROCESSING IN INDIVIDUALS WITH DEPRESSIVE AND MANIC SYMPTOMS

Melissa Saucedo & Andrew J. Freeman
University of Nevada, Las Vegas, Department of Psychology

Faculty Research Mentor: Andrew J. Freeman, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Cognitive theory asserts that thinking controls behavior and states that attention, encoding, and interpreting information are critical to cognition. Applied to mood disorders, depressive symptoms bias attending to negative stimuli because of congruence between mood and stimuli. Individuals with depression display biased attention, encoding, memory and interpretations of negative stimuli (Peckham, McHugh, & Otto, 2010). Biased attention to negative stimuli is occurs in individuals with high levels of negative affect but no depression as well indicating that biased attention is a marker of state affect. Applications to bipolar disorder, a mood disorder characterized by both negative and positive affect, have been mixed. Cognitive theory suggests that attention to emotionally laden symptoms should be mood congruent to both positive and negative stimuli. Some found no biased attention (e.g., Peckham, Johnson, & Gotlib, 2016) and others found mood-congruent biased attention in bipolar disorder (e.g., Garcia-Blanco et al., 2013; Jongen et al., 2007). Therefore, the purpose of the current study is to examine biased attention to emotional faces in approximately 300 participants with no mood symptoms, only depressive symptoms, and both depressive and manic symptoms. We hypothesize that individuals will demonstrate mood congruent biased attentional processing such that those with depressive symptoms will demonstrate a bias to negative stimuli and those with manic symptoms will demonstrate a bias to positive stimuli. The presentation will cover both theory and empirical results of the current study.
PHARMACOLOGICAL MODULATION OF TSPO AFFECTS AROUSAL STATES IN MICE

Matthew Khumnark & Frank Salamone
University of Nevada, Las Vegas, School of Life Sciences

Faculty Research Mentor: Dustin Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

The ability to react to stimuli psychologically and physiologically is also known as an arousal state. TSPO, also known as peripheral benzodiazepine receptor, is an 18 kDa protein with binding sites for modulators of arousal states such as manufactured and endogenous benzodiazepines. The native function of TSPO has not been clearly defined, TSPO has been implicated in apoptosis, cholesterol transport, steroid biosynthesis, anxiety disorders, neurodegenerative disorders, bile acid synthesis, and regulation of reactive oxygen species. In the central nervous system (CNS) it is primarily localized to astrocytes and microglia. These cells provide support to neurons by providing resources, such as glycogen, or by being the resident immune cell in the CNS respectively. TSPO expression in these cells change during cases of neural degeneration and depression. Although the TSPO inverse agonist Ro5-4864 and PK11195 (TSPO antagonist) have been shown to cause changes in the generation in seizure prone mice (EL mice), little is still known about these two drugs. Aside from seizure generation in EL mice Ro5-4864 and Pk11195 have also been shown to have some anxiolytic effects and stimulate aggression respectively. Because of the effects mentioned prior, we expect that administration of Ro5-4864 will cause an increase in arousal state, and administration of Pk11195 will cause a decrease in arousal state. In this study we assessed arousal state through the usage of electroencephalography (EEG). We have found a decrease delta oscillations, implicating a decrease in arousal due to Ro5-4864 injections. While Pk11195 showed a similar effect. More N's are needed.

This research will be presented at the 1st Annual AANAPISI Poster Presentation and Reception.

Funding for this project was provided by the AANAPISI Program.

WE HATE TO SEE YOU GO: THE IMPACT OF THIRD-PARTY FORCES ON THE VOLUNTARINESS OF TURNOVER

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Faculty Research Mentor: John Baur, Ph.D.
University of Nevada, Las Vegas, Department of Management, Entrepreneurship and Technology

Employee turnover is a particularly costly workplace event with replacement and training costs that may exceed 200% of the exiting employee’s annual compensation. While turnover is an oft-researched area of management with myriad findings to suggest ways to decrease employee turnover by changing employee attitudes (e.g., satisfaction, commitment) as well as organizational settings (e.g., culture, leadership), the research is disjointed. Specifically, employee turnover has traditionally been considered through two differing dichotomies (voluntary-involuntary; functional-dysfunctional). In addition to creating separate lenses in which to turnover, neither of these approaches is comprehensive.

