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K-STATE STUDENT UNION BALLROOM
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THE DSP DIFFERENCE

A FUTURE OF DIVERSE EXCELLENCE

Developing Scholars Program

ABSTRACT BOOKLET

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The Meadow Project

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Grassland ecosystems lack protection across the globe. Only four percent of the planet's prairie grasslands are actively protected. This project was created to simulate these grassland ecosystems within a controlled environment. The purpose for creating this project is to evoke the idea of grasslands in a small scale, urban setting. A small, six-tenths acre area of land on campus, known as the Meadow, consists of native Kansas flower and grass species that are accustomed to the clay soils and climate of the area. Samples were taken during the 2016 growing season to determine the biodiversity of plants and insect pollinators. The Meadow was also monitored to evaluate absorption of storm water as compared to campus grass areas. Because of their adaptation to the climate and conditions of the Kansas area, the plants are sustainable enough as to require no irrigation, pesticides, or herbicides, but do require maintenance from volunteer workers. It has been found that the Meadow requires less cost for upkeep, compared to the typical campus landscape, but this savings is made possible in part by volunteer labor. More than thirty native plant species have been documented in the Meadow. Pollinators from multiple families in the order of bees and wasps and the order of butterflies and moths have been observed in the Meadow. The meadow serves not only as an example of sustainable and chemical free landscaping, but also an educational space for the Kansas State students, faculty, and the community that addresses the importance of preserving and integrating the prairie environment.

Use of Lexical Access Strategies in Typically Fluent Adults

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Adults who stutter (AWS) have a disordered phonological system that results in difficulty completing tasks when nonword stimuli is used, but not when the stimuli includes real words. If AWS have a disordered phonological system, then it should be disordered regardless of the lexical status of the stimuli; however, this is not the case. One way to account for this finding is to consider a lexical access strategy called redintegration that utilizes information stored with the meaning of a word to help remember the sounds of a word. For example, picturing a sheep will aid in the recall of the word "sheep" for a longer period of time than if only sounds were used. Nonwords have no meanings associated with them so using lexical access would not benefit a disordered phonological system. It is hypothesized that AWS use lexical access to bolster a weak phonological system, which is why deficits are only found when using nonwords. We used a Visual World Paradigm to explore the use of lexical access strategies in AWS. When provided with a target word, participants were shown pictures that were either lexically/semantically related, phonologically related, or unrelated to that target word. The eye tracker then recorded eye gaze to determine gaze order and duration. This study helps identify the strategy AWS use to process phonological and semantic information in contrast to typically fluent adults. The stimuli were tested first on typically fluent adults to establish that the stimuli resulted in the expected phenomenon.

Measuring Equity in Small Groups

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This project investigates how to measure equity in small student groups. We follow several student groups to operationalize how discourse may be equitable or inequitable. The groups came from the IMPRESS program, a two week, pre-college program that prepares first generation and deaf/hard-of-hearing students to major in a STEM field. At IMPRESS students focus on improving their metacognitive skills and cultural preparation for college life within a context of model building. We use three methods to measure equity. First, we look at speaking time: who talks, when, and to whom. Second, we look for moments when individuals are included or excluded and the prevalence of those moments. Third, we look at the comparative "inchargeness" – how much control an individual has over the direction of conversation – of the group members. We compare all three methods to see how effective and consistent they are at capturing equity in group's discourse.

Catalytic Effects in Gradient Films

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Catalysts speed up reaction rate by lowering the activation energy of a reaction. Catalytic activity is highly dependent on the composition of the catalyst. For example, when multiple metal oxides are mixed together, the relative compositions of the different metal oxides will impact catalyst properties such as acidity. In this research, thin catalytic films were synthesized with gradients in the compositions as a function of position using sol-gel chemistry. Two different metal oxide systems were considered: Al2O3-SiO2 and MgO-SiO2. To synthesize gradient films of these metal oxides, a glass slide was slowly retracted from a solution with a constantly changing concentration. This procedure, known as dip coating, allows for the production of catalyst films with gradients in composition. Experiments were conducted to optimize this process in terms of metal concentrations and gelation times in order to synthesize the gradient films. Once synthesized, films were characterized by using multiple techniques including: ellipsometry, an analytical technique that measures the difference in refractive indexes of highly thin films, scanning-electron microscopy (SEM) and energy-dispersive x-ray spectroscopy (EDS). These techniques allow the composition of the metals to be quantified as a function of position. With this information, methods for making catalysts with gradients in composition and functionalities can be developed.

Advantages of Air Cooling in Thermal Ablation

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Thermal ablation is the method of destroying tumors through extreme temperatures by inserting a catheter device into a designated area. Cooling the tip of the device can be used to control this heat in effort to expand the ablation size and cut down on the destruction of unwanted tissue. Thus far, water cooling has been the primary method used. The practice of using an air-cooling device to improve thermal ablation has shown to be beneficial. Its effectiveness compared to water cooling will be evaluated in this experiment. Two air-cooling devices will be created at different parameters. They will be tested ex vivo on pieces of meat and compared to the results of thermal ablation with water cooling and with no cooling. The air-cooling device is expected to show improved results compared to the other methods. This is due to air's ability to deliver more energy to tissue as well as air requiring less space, thus allowing for a smaller needle for insertion. The goal is that these air-cooling devices will produce a much larger ablation zone while being less invasive and more time efficient than a device with water cooling or no cooling. In finding that air-cooling is a much more improved method over water cooling, doctors practicing thermal ablation will be able to target a varying amount of tumors in a safe and timely manner.

Aquaporins: How boron gets into plants

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Typically, plants die from an excess of boron. This is an issue in southwestern states where soil has high boron and is hard to remove. However, for plants to grow, they need to uptake certain uncharged elements such as silicon, selenium, and boron. To obtain these elements plants use a system of channels in their cell membranes known as aquaporins. These aquaporins are proteins which have a low energy requiring mechanism for plants to allow these neutral elements to enter their cells. The focus of this research project was to create a model aquaporin to see how boron gets into plant cells. To construct the model, the research first needed a sequence of amino acids that code for this kind of aquaporin, leading to a literature review. The literature review suggested the closest relative to the salt cedar (boron tolerant plant studied in lab) found belongs to the squash family. This was determined by using phenology trees showing the history of aquaporins in plants. Once a sequence was decided, the sequence was then run through computer programs making a 3D model of the aquaporin to understand how the neutral elements are entering. The current phase is modeling off Aquaporin-1's crystal structure, while looking at areas of similarity between several more closely related species, determining where the helices are positioned within the structure.