To address these shortcomings, we begin by creating a composite definition of voluntariness in employee turnover. Next, we synthesize the two traditional perspectives into a more universal approach that considers turnover events when both the employee as well as the organization voluntarily and involuntarily are parties to the process and the resulting ramifications for the functionality of the event. Yet to date turnover has been solely considered as a decision between these two parties — the employee and organization. We advance from this perspective to consider the influence of third-party forces which, when present, reduce or remove the voluntariness from the turnover decision. When then create a typology of third-party forces to consider how (1) governmental/economic, (2) industrial, (3) environmental, and (4) work/family conflict impact employee turnover.

Did you know?
Lightning talks expose the audience to a variety of topics and presenters quickly and efficiently.
A COMPUTATIONAL ANALYSIS OF THE LOTKA-VOLTERRA EQUATIONS

Delon Roberts
University of Nevada, Las Vegas, Department of Mathematical Sciences

Faculty Research Mentor: Monika Neda, Ph.D.
University of Nevada, Las Vegas, Department of Mathematical Sciences

Computational analysis of the Lotka-Volterra equations is essentially the numerical analysis of a system of Ordinary Differential Equations. This system must be analyzed with the use of computers due to the complexity of its solution set and the inability to solve the system analytically while maintaining an overall understanding of the system. As the variables and constants within the system increase, any attempts to understand the qualitative nature of the system in its totality becomes a fruitless intellectual exercise. Therefore, we are presently attempting to create more robust algorithms within the present numerical methodology so that the Lotka-Volterra equations may be studied with little regard to the increase in complexity with respect to the addition of variables and constants. We are also attempting to ascertain whether Tensor Calculus may be employed to provide completely new qualitative methods for an even more thorough analysis of the system.

The research questions that we are attempting to answer are twofold: 1) What manner of numerical techniques may be created to acquire a more robust comprehension of the Lotka-Volterra equations? 11) May Tensor Calculus be employed to acquire a better understanding of the system by means of providing a different perspective?

To answer these research questions, the methods that we are using in our research are the C, C++, Python and Matlab programming languages. Other programming languages may be added to our methodology as we attempt to potentially create new numerical methodologies to answer our research questions. Languages such as Haskell and Lisp may be applicable.

We are also using tensor analysis in an attempt to provide a completely new framework for the analysis of the Lotka-Volterra equations. As the variables in the model increase, tensor calculus may be employed to transform the system seamlessly between coordinate systems and to, more importantly, view the equations without reliance upon any system of coordinates. This may allow us to view hitherto unknown qualitative properties.

Due to a preliminary analysis, we expect to find that more robust computational algorithms may be created to better understand the qualitative nature of the system. We also expect to find that tensor calculus may be employed to acquire a completely new perspective, but only if the variables are greater than three. If the variables are less than three, then we suspect that no new significant information may be ascertained by the application of tensors.

ASSESSING THE SOURCE OF FECAL CONTAMINANTS IN LAS VEGAS VALLEY URBAN WATERSHEDS

Lara A. Turello1, Ariel D. Friel1, Mayra Sarria2, Daniel Gerrity3, Nancy N. Menzel2 & Brian P. Hedlund4
1 University of Nevada, Las Vegas, School of Life Sciences
2 University of Nevada, Las Vegas, Department of Civil and Environmental Engineering and Construction
3 University of Nevada, Las Vegas, School of Nursing
4 University of Nevada, Las Vegas, Nevada Institute of Personalized Medicine