The Redesign and Construction of a Compact Inverted Pendulum Cart

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In 2012, Dr. Warren White and his controls lab team created Kansas State's inverted pendulum cart, AKA "Wally." The four-wheeled cart uses a control system to balance the inverted pendulum, an underactuated mechanical system. If the pendulum falls in one direction (either forward or backward), the cart will roll in that direction to prevent it from falling, analogous to balancing a broom stick, vertically, in one's hand. The current cart is large, one of a kind, and difficult for a large number of students to use at once. The purpose of the project is to create a smaller, less expensive version of the inverted pendulum cart so that students will be able to test the dynamics of their controllers on their lab station tabletops. The greater number of carts would allow for a more efficient utilization of class time. The new cart, nicknamed "Junior", was designed using the program SolidWorks, with many of the parts 3-D printed or purchased from hobby robotics websites. The on-board control computer is the myRIO, a micro-controller, from National Instruments. The intended results will be determined by building a controller in LabVIEW and testing the dynamics of the cart using the program MATLAB. We are currently designing and testing the second "Junior" prototype. During testing of the first model, it was discovered that the front wheel slipped, calling for a redesign of the cart. Both a three-wheeled model and a four-wheeled model are being considered for the second prototype. The desired outcome is to produce a viable prototype that can then be reproduced for classroom use after further testing. The ultimate goal is to have nine inverted pendulum carts for classroom use.

The Influence of Coping Strategies on College Student Outcomes

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Financial stressors are common for college students and are known contributors to student attrition. The purpose of this study was to test the hypothesis that financial stressors will have a reduced impact on GPA, which could ultimately lead to dismissal or dropping out of college. A total of 16,675 e-mails were sent to undergraduate students, with a response rate of 20% for partial data and 15.5% for mostly complete data. In examining the impact of financial stress on GPA, we controlled for perceived resources and coping strategies. Results show that students who feel more financially stressed are associated with a lower GPA. Similarly, if students feel they are financially worse off than their peers, their GPA will most likely be lower. There is an inverse relationship between income and GPA with higher income (most likely associated with increased hours of part-time employment) being associated with lower GPA. An inverse relationship between age and GPA also exists. Problem management-focused coping strategies—such as organization and time management strategies—contributed to higher GPA, whereas emotion-focused coping strategies did not. Academic advisors may be able to help students improve their GPA by incorporating such things as time management skills, prioritization techniques, and organization as a way to increase problem-focused coping strategies. Findings suggest that working too much while taking coursework is counterproductive. Offering access to immediate needs—such as personal hygiene products, food, and textbook sharing—may reduce the reliance on part-time employment. Promotion of financial education opportunities is warranted.

Fatigue Effects on the Base of Wind Turbines

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Throughout the United States wind turbines (WT) have sprouted up like flowers of renewable energy. Wind turbine towers experience large stress problems as a result of wind load, which in turn will cause crack propagation at the diameter of WT base. Due to cyclic loads and stresses, WT structures are subjected to fatigue failure. In this study, fatigue of wind turbine towers is studied to gain an understanding of the causes of fragility of WT structures and ways to improve the fatigue life. Different methods have been used to assess the fatigue life such as S[tress]-N[umber of Cycles] Curve, Finite Element Method (FEM), miner's rule, and design codes (such as ASTM or AASHTO.) Preliminary conclusions include: thickness in tower affects crack propagation which then leads to a decreasing fatigue life, cyclic loads are the governing parameter for fatigue failure, fatigue lifetime decreases with an increase of stress range. In conclusion, this study summarizes the knowledge of fatigue life of WT structures and will assist further research.

Impact of Race and Sexual Identity on Social Integration on College Campuses

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Research has shown that students of racial and sexual minorities encounter unique experiences throughout college that are shaped by these identities. We are interested in the specific ways in which the college career of individuals enrolled at Kansas State University are affected by their race/ethnicity and sexual orientation. To gather results, we performed individual interviews with current students attending Kansas State University with a focus on students self-identified as being a racial minority, sexual minority, or an intersection of the two. Subjects were asked questions revolving around their interpretation of how their identities have played into their experiences in post-secondary education thus far. The knowledge gained from this study will provide insight into areas where Kansas State University is excelling at positively engaging students of racial and/or sexual minorities, as well as help us determine where improvement needs to occur.

Applications of Building Information Modeling for Contractors

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The goal of this project was to research the efficiency of Building Information Modeling (BIM) for contractors in cost reduction, time saving, and management. BIM is changing how the construction process works. This technology helps create and manage information in the construction process before, during, and after construction. The research was gathered from literature reviews on BIM. The companies studied were small and large commercial construction companies.The studies conclude that BIM made communication better between contractors, architects, and engineers; reduced construction costs; and made the process more efficient. Before this technology, contractors would have to adjust to construction problems as they faced them, but now contractors can see the problems before the structure is built. Research shows that BIM reduces the number of problems that are not normally seen in the design phase and saves contractors time and money. BIM technology also reduces workspace conflicts and construction problems that surface during construction. BIM is most useful in the design part of the construction process. Additionally, contractors use BIM to perform detailed construction estimates. BIM offers significant time and effort savings in the estimation process by minimizing manual takeoffs and creating more accurate estimates. Contractors also use BIM for schedule management for construction projects because it eliminates project delays, enhances visualization, and creates a more efficient schedule. The assessment of the studies indicate that BIM is a proven success in the construction process because of how efficient, functional, and convenient it is for construction.

Towards Faster Annotation in Learning to Filter Documents for Information Extraction Tasks

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This work addresses the problem of extracting procedural information from published papers: specifically, the task of choosing which documents from among a collection are of specified type, structure and content depending of a query and context. The novel contribution of this project is the development of a fast and usable user interface for annotation of training documents for machine learning.