Faculty Research Mentor: Brian Hedlund, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Homelessness in Nevada has increased drastically in recent years, with unsheltered homeless populations reaching 62% from 2013-2014. A large portion of the homeless population finds shelter in watersheds flowing through the Las Vegas Valley, leading to public urination and defecation in immediate proximity to urban waterways. This research aims to assess the source of fecal contaminants in the Las Vegas Wash, a collection of urban runoff, shallow groundwater, and reclaimed water. Fifteen sampling locations were chosen based on their proximity to possible homeless encampments and location relative to the Las Vegas Wash effluent. Locations were sampled three times within a two-month period. Results from qPCR assays targeting six fecal indicators and four fecal microbial source tracking (MST) markers suggest there are substantial human and bird fecal contaminants in the Las Vegas urban watersheds. The range of abundance (gene copy/100 mL) for the highly specific human marker HumM2 among the three sampling events was 3.21x103 (σ=1.86x103) to 3.50x106 (σ=8.34x105), whereas the range for the highly sensitive, but less specific, human marker HF183 was 3.70x103 (σ=4.50x102) to 2.74x107 (σ=6.06x106). The ranges of abundance for fecal indicators Bacteroides spp., Campylobacter spp., and Enterococcus spp. were 2.70x103 (σ=3.80x103) to 2.48x108 (σ=3.81x103), 3.44x103 (σ=3.81x102) to 1.05x105 (σ=1.45x105), and 5.64x102 (σ=3.91x102) to 5.55x106 (σ=2.84x106), respectively. Studies have proposed a link between the presence of Campylobacter spp. and instances of bird fecal contamination. The fecal contaminants were predominantly human, suggesting a possible link to homelessness. This indicates the need for improved homeless management strategies.

Funding for this project was provided by the National Institutes of Health.
INVESTIGATING THE MECHANISMS OF NEURODEVELOPMENTAL DISORDER GENESIS

Katie Randolph & Greg Manning
University of Nevada, Las Vegas, School of Life Sciences

Faculty Research Mentor: Rochelle Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

In the central nervous system (CNS), fast inhibition is regulated via gamma-aminobutyric acid type A receptors (GABAARs). In particular, the α2 subunit of the GABAAR exercises exquisite inhibitory control due to its localization of the axon initial segment (AIS). Past research has implicated aberrant inhibitory function as a factor in the genesis of neurodevelopmental disorders (NDDs). This study is aimed at investigating whether NDDs originate due to atypical expression of α2 subunit GABAergic synapses. This will be investigated utilizing a western blot protocol to measure and compare the protein expression in a mouse model mutated to lack α2 subunit GABAARs to the protein expression in previously established disease models of Fragile-X and Rett’s syndrome mice. Results will elucidate if established disease models show abnormal expression of α2 subunit GABAARs. This investigation could illuminate a new target for the treatment of NDDs.

This research will be presented at the McNair Summer Research Internship Presentation.

Funding for this project was provided by the McNair Summer Research Institute.

USING A HYPERDRIVE RECORDING IMPLANT TO RECORD MULTI SITE AREAS

Andrew Ortiz, Ryan A. Wirt, Ryan M. Francis & James M. Hyman
University of Nevada, Las Vegas, Department of Psychology

Faculty Research Mentor: James M. Hyman, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Interactions between the anterior cingulate cortex (ACC) and hippocampus (HC) are crucial for completing an array of cognitively demanding tasks (Hyman, et al., 2005; Lopez, et al., 2012; O’Neill, et al., 2013; Brincat & Miller, 2016). Over time memories become independent of the HC. Recent data have suggested that spatial memories in particular are transferred from the HC to the ACC as memories go from being more recent to remote (Bontempi et al., 1999). Our lab records electrical activity from these brain areas, using hyperdrive recording implants we construct in house. Our implants are composed of 32 moveable bundles of wires. Using the hyperdrive, the recording wires can be carefully lowered into the proper locations within a rat’s brain before the subject performs a complex spatial memory task. This allows us to measure local field potentials and action potentials from neurons in the targeted regions while minimizing neural damage. By implanting leads into multiple brain areas simultaneously and recording under specific behavioral contexts, we can gain an understanding of the dynamics affecting network function.

Funding for this project was provided by the AANAPISI Program.
THE BIOMIMICRY OF CILIA

Michelle Quizon, Jessica Cole, Luis Silva, Kwang J. Kim & Zakai Olsen
University of Nevada, Las Vegas, Department of Mechanical Engineering

Faculty Research Mentor: Kwang Kim, Ph.D.
University of Nevada, Las Vegas, Department of Mechanical Engineering

Cilia are microscopic, hair-like structures found by the bundle in microorganisms. In biology, natural motile cilia have metachronous motion consisting of effective and recovery strokes. This combination of strokes propels particles along surfaces. This transportation lends to advantageous applications for particle delivery. This research is focused on replicating biological cilia with two models—a simple model and a smart model—using artificial actuation and corresponding materials.

We used the computer software Fusion 360 to devise the blueprint of our physical model. It is of a single cilium consisting of detachable segments. In order to actuate the simple model, a push-and-pull method is implemented. The objective of this model is to verify that the motion can be simulated before reproduced with synthetic materials.

As for the smart model, we have just finished the preliminary stage of selecting which smart material is most appropriate. Our literature review has encompassed a wide variety of previously tested actuators: magnetic, optic, electrostatic, and pneumatic. With guidance from professors on our ongoing internship at the Korea Advanced Institute of Science and Technology, we have selected conductive polymers.

The use of conductive polymers in biomimicry is a novel, rising technique. Upon submersion in an electrolyte, a coated polymer oxidizes and de-oxidizes, undergoing deformation and ultimately, producing motion. Once back at UNLV, we will 1) complete our simple model and 2) begin our smart model of artificial cilia actuated by electromagnetism.

Then, we shall test dynamic parameters.

HOST PLANT SELECTION IN THE ENDANGERED MOUNT CHARLESTON BLUE BUTTERFLY

Mandy Mountain & Aaron R. Tippetts III
University of Nevada, Las Vegas, School of Life Sciences

Faculty Research Mentor: Daniel Thompson, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Icaricia shasta charlestonensis, commonly known as the Mount Charleston blue butterfly, is an endangered species endemic to the Spring Mountain Range in Clark County, Nevada. I. s. charlestonensis females are only known to oviposit (lay eggs) on three host plant species. Although all three of these host plant species are relatively common at the high elevations where I. s. charlestonensis is found, females seem to be particular about which plants they choose for oviposition. The factors that determine which host plants are selected by female butterflies are still unknown. We are currently investigating several environmental factors to determine if host plant selection in I. s. charlestonensis is associated with host plant mean density, basal area, cover, number of flowers, proximity to nectar plants, temperature and daily incidence of sunlight, as well as numbers of flowers on nearby nectar plants. This study is important because the ecology and habitat requirements of this endangered species must be understood before conservation projects can take place. Because so little is currently known about the ecology and habitat requirements of this species, any new information gathered through this project will be valuable to future conservation efforts.

Funding for this project was provided by United States Forest Service.

Did you know?
Every campus discipline engages in their own unique form of research and inquiry!
TUBBY REGULATES THE OXIDATIVE PATHWAY IN THE RETINA VIA INTERACTION WITH ESTROGEN RELATED RECEPTOR BETA (Esrrβ)

Jimver Villadoz, Nicole Rock, Peipei Pan, Arnold Salazar, Adrienne Bugayong & Nora B. Caberoy
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Faculty Research Mentor: Nora Caberoy, Ph.D.
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Mutation in the Tubby gene causes adult-onset obesity, progressive retinal, and cochlear degeneration with unknown mechanisms. Tubby was identified as a MerTK ligand for phagocytosis in the Retinal Pigment Epithelial cells, and was shown to play a role in ciliogenesis. However, its poorly defined protein interaction networks hinder delineation of its pathological mechanisms. Using ORF phage display for protein-protein interactions, we identified putative Tubby-binding proteins, including Estrogen related receptor β (Esrrβ). Esrrβ is a nuclear receptor associated with cell survival in low-oxygen environments, pluripotency in embryonic stem cells, regulation of energy metabolism, and oxidative stress. Mutation in Esrrβ causes hearing impairment, dental decay, and rotator cuff disease. Its role in retinal cell physiology has not been established. This study aims to characterize Tubby and Esrrβ interaction to elucidate their roles in retinal homeostasis and disease pathogenesis.

Our results revealed that Tubby interacts with Esrrβ protein in vitro and in vivo and the interaction is mediated through Tubby N-terminal domain. Moreover, promoter binding and transcriptional activation studies showed that Tubby directly binds to Esrrβ response elements and activates its transcription. Esrrβ’s involvement in oxidative stress and Tubby’s direct regulation of Esrrβ links Tubby to the oxidative pathway in the retina. Tubby was predicted as a transcription factor with no reported target gene(s). To our knowledge, this is the first to describe a gene targeted for Tubby regulation.