In prior research, we developed a system aimed at extracting experimental data from scientific publications, with the long-term goal of extracting procedural information from relevant sections on experimental methodology. For this purpose, we use supervised machine learning to learn a classifier that can filter documents crawled from the web with respect to such relevance criteria. This learning task requires a lot of training data, hence the need to make human labeling of data (annotation) more efficient.

We consider subsequent information extraction tasks that depend on the documents passed by the filter: marking up sections (or passages) that contain the desired procedural information; finding the elements, compounds, and relationships that are related to a recipe of interest; and explaining to a domain expert why a document is relevant. These distinct use cases make the annotation task multifaceted, and illustrate the need for a new approach to annotation. Our approach focuses on speeding up annotation in learning to filter, while minimizing loss of precision or recall on the learning task, and aiming towards developing a reconfigurable user interface for text annotation.

Learning to detect relevant items: deep learning for object tagging in aerial images and semisupervised learning for text document categorization

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The research presented involves two different projects whose shared goal is to extract relevant items from an annotated data collection: spectral features from tagged bounding areas in images, and documents and subsections from web corpora. Deep convolutional neural networks have improved object recognition on image data, producing models that can be used to classify aerial images. With the purpose of systematically identifying luminous objects in images, this research uses Caffe, a deep learning framework, along with an object detection system that combines bottom-up region proposals with rich features computed by a convolutional neural network. The training input for Caffe models are nighttime aerial photos of ground-level objects superposed on maps showing the expected locations of individual objects. The output are images with bounding boxes and a classification label around each recognized object.

The primary goal of the second project is to train a classifier that can filter documents crawled from the web with respect to our relevance criteria: nanomaterials manufacturing. This requires section extraction, relevance determination, and deduplication. Selective learning was used to decide whether a document scraped from the web was relevant. Features used to train the classifier to identify relevancy came from a *gazetteer* of key terms and phrases. Training examples were generated by converting documents into a *bag of words* representation (vectors of normalized term frequencies, or TF-IDF). To improve the classifier's learning, active learning will be used to query users for feedback when a document is close to the current relevance boundary.

Visualizing Pneumocystis Protein Bgl-2 in Infected Mouse Tissue by Immunofluorescence

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Pneumocystis jirovecii, a fungus, causes *Pneumocystis* pneumonia, a potentially fatal disease in immunosuppressed patients. *Pneumocystis* (Pc) can become resistant to anti-fungal treatment. The underlying mechanisms for this are poorly understood. Recent sequencing of the Pc genome has revealed a number of proteins of interest, including Bgl-2. Homology analysis indicates that Bgl-2 is likely a beta-glucanase, an enzyme the breaks down the glycosidic bonds of beta-glucan, a component of the Pc cyst-form cell wall. To explore this further, we developed an immunofluorescence assay to examine the presence and location of Bgl-2 in different Pc life stages.

Pc cannot be reliably cultured *in vitro*, therefore mouse pneumocystis, caused by *P. murina*, serves as the animal model for human Pc research. In histochoice-fixed, paraffin-embedded Pc-infected mouse tissues we visualized 2 life stages, trophs and cysts, using a pan-PC marker, rabbit anti-major surface glycoprotein, and a mouse anti-beta-glucan marker. The latter identifies cysts. We combined these with a mouse anti-Bgl-2 serum and DAPI to create a 4-color image showing the relationship of Bgl-2 to the Pc. Our technique included direct, 1-step indirect, and 2-step indirect detection technique using Cy5 and Alexa fluor 488 and 594 fluorochromes. We also used multiple blocks to prevent cross reactivity common when multiple mouse raised antibodies are used together on mouse tissue. Uninfected mouse lung was our negative control. Multiple single and dual-label controls, as well as a reagent control, were also used.

The Effect of Tonicity on Canine Red Blood Cell Fragility in a Diabetic Model

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Serum tonicity reflects the osmotic effects of serum constituents and is important for cell volume regulation. Hypertonicity, caused by an increase in glucose (hyperglycemia), is a feature of canine diabetes and may contribute to diabetic complications. Canine red blood cells (cRBCs) can be used to assess changes in tonicity. We hypothesized that cRBCs maintained in hyperglycemic or normoglycemic environments will display different responses when exposed to tonicity changes. RBC responses to isotonic and hypotonic challenges were assessed using cRBCs incubated for 48-hr in 300 mOsM NaCl with 0, 30, or 60 mOsM added as either glucose or NaCl. cRBCs were then challenged by exposure to isotonic or hypotonic solutions containing the same or different osmole compositions. RBC fragility was determined spectrophotometrically by measuring hemoglobin released from lysed cRBCs during challenge. The results show that fragility of cRBCs incubated with 0 or 30 mOsM glucose or NaCl does not change during isotonic challenge. However, incubation with 60 mOsM added NaCl increased fragility 4-fold over 60 mOsm added glucose. The difference persisted when cRBCs incubated in 60 mOsm NaCl were exposed to 60 mOsm glucose during isotonic challenge but not when cRBCs incubated in 60 mOsm glucose were exposed to 60 mOsm NaCl during challenge. During hypotonic challenge, fragility was the same in cRBCs incubated with 30 mOsm added NaCl or glucose. In contrast, greater fragility was observed in cRBCs incubated with 60 mOsm added NaCl compared with 60 mOsm glucose and fragility was 2-fold greater than recorded during isotonic challenge.

Effects of mutation in C. *difficile* sin locus

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Clostridium difficile is an anaerobic endospore forming bacteria and is the major cause of nosocomial diarrhea and pseudomembranous colitis in hospitals. The dormant spores it produces serve as infectious vehicles responsible for transmission of the disease and persistence of the organism in the environment. When high risk patients with weakened immune systems, such as the elderly or infants, take antibiotics and the normal microbiota are disturbed, *Clostridium difficile* is able to establish an infection. In *Bacillus subtilis*, the *sin* locus (*sinRI*) is responsible for sporulation inhibition. A homolog of the *sinR* encoding gene is present in the *C. difficile* genome and was predicted to have a similar role. To understand the role of *sin* in *C. difficile*, we constructed and characterized *sin* mutants in the R20291 and JIR8094 *C. difficile* strains. We found that the *C. difficile sin* mutant is asporogenic in nature, indicating that the products of *sin* locus have positive influence on sporulation in *C. difficile*. Other than being asporogenic, the *sin* mutant in R20291 strain also displayed decreased toxin production and motility. Transcriptome analysis further revealed reduced expression of sporulation and motility-associated genes in the *sin* mutants when compared to the parent strains.