Funding for this research was provided by a National Institutes of Health/NEI grant to Nora Caberoy, Ph.D.

METHYLISOTHIAZOLINONE CAUSES DEVELOPMENTAL ABNORMALITIES AND DEATH IN Xenopus laevis

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Methylisothiazolinone (MIT) is a biocide found in many household products and cosmetics. The use of MIT in products is deemed to be safe in concentrations up to 15ppm or 100uM (Margot, 2014). Although the use of MIT has been regulated, it has still been shown to cause severe allergic reactions in humans, such as contact dermatitis (Chang et al, 2013). Just as it has been noted that MIT affects humans, studies in the Tseng lab have shown that exposure of MIT to the African Clawed frog, Xenopus laevis, can cause developmental abnormalities and even death. The development of X. laevis is external, transparent, and well documented. Therefore, using the Frog Embryo Teratogenesis Assay — Xenopus (FETAX) protocol, the embryotoxic effects of MIT could be evaluated. Differing concentrations of MIT (0µM, 50 µM, 75 µM, and 100 µM) were tested on developing Xenopus laevis embryos for a period of 96 hours (Mouche et al, 2011). At 24 hour intervals, the developing tadpoles were observed and examined for any malformations and abnormalities. Our results show a concentration dependent response to MIT with increased developmental abnormalities at higher concentrations. MIT exposure caused developmental abnormalities such as shortened length, tail disintegration, bending at the axis, curled tails, and overall delayed development. Since MIT is found in countless household products that humans are exposed to on a daily basis, studies such as this one would aid in knowing what concentration of MIT is safe for human exposure. The embryotoxic effects of MIT are still not fully understood, and future studies can include deducing the lowest concentration of MIT exposure that still significantly affects X. laevis development.

Funding for this project was provided by the National Scince Foundation.
FEELING THE BERN: THE RELATIONSHIP BETWEEN A VARIETY OF VOTER DEMOGRAPHICS AND THEIR LIKELIHOOD OF SUPPORTING BERNIE SANDERS

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This experiment analyzes various demographics and their respective impacts on voting for Sanders within Clark County, Nevada. We analyzed for gender (female held constant), race (White), age (18-24, 45-49, and 60+ years of age), education (less than a high school diploma, and Bachelor’s degree or above), and employment (unemployed held constant). The descriptive statistics found a surprisingly low level of support from 18-24 year olds. Our matrix of correlation coefficients demonstrated a high correlation for Whites and age 60+, suggesting retirees. Finally, results from multiple regression analysis demonstrated that multiple independent variables together with such a low level of observations (n = 60) to test impact of zip code demographics and their voting preference in the 2016 Democratic Caucus in Clark County are insufficient to produce statistically significant results, even in the instance of multiple reduced and semi-log models.

AN EVALUATION OF PERCEIVED IDEAL BODY TYPES AND THEIR RELATIONSHIP BETWEEN SELF-ESTEEM AND ATTITUDES TOWARDS EATING AMONG WOMEN

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Current research indicates that women who idealize a skinny body type experience lower self-esteem, lower levels of physical activity, and negative attitudes towards eating; however, there is limited research on the impacts of other body the aforementioned topics.

The purpose of this study is to examine perceived ideal body types (i.e. skinny, fit, and thick) and if there is a relationship between self-esteem and attitudes towards eating among women. Additionally, the study will explore if there is a relationship between race/ethnicity, level of physical activity, social pressures, and/or involvement in extracurricular activities.

A 73-item survey has been adapted from valid and reliable questionnaires. It is designed to explore the perceptions, attitudes and behaviors related to body type. BMI will be ascertained from self-reported weight and height. The survey will be administered electronically with a link that will record and store responses in a locked, limited access location. Women will be recruited through social media and social networking sites, as well as via email and email listservs.

As a pilot study it is expected that the findings will provide insight into women’s beliefs, perceptions and behaviors related to body type, food consumption, physical activity with possible mediating factors such a cultural influences and social behaviors. The findings will help to establish the framework for further inquiry and exploration into body types and related health outcomes among women.

Funding for this project was provided by the McNair Scholars Program Summer Research Institute.
DEVELOPMENT OF A NOVEL ALZHEIMER’S THERAPY

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Faculty Research Mentor: Nora Caberoy, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Alzheimer’s disease is a progressive neurodegenerative disorder that is characterized by impairment in memory, complex cognition, language, and visual/spatial skills. The exact cause for Alzheimer’s is poorly understood and currently there is no cure. One of the major pathologic hallmarks of Alzheimer’s is the buildup of harmful levels of amyloid beta (Aβ) protein aggregates in the Alzheimer’s brain. Aβs are normally removed by specialized cells in the brain called microglia. However, the removal of these aggregates leads to activation of the inflammatory pathway that eventually results to death of the brain cells.

The Caberoy Lab has identified Tubby protein as a ligand that facilitates eating and degradation of cellular debris through MerTK (Caberoy et al. 2010), a receptor whose activation is known to not cause an inflammatory response. Our goal is to develop a new therapy to prevent the build up of Aβ in Alzheimer’s disease. Our work towards this goal involves the development of peptides that have high binding affinity towards Aβ. For this study, we performed PCR mutagenesis and phage display selection to screen for peptides with high binding to Aβ. The peptides were then fused to Tubby protein to create hybrid proteins. Our hypothesis is that, the hybrid proteins will “snatch” harmful Aβ and “re-channel” them to an alternative degradation route that will not instigate a toxic response.

This research was presented at the OUR-UNLV Undergraduate Research Showcase at the University of Nevada, Las Vegas, October 2015.

Funding for this project was provided by the John B. and Mary N. Knight Trust “Alzheimer’s Disease Grant,” Funding for this research was provided by Institutes of Health/NEI grant to Nora Caberoy Ph.D. and NSF Research Infrastructure Improvement Award to Kayvon Etebar.

THE ROLE OF THE ACC IN PREFERENCE FORMATION

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Faculty Research Mentor: James M. Hyman, Ph.D.
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When an animal’s expected outcome does not match the actual outcome of a task, the anterior cingulate cortex (ACC) emits a signal known as feedback-related negativity (FRN; Milner, 1997). It is also well established that rats can dynamically modify their internal preferences based on reward probabilities. For this experiment, we will eliminate the ACC-FRN signal by infusing inhibitory compounds directly into the ACC while our subjects perform a rodent FRN task developed by our lab (Warren, et al., 2015). We have used preliminary behavioral experiments to modify the task to elicit rapid preference formations and reversals in rats. We expect the number of reversals achieved by our rats to dramatically decline post-ACC deactivation, suggesting that the ACC-FRN signal is necessary for updating internal preferences based upon changes in reward probabilities.
Bitcoin is both a digital asset and a payment system. In 2008, Bitcoins were first published and developed by the allusive Satoshi Nakamoto. This new system does not require a financial intermediary; in other words, it is peer-to-peer. The transactions are verified by network nodes and then recorded in a ledger, the blockchain. The blockchain uses Bitcoins as its unit of account. This system does not require a central repository or an administrator. With that being said, Bitcoin is the very first decentralized digital currency and is considered the first successful cryptocurrency.

Putting bank opposition, price fluctuation, and Bitcoin’s ‘bad’ reputation aside, Bitcoin is just a currency; it is a currency with great potential. Paired with the blockchain system, Bitcoins have the potential to create a new way to buy and purchase items securely and affordably. This report attempts to answer the question: Do Bitcoin and the Blockchain, together, provide a secure and affordable system for financial transactions that is not being widely implemented because of Bitcoin’s ‘fluctuating prices’, and because of Bitcoin’s infamous reputation? Mainly, this report focuses on Bitcoin’s fluctuating prices because they are much more testable than Bitcoin’s reputation.

Isoflurane is a volatile anesthetic that has been previously used in humans. Currently, isoflurane is almost exclusively used in veterinarian medicine. However, the mechanism of action is similar to popular anesthetics used in humans. Isoflurane produces an anesthetized state by utilizing inhibitory GABA signaling in the central nervous system. Because of the narrow therapeutic index that most anesthetics have, gaining an understanding of what it means to be anesthetized is important. Using EEG and gabra2-1 mutated mice, we aim to investigate the role of GABA alpha 2 subunit on inhibition and synchrony within the brain.