Contemporary Architecture Form Types | understanding design complexity

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This abstract proposes that it is not essential to have a formulaic response to form questions in architecture but one that strives to achieve an understanding of what shapes a building. To do so means to codify the evolution of contemporary architecture by looking at a variety of form determinants and design principles such as grounding, material, light, openings and program distribution. The intent is not to provide a stylistic guide to contemporary architecture but rather a means to discuss and trace the roots of architecture today and how it answers complex contextual and formal issues. Just as Durand's encyclopedic categorization of the architecture of the 19th century demonstrated a buildings compositional language, so have we derived a typological definition of five key form types found within architecture of our day: warehouse, tube, ribbon, fractal and peeling. This chapter of the research critically looks at the warehouse as a formal design alternative. The form determinants above are then applied holistically to better understand how the architect shapes space within the confines of the type. If we consider the architect's responses as intuitive and biological we can start to trace the evolutionary influence on contemporary architecture today. The theoretical underpinnings of typological studies as described by Laugier, Rossi, and Moneo, reveal a bias for geometric blocks found in nature. Contemporary theory builds from this to understand design complexity. This knowledge affords a road map to questions in the design process.

The Scaling of Data Collection and Processing of Many Sleep Study Subjects

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The overarching goal of this project is to gather heart and breathing rates of sleeping patients in hospital and assisted care living centers to study patterns that correlate to wake-up events. With this data we will be able to better analyze sleeping patterns for abnormalities. The software will also be programmed to watch for triggers of patients leaving their bed and to alert doctors and nurses which will increase the safety of the patients. This portion of the research focuses on the scaling of data collection. Currently we can only collect from one bed due to hardware limitations. With the use of embedded systems and a local file server we will be able to scale data collection to many beds with a minimal hardware increase.

We created PCB boards to gather and send data through Ethernet to a central server. The file server to house the data is still a work in progress. Once the server is in place it should sort the data as it comes in by source – i.e. the patient the data is attached to. With all the data on one local server we will be able to remotely access it from our labs to begin analyzing it.

Effects of Gap Junction Enhancers in Human Pancreatic Cancer cells

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According to the American Cancer Society, approximately 53,070 people in the U.S were diagnosed with pancreatic cancer in 2016. An estimated 71% of these patients will die within the first year. This type of cancer has been challenging to treat due to the complexity of tumor cells, tumor aggressiveness, current drug availability and drug delivery. Thus, the goal of this project is to provide a new approach to treat pancreatic cancer, including combination treatment of novel drugs as well as existing antineoplastic drugs. One approach is to increase cell communication of pancreatic tumor cells using small molecules and hence allowing antineoplastic drugs to effectively travel from cell to cell. A small molecule of gap junction enhancer, known as PQ1, in combination with antineoplastic drug, 5-Fluorouracil (5-FU), was used to test this approach. First, gap junction intercellular communication (GJIC) assay was performed. The results show that PANC-1 cells have minimal level of gap junction activity compared to normal noncancerous cells, suggesting pancreatic cells are similar to other types of cancer, i.e. breast and colon cancers in which cancer cells lost the ability to communicate with its surroundings. Next, PANC-1 cells were treated with PQ1, 5-FU, and a combination and examined the effect on gap junction protein. The results show that 5-FU significantly decreased the expression of gap junction protein, connexin 43, compared to control and PQ1 treatments. This suggests that 5-FU has negative impact on cell communication. Overall, the project provides an initial insight to a new approach in treating pancreatic cancer.

Purification of NMDA R1 mRNA binding protein GIIβ

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Alcohol addiction is a major disease in America and a major economic problem. Excitatory N-methyl-D-aspartate (NMDA) receptors play an important role in our body and are involved in the development of alcohol tolerance, dependence, and withdrawal syndrome. The NR1subunit is the functional subunit of NMDA receptors and we are investigating the effect of alcohol on this subunit. Our main aim here was to identify post-translational modifications of GIIβ, the beta subunit of alpha glucosidase II. This protein is a NR1mRNA RNA-binding protein involved in regulating expression of NR1after alcohol exposure. We performed a biological purification of GIIβ from mouse brain. The brain was dissected, minced and homogenized in the presence of anti-proteases. Homogenate was spun at 10,000 rpm for 10 min at 4C°to remove nuclei and mitochondria. Supernatant was layered over 30% sucrose and spun at 100,000g for 2.5 h at 4C°. Supernatant, the S100 fraction, was collected. In the presence of ammonium sulfate the S100 fraction was rotated at 4C° for 2h. Sample was then spun at 15,000rpm and the pellet dissolved in buffer A. Proteins in the dissolved pellet were separated by 8% SDS-Polyacrylamide gel electrophoresis. The gel was stained overnight with Coomasie dye. The 113kD protein band was excised and sent for mass spectrometry analysis to assess post-translational modifications.

Quality Factors of Secondary Cancer Risks

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To characterize the cancer-causing potential of radiation, the amount of energy deposited per unit mass in an organ (the absorbed dose) is adjusted by a quality factor, which represents the potential of a radiation type to cause cancer. Past studies have determined that the risk of secondary cancer through quality factors is dependent on the linear energy transfer (LET) in water. Recently, NASA developed a new quality factor definition that better characterizes the cancer-causing potential of particles of different atomic number and velocity. The purpose of this study is to understand how the NASA quality factor definition affects predictions of secondary cancer resulting from charged proton therapies and carbon ion treatments, two common radiation treatments. We plan to calculate the difference in dose equivalent calculated using the NASA quality factor and the LET dependent quality factor by simulating a water phantom. We will be calculating dose equivalent at different positions with respect to the radiation beams, and the collected data will help us determine the difference in estimates of secondary risk between these methods. If we find that the NASA quality factor results in substantially different dose equivalent values, we plan on extending our experiment to a computational phantom, and to a whole-body secondary cancer risk minimization in charged particle treatment planning. The results of this study will eventually help us determine more accurately the risk of secondary cancer for patients that undergo charged particle radiation therapy.