The mice were kept awake 60 minutes prior to being subjected to isoflurane. The isoflurane chamber was then filled for 1 minute to ensure complete saturation. Mice were then placed in the chamber, one by one, until gasping was observed. Time of subjection and removal from chamber was recorded. EEG recording was then continued for 60 minutes.

Results showed that wildtype mice have a noticeable decrease in gamma power starting about 10 minutes after being anesthetized. Reverberations in the delta and theta bands were observed for the full hour of post-chamber recording. Homozygous and heterozygous mice for the alpha 2 subunit mutation showed even greater decreases in gamma power. Delta spikes were observed while in the chamber, demonstrating that the brain was having difficulty coming back online. It appears that the role of the axon initial segment and axo-axonic synapses that contain the GABA alpha 2 subunit are integral in the role of anesthesia.
BIFUNCTIONAL N-HETEROCYCLIC PHOSPHINE (NHP)-THIOUREAS: EFFICIENT PHOSPHORUS REAGENTS FOR CATALYST-FREE PHOSPHA-MICHAEL ADDITION OF NITROALKENES

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² Nanjing Tech University

Faculty Research Mentor: Jun Yong Kang, Ph.D.
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Bifunctional N Heterocyclic Phosphine (NHP)-Thioureas have been designed and applied in phospha-Michael addition of nitroalkenes. The improved reaction here takes place at room temperature under catalyst-free conditions and exhibits good functional group tolerance. The key to the success of the reaction is the suitable hydrogen-bonding activation of the nitro group by the Brønsted acid (thiourea), which is directly combined with the N Heterocyclic Phosphine (NHP) part.

IMPLICATIONS OF MARRIAGE TRADITIONS AND SURNAME RETENTION

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Faculty Research Mentor: Rachael Robnett, Ph.D.
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This study investigated common perceptions regarding a man’s personality traits in marriages where the wife did not adopt his surname. It also examined the perceived power dynamic in marriages where wives kept their maiden name after marriage, as opposed to the more common practice of a wife adopting her husband’s surname. Findings indicated that men whose wives kept their maiden names were commonly stereotyped as being more effeminate and less masculine and that their relationships were stereotypically thought to more equal and egalitarian in nature, with the man espousing less power than is perceived to be readily apparent in most heterosexual marriages.

Participants’ descriptions of men whose wives do not take their husband’s surname were analyzed by using an inductive approach to thematic analysis as outlined by Braun and Clarke (2006). Participants’ open-ended responses to questions were coded, using themes identified throughout the participants’ responses. Results were then tabulated and a high inter-coder reliability was achieved. The implications of this study are far reaching in that marriage as an institution is a centuries old practice, and its traditions were long considered to be ubiquitous. However, by identifying existing stereotypes, these traditions can be examined and reevaluated; and findings from this unprecedented study can be deemed truly pioneering as current societal norms begin to shift.

Did you know?
The Office of Undergraduate Research can help you find a summer research opportunity!
The Office of Undergraduate Research (OUR-UNLV) is rolling out the brand new Summer Research Fund for undergraduate students conducting research under a Faculty Research Mentor during the summer months, starting summer 2017.

Information and applications will be available soon at unlv.edu/our

UNLV Office of Undergraduate Research Summer Funding

The Office of Undergraduate Research (OUR-UNLV) is accepting applications for OUR-UNLV Travel Funding. This award allocates up to $500 to assist undergraduate student researchers with travel to an academic conference, symposium, or other venue to present their scholarly work, or travel for research purposes (e.g., data collection, sample analysis, etc.).

2016-2017 Application Deadlines:

Fall 2016 (travel from 08/29/16 - 12/17/16): Due by September 20, 2016
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Summer 2017 (travel from 08/29/16 - 12/17/16): Due by April 20, 2017

For more information and to apply, visit unlv.edu/our

Hooray for Summer Research!
National Science Foundation’s Experimental Program to Stimulate Competitive Research Undergraduate Research Opportunity Program (NSF EPSCoR UROP)

Nevada INBRE sponsors 15 undergraduate research scholarships each year. Those selected for the program will spend the summer doing a lab research project in a faculty mentor’s laboratory. Summer research opportunities often lead to longer-term collaborations between students and faculty, publishable research, and careers in medicine or biomedical research. Opportunities are available for research in emerging areas such as genomics, proteomics, molecular modeling, imaging, and bioinformatics. However, any area of research that might be supported by the NIH is appropriate. Students are selected in a statewide, merit-based competition. As part of the application process, students are required to identify a faculty mentor at UNR, UNSOM, UNLV, or Nevada Cancer Institute with whom they are interested in conducting research.

For more information about this opportunity, visit unlv.edu/sciences/urop/inbre

Nevada IDeA Network of Biomedical Research Excellence Undergraduate Research Opportunity Program (INBRE UROP)

The Undergraduate Research component of the current NSF EPSCoR award provides lab and field research experiences, through summer scholarship programs and annual fellowship opportunities, to full-time NSHE undergraduate students.

These programs fund eligible students either majoring in mathematics, science, or engineering, or majoring in education and specializing in teaching K-12 in the fields of mathematics, science, or technology. Research is conducted under the guidance of NSHE faculty mentors. The hands-on experience gained through these programs has proven to supplement classroom learning and serve as gateways to new and exciting opportunities for all participants.

For more information about this opportunity, visit unlv.edu/sciences/urop/epscor
During the UNLV Dr. Ronald E. McNair Summer Research Institute, student scholars work on the research projects that they propose and design under the guidance of faculty research mentors. Scholars come from virtually all academic disciplines, such as the fine arts, social sciences, life sciences, engineering, hotel administration, and business.

To be eligible for consideration to participate in the UNLV McNair Scholars Summer Research Institute, applicants must be active participants in the UNLV McNair Scholars Post-Baccalaureate Program, and must be classified as a junior with no less than 60 credit hours.

For more information about the McNair Scholars Program and the Summer Research Institute, visit caeo.unlv.edu/mcnair/

The Calvert Award recognizes undergraduate students who demonstrate sophistication and originality in research projects. Up to five prizes will be awarded in three categories: Emerging Scholars with a $750 prize, Advanced Undergraduate and Creative Works with a $1000 prize. Project length will be dictated by the course instructor or project advisor who supports the application. Projects by individual or groups in all formats are eligible including: research paper or thesis, design portfolio, theatre designs, visual/fine arts performances accompanied by program notes, creative work (writing, art in any format), film/digital media, & poster presentations.

Applications due in April. For more information, visit library.unlv.edu/award#criteria
The CSUN Scholar Program was established by members of student government to recognize high achieving undergraduates at the University of Nevada, Las Vegas. Recipients of the nine different CSUN scholarships are distinguished as “CSUN Scholars” and are admitted to the CSUN Scholar Program, in which they are required to participate in university events throughout the school year. Scholars in this program are high achieving students with diverse backgrounds engaged in contributing to all aspects of the UNLV campus community.

The Research and Development Scholarship was created for the purposes of recognizing students who display academic abilities and potential. This scholarship includes a monetary award of $3,000 that will be awarded to students who will be actively working on a research, scholarly, or art project during the academic year in which they apply for the scholarship.

For more information about CSUN Scholarships, visit http://unlvcsun.com/scholarships/

The mission of NSURJ is dedicated to educating, supporting, and providing a competitive edge for all students in the NSHE system. This is accomplished by providing an accessible, student run, and highly selective peer reviewed research journal specifically for undergraduate students.

As an interdisciplinary journal, NSURJ accepts many forms of submissions. All manuscripts must be thesis driven. A literature based research manuscript is appropriate as it pulls current data and opinion in a thesis driven way that offers something original and unique to the field. The standard of a manuscript is expected to be higher than that of a college research paper. Because new protocols and experiments are often developed, NSURJ includes such development as publishable material.

For more information about how to publish your original work in the Journal, visit http://nsurj.com/
Acknowledgments

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Rosita Chapman, Conference and Event Coordinator

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Thank You!
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