Ultrasensitive Detection of Cytokines Involved in Breast Cancer Progression

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Cytokines are small proteins that are important in cell signaling and have an effect on other cells. Cytokines are produced by a variety of cells, such as macrophages, B lymphocytes, T lymphocytes, mast cells, endothelial cells, fibroblasts, and stromal cells. There are cytokines, which are important in host responses to infection, immune responses, inflammation, diagnosis of cancer and other diseases. Although the exact initiation process of breast cancer is unknown, breast cancer could be detected by determining the presence of one or several cytokines that are specific for this type of cancer. The purpose of this approach is to create a nanobiosensor that can be used to detect the presence of an enzyme and cytokine expression pattern specific for breast cancer. The assay is composed of dopamine coated iron/iron oxide nanoparticles, cyanine 5.5, and peptide sequences that bind highly selectively to interleukin 6, Thymic stromal lymphopoietin (TSLP) and Chemokine (C-C motif) ligand 20 (CCL 20). Tetrakis-carboxyphenyl-porphyrin (TCPP) is tethered to the central inorganic nanoparticle by means of these oligopeptides. After the binding of cytokine to the oligopeptide, the signal that originated from TCPP was quantitatively monitored using a fluorescence plate reader.

Sample stacking in Capillary Electrophoresis using Viscosity Gradients

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Sample stacking is an effective way to increase the separation efficiency and improve the detection sensitivity in capillary electrophoresis. In sample stacking a mismatch in some buffer parameter between the injected sample and the surrounding running buffer is generated. This creates a condition where the analytes in the sample plug will transiently concentrate at the interface between the sample plug and run buffer. There are many ways that stacking can be implemented. The most common methods generally employ a conductivity mismatch between the sample plug and run buffer. The purpose of this project is to introduce a new approach to sample stacking. Sucrose will be used to increase the viscosity of the run buffer allowing analytes in the sample to transiently stack against the boundary between the sample plug and buffer. One major advantage to using sucrose is that it is nonionic and so does not affect the conductivity of the sample or run buffer. A second advantage is that the increased viscosity should decrease the electroosmotic flow thus increasing the resolution for any given applied electric field strength.

Identification of an Insect Cuticle Degrading Protease

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Insects have an outer skeleton known as an exoskeleton or cuticle. However, this limits how big they can grow. Therefore, they need to shed their old exoskeleton and synthesize a new one in order to continue growing, a process known as molting. To do this, insects produce a fluid that helps to degrade the exoskeleton. Enzymes found in this molting fluid are critical for this process. One of these enzymes is known as Molting Fluid Protease 1 (MFP-1). This enzyme has been previously purified and shown to be similar to the blood-clotting enzyme thrombin, however, the gene for this protease has never been identified. Our goal is to identify the gene coding for MFP-1. In order to accomplish this, we collected molting fluid from the insect and purified MFP-1 following a previously published procedure. This was achieved by utilizing distinct properties of MFP-1; namely its ability to bind to the complex sugar heparin, and its negative charge at pH 8. Progress was monitored by performing assays for enzymatic activity. The next step will be to analyze candidate proteins by the method of peptide mass fingerprinting. With this technique, a protein is cut into smaller pieces with an enzyme that produces a unique pattern of peptide fragments. A virtual digest is performed on the proteins in the genome which produces a unique pattern, or “fingerprint”, for each protein. The fingerprint from the protein digest is compared to each fingerprint produced by the virtual digest and statistical analysis is used to identify the best match.

Microalgae Lipid and Protein Productivity Data Confirmation

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Researchers are investigating various biomass sources as alternatives to fossil fuels to help reduce greenhouse gas emissions. Microalgae has been identified as a potential biofuel, food, feed, and pharmaceutical product due to high levels of proteins, carbohydrates, and lipids. They are advantageous over other biomass sources because they reproduce faster than most terrestrial crops, and avoid the food vs. fuel debate. However, there are scientific and engineering challenges that limit the cost effective extraction and processing of microalgae-derived-products. Current extraction and processing methods are costly, underutilize biomass components, and can be environmentally unfriendly. Previous work by our research group has focused on the use of aqueous enzymatic processing to extract protein and lipids from *Chlamydomonas reinhardtii*. As an initial characterization of the microalgae, protein and lipid productivity studies were performed when the microalgae was subjected to nitrogen replete and deplete conditions over a period of 96 h. Results indicated nitrogen deplete cells have maximum lipids and proteins accumulated after 48h with a dramatic decrease after 72h. Confirming this trend and modifying the data to show the values as lipid and protein content per cell will allow the research group to effectively design subsequent processing schemes to extract and recover proteins and lipids.

Atrogin-1 influences Drosophila muscle homeostasis

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Atrophy is a normal biological process in which cells or tissues decrease in size. Regulated atrophy ensures the correct and continual growth of an organism. However, atrophy that occurs in the wrong place or time can have negative effects on organismal homeostasis and survival. In humans, atrophy of the muscles can dramatically affect one's ability to perform normal everyday tasks and limits quality of life. To gain a better understanding of how muscle atrophy occurs and how to reverse its affects, we use the fruit fly *Drosophila melanogaster,* a model organism, to study muscle atrophy. Atrogin-1 is evolutionarily conserved from flies to humans and is required for normal muscle atrophy. The *Drosophila* larval muscles normally undergo a temporally and spatially regulated atrophy process that results in the remodeling of muscles for adult flight and mating. Muscle-specific RNAi knockdown of the *Drosophila* ortholog of Atrogin-1/CG11658 does not undergo this same atrophy process and instead the muscles retain their original size and shape. This suggests that Atrogin-1 is required for normal muscle atrophy. This characterization of Atrogin-1 is the first step in developing a genetic model for muscle atrophy. Future directions include determining additional proteins that function with Atrogin-1 during muscle atrophy with the long-term goal of better understanding how aberrant atrophy leads to disease.

Retention of Minority and First Generation Students in the College of Architecture, Planning and Design

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Recent literature, accreditations, and rankings validate the high quality education the College of Architecture, Planning and Design provides at Kansas State University. Support through the University and College are immense, yet retention rates amongst traditional Caucasian, minority, and first generation students appear to be significantly disproportionate. The purpose of the project is to explore and analyze the retention rates of minority and first generation students, document potential internal and external factors, and create action steps to assist the College. First, the project will examine the available retention data of minority and first generation students from their first semester within the college to their graduation. Secondly, a survey and\or interview process will be developed in order for students to self-identify the factors which contributed to their state of retention. Third, the research will identify common themes and needs of minority and first-generation students to inform action on behalf of the College. The poster will discuss the process, available results, and suggested actions in order to create a space for improved minority and first generation retention.

The expression of PGE2 and IDO in Human Umbilical Cord-Derived Mesenchymal Stromal Cells (HUC-MSCs) after Stimulation

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The preparation of human umbilical cord-derived mesenchymal Stromal Cells (HUC-MSCs) for clinical applications might be refined through analyzing their cytokine expression. An enzyme-linked immunosorbent assay (ELISA) was used to quantify the release of indoleamine 2,3-dioxygenase (IDO) and prostaglandin E2 (PGE2), which are known to mediate the immunomodulatory effects of HUC-MSCs. The expression was measured after activation by cytokines known to stimulate immune suppression. The lab compared one of seven biological replicates of HUC-MSC isolates with three stimulants: Lipopolysaccharide (LPS), Polyinosnic: polycytidylic acid (Poly (I:C)), Interferon-γ (INF-γ), and a control (no stimulant, standard low glucose DMEM with 10% fetal bovine serum media). After one hour of exposure to stimulation or control medium, the plates are washed and replaced with fresh cell culture media. Twenty-four hours later, the medium is collected and the cytokine content measured by ELISA. These results will provide a comparison to analyze if LPS, Poly (I:C), and INF-γ can cause immunosuppressive effect on cells derived from our technique compared to the control.

Importance of Spanish Song Study in Vocal Music Education

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The purpose of this study is to understand how studying Spanish classical music enhances vocal music curriculum, to describe effective pedagogy for Spanish classical music, and to understand student perspectives toward Spanish classical music. In most high school and college vocal music curricula in the United States, French, Italian, German, and English language classical music comprise the bulk of the repertoire. Spanish language music and diction is not a part of the core curriculum. This study is important because it will help illuminate the reasons why classical Spanish music is not currently part of the vocal music curriculum at the high school or college level in the United States, highlighting underlying systems of racism. This study focused on two main research questions, "Why is Spanish music excluded from the music curriculum, even though Spanish is commonly studied as a foreign language class in schools?" And " What could the inclusion of Spanish classical music look like and how would it enhance the curriculum?" To gather data for this study, the researcher began by studying three popular Spanish classical composers, to have a better understanding of Spanish Classical music. After studying the composers, the researcher observed three males and five females, in high school, undergraduate, and graduate programs at Kansas State University. The researcher documented how each participant responded to the music and what his or her weaknesses and strengths were while they learned Spanish pieces during their voice lessons. Also, the researcher studied each participants' perception of how the study of Spanish classical music helped their other vocal music studies. Each participant filled out the same survey describing their experiences with Spanish classical music (past and present) and what their opinions were regarding the style and how Spanish classical music helped their other vocal music studies. Finally, the researcher coded the participants' surveys and interviews using the tools of grounded theory. The researcher documented several key findings. The participants enjoyed singing songs in the Spanish language, the freshness of the music, and relaxed feeling of the songs. Because of this experience, the participants expressed a desire for more study of Spanish song. Also students described the performance of Spanish music as expressive and passionate, faster paced. They noticed the Arabic influence in the music, the qualities of the piano accompaniment as an equal partner to the voice, the specific character in the song. The significance of this study is that vocal students and teachers will develop personal connections to, and perceptions of, Spanish Classical music and learn unique performance qualities. Students and teachers can use this study to develop pedagogy that will include Spanish classical music in the vocal music curriculum on an equal footing with French, Italian, German, and English music and not see it as "extra-curricular."

Understanding Mathematical Concepts

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In mathematics literature results are not presented in a way suitable for a high school classroom. We look in the mathematical literature for interesting concepts, try to understand them and find ways to explain them to high school students. We looked at the concepts of magic squares and geometric dissections. A magic square is an array of numbers arranged so that the sums taken in any row, column or diagonal are the same. We also looked at another type of magic square which is called a geometric magic square. In a geometric magic square in place of numbers there are regions that may be assembled to pave an identically shaped region. Starting with one shape and finding ways to cut it and form different shapes is called geometric dissection. We wrote student activities and teacher guides for each concept. We tested the activities with a small number of high school and college students.

A case study of a rural, Spanish-language, Hispanic newspaper

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This study examines a Spanish-language publication in a Midwestern town with a population of about 25,000 and the publication's influence in the Hispanic community. Hispanic media use and consumption at the rural, community level is a topic that has been largely unexplored by the field of journalism. This case study will provide insight into the efforts and motivations of the publisher and his staff to expand coverage to Hispanic audiences, as well as insight into the reception of those efforts by the targeted Hispanic communities. This will be accomplished by analyzing surveys of a sample of the Hispanic community and conducting interviews with select religious, education and business leaders. These surveys and interviews are expected to reveal the most effective methods of communicating with the rural Hispanic audience. They also will show how the publication might better serve the information needs of the Hispanic community, and how it might focus its communication to that community. Interviews should yield information about the publication's successes and areas of potential improvement, as well as give answers to what the publication's goals are and what steps the staff can take to achieve those goals. The information garnered will be valuable not just to this one publication, but to other publishers in communities with a significant Hispanic presence.

A viral oxidoreductase modifies viral structural proteins, a requirement for virus infectivity

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Baculoviruses are enveloped, rod-shaped viruses with circular, double-stranded DNA genomes that infect insects. They have two virus forms: budded virus and occlusion-derived virus. The budded virus specializes in cell-to-cell infection within the insect, while the occlusion-derived virus specializes in infection between insects. The baculovirus *ac92* gene is a sulfhydryl oxidase present in all baculoviruses sequenced to date, suggesting that it has an essential function for baculovirus replication. During sulfhydryl oxidation, thiol groups from cysteines in specific proteins are oxidized to form disulfide bridges within or between proteins. Ac92, the product of *ac92*, is an envelope-associated protein of the budded and occlusion-derived viruses; its oxidation substrates may also be envelope proteins. Deletion of *ac92* affects the phenotype of each virus form: lack of infectious budded virus production and singly-enveloped instead of multiply-enveloped nucleocapsids in the occlusion-derived virus, suggesting defects in assembly. This project identifies viral proteins oxidized by Ac92 using two methods. First, we developed an assay in which viral proteins will be modified by alkylation and identified using mass spectroscopy methods. Second, we will purify tagged viral proteins by affinity chromatography and identify the pulled-down proteins. We hypothesize that the virus encodes a sulfhydryl oxidase gene to carry out this reaction in the nucleus and cytoplasm of infected cells, cellular compartments where this reaction is unfavorable. We further hypothesize that sulfhydryl oxidation of envelope proteins renders more stable and infectious viral particles. This information may translate into methods important to design better vaccines and therapeutic agents.

Gender Pay Gap at IPO Firms

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According to a study conducted by Bernadette D. Proctor in 2015, women working full time in the United States typically were paid just 80 percent of what men were paid. This 20 percent pay-gap is observed both at the rank-and-file labor-force and the corporate executive levels at public corporations. However, the state of gender pay-gap at entrepreneurial ventures or IPO firms is not well documented. This research project is aimed at filling this gap in the literature. The research motivation for undertaking this study is twofold. First and foremost, if we were to study the nature of gender pay gap more closely, it is essential that one examines the firms that straddle between small and large, and private and public; IPO firms perfectly fit that description. Second, this topic draws significant interest of the media and is deemed important in policy circles so that any socio-economic gender bias can be eliminated, or at best alleviated, through curative policies. The main hurdle of conducting this research is the lack of readily available data on entrepreneurial firms. But this data can be hand collected from EDGAR's (SEC's Electronic Data Gathering, Analysis, and Retrieval system) IPO prospectus filings. Therefore, we have begun the process of collecting data from EDGAR. Our sample of IPOs is between 1996 and 2013 obtained from the Securities Data Company (SDC). Accounting data would be collected from Compustat. For a comparative analysis with the S&P 1500 companies, we would use Execucomp data. The study would principally rely on regressions and matching methodologies for analysis. We have collected about a quarter of the required data from EDGAR, which does not allow us to state anything definitive at the moment. We are hoping that the data collection will be completed by the end of spring 2017, and a working draft of an academic paper will be ready by the end of summer 2017 for conference presentations and submission to a journal for publication.

Does Anti-Inflammatory Treatment Alter Glucose Infusion Rate Required to Maintain Euglycemia During Insulin Infusion?

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Sodium salicylate (SS), a non-steroidal anti-inflammatory drug (NSAID), has been shown in previous studies to cause hypoglycemia in early lactating cows. We hypothesized that in an induced hyperinsulinemic state, SS would cause an increase in the glucose infusion rate required to maintain euglycemia. We hypothesized that this is especially true for cows being frequently milked, as this increases milk yield and therefore elevates the demand for glucose. To investigate the interaction of NSAID and glucose demand, a total of 32 Holstein cows will be randomly assigned to treatments during early lactation with infrequent and frequent milking as well as with the control and salicylates (2 × 2 factorial design). On day 5 of treatment, insulin-dependent glucose metabolism will be evaluated using the hyperinsulinemic-euglycemic clamp protocol. To date, 12 cows have completed the study, and glucose infusion rate data from these cows were analyzed by ANOVA. Under hyperinsulimic conditions, glucose was infused at a mean rate of 163 ± 44 g/hour. There were no significant effects or interactions of NSAID and milking frequency in the current cohort of cows. We found no evidence of alterations in insulin-mediated glucose utilization by milking frequency or NSAID treatment in early lactation.

SA-K6L9-SA Peptide Sequence Loaded with MSN

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The SA-K6L9-AS peptide is a highly toxic peptide sequence, which has potentially a great impact of destroying cancer cells, yet, it cannot be delivered systemically because of its toxicity. Our group is developing a self-assembling sequence that can aggregate with itself and launch the formation of supramolecular peptide structures that include the SA-K6L9-AS sequence. In considering a novel approach of loading an anti-cancer peptide, we will use a MSN (Mesoporous Silica Nanoparticle) synthesis technique that was developed by Dr. Wang in the Bossmann group. He performed the first synthesis of an MSN around a supramolecular structure. In my research, the MSN will be synthesized around the self-assembling SA-K6L9-AS sequence. Using MSN as a frame will "gift-wrap" the peptide sequence and, therefore, retain its toxicity. Human cells are able to dissolve the silica, thus releasing the peptide again. We used MSN that have been built around this peptide sequence and tested them in cell cultures of cancer and normal cells. The advantage of this method is to load anti-cancer peptides into safe transport containers and get the maximal loading capacity, followed by efficient release once the target has been reached.

Invasion of Mesenchymal Stromal Cells in 3-D PGMatrix and Human Platelet Lysate

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Mesenchymal Stromal Cells, MSCs, can help promote cell regeneration on an open wound. The common method to culture MSC is in 2-dimensional (2D) model. The growth of cells in 3D environment can mimic in vivo better than 2D environment. Here, the purpose of this study was to see how MSCs responded to growing in a 3D environment. The invasion of MSCs were monitored in two different 3D gel models: a synthetic peptide hydrogel, Pepgel's PGmatrix, and a gel made up of Human Platelet Lysate gel, HPL gel with a custom-made cast that created holes in the gel. Two assays were performed. One where the HPL gel was the surrounding gel and the MSCs were inserted into the hole while being enclosed by PGmatrix. The other method was the opposite where the surrounding gel was PGmatrix and the MSCs were inserted while being surrounded by HPL gel. The results for both assays were different. MSCs invaded HPL gel from PGmatrix, but could not invade PGmatrix from HPL. It is possible that the MSCs died within the HPL gel, or could not traverse the boundary between the two types of gels. For the assay with the PGmatrix as the surrounding gel, the MSCs were not able to invade into the pepgel, indicating that the MSCs died within the HPL enclosure. The reason as to why this is happening to the MSCs is still unclear. The findings will contribute to the forward movement of clinical applications for MSCs grown in pepgel and HPL gel, as well as enable us to use a 3D printer to lay down a scaffold for MSCs to grow into for tissue engineering purposes.

How Community Engagement is Implemented in Financial Literacy Programs

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According to OECD, "A 2012 study of nearly 30,000 teenagers from 18 countries found more than 1 in 6 students in the U.S. failed to reach the baseline level of proficiency in financial literacy" (OECD, 2012). Given these statistics, when students need to make important decisions they lack the knowledge needed to decipher the best options possible even after graduation. The lack of financial literacy is a cyclical issue that can be stopped at the college level (Bidwell, 2013). This literature review provides the best practices of community engagement that consist of trust, empowerment, mindfulness, and stories from a series of sources that range from books to articles and journals. These elements provide a criterion to evaluate practices of community engagement that are effective as an assessment tool to see how existing financial literacy programs implement them and how successful they are. Eventually, this study will show existing best practices, which will be used as a cumulative case study to develop a foundation for the future development of a financial literacy program that works in tangent with existing programs.

Behavioral Health in Wyandotte County and Beyond: Perceptions from decision-makers and community members

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From rural areas where vast distances limit access to care to urban places where increasing demand challenges providers, access to behavioral health service is a pressing health issue across Kansas. K-State Research and Extension received a federal SAMHSA (Substance Abuse, Mental Health Services Administration) CAPE (Community Assessment and Education to Promote Behavioral Health Planning and Evaluation) grant to conduct research on the perceptions that decision-makers and community members have about behavioral health in Wyandotte county, Kansas City, Kansas. Research methods included monthly surveys, provider focus group, expert interviews, and review of population-based behavioral health data. Results indicated that inadequate cultural diversity, cultural preparedness and cultural accommodation among behavioral health providers was a primary barrier to consumer access of appropriate behavioral health services. Providers also acknowledged that availability and accessibility were linked to acceptability of behavioral services provided. Researchers recommend that solutions to barriers include cultural adaptation education of behavioral health providers, advocacy for behavioral health in the community, and empowerment of culturally diverse clientele.

Probation Outcomes in the State of Kansas

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An emerging body of empirical work on the effects of social context on community supervision has made important contributions to the American criminal justice system. These studies have shown that recidivism among parolees is shaped by unemployment, socioeconomic disadvantage, and the availability of community and treatment resources. Research on probation outcomes, however, has focused on individual-level characteristics associated with probation outcomes, such as offender (e.g., race, gender, race/ethnicity, and employment status) and case characteristics (e.g., offense severity and criminal history), and has neglected whether probation outcomes are influenced by location, that is, socioeconomic and community context. This is a timely issue as almost 4 million individuals in the U.S. are currently on probation (Bureau of Justice Statistics, 2014). Therefore, the current study uses probation data from the Kansas Department of Corrections, across 105 counties, between fiscal year 2004 to fiscal year 2014. The primary objective of this study is to test whether probation outcomes in Kansas vary across counties. The goal of this study is to discover if probation outcomes vary in different counties. Previous studies have neglected to connect the location of an individual and their probability of their probation outcomes. Past studies have only looked at the individual variables rather than connecting them to where the individual resides and how their location determines the level of punishment for their offense. The results should address the following; which offender and case characteristics predict probation outcomes in Kansas? Do probation outcomes vary across counties in Kansas? Do county-level characteristics predict probation outcomes? Is the association between county-level characteristics and probation outcomes conditioned by offenders' race/ethnicity?

Engineering Retention Rates

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Retention rates for students in engineering all over the world are decreasing. To address this issue, the department of Electrical and Computer Engineering at Kansas State University changed its instructional model; this study is an assessment of the new instructional model and its effect on first-year students' retention rates. The focus of our research is whether the new form of electrical engineering (EE) education, i.e. video lectures, student mentors, and early engineering courses, are more conducive to higher retention rates compared to the old form of EE education, i.e. years of math, physics, and general education, before taking any engineering courses. The study measures engineering students' retention rates by comparing grades of students who took the old form of engineering courses and the grades received by those taking the most recent EE courses. The study also looks at concurrent math enrollment and whether that influenced what grade they received in the class. What we expect to find is that the newer EE class is helping the new students stay in engineering fields. There are not nearly enough students graduating as engineers to meet the growing demand for engineers in our ever technology-based world. Because of this, it is very important to find out how we can minimize the number of students leaving engineering.

Trim32 is Required for Muscle Histolysis in *Drosophila*

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Protein synthesis and protein degradation must be balanced for muscle development and function. A protein called TRIM32 is essential for proper muscle function and maintenance. Human mutations in *TRIM32* result in Limb-Girdle muscular dystrophy type 2H (LGMD2H) or the unrelated Bardet-Biedl syndrome (BBS). Due to the evolutionary conservation of TRIM32 across organisms, the common fruit fly *Drosophila melanogaster* serves as a good genetic model, as mutations in fly *Trim32* exhibit larval muscle degeneration. We recently discovered that *Drosophila Trim32* plays a role in muscle histolysis of the dorsal oblique external muscles (DEOMs) during pupal morphogenesis. Our hypothesis is that *Trim32* mutant muscles would not degenerate due to inhibition of cell death proteins. This hypothesis was tested by monitoring the DEOMs during progressive stages of pupal development. We found that histolysis was blocked and muscles were still present in knockdown of *Trim32* using RNA interference (RNAi). These findings are important to understand the normal function of *Trim32* in muscles. Studying the function of this protein in *Drosophila* can give us insight on how it functions in humans, which with further study can help prevent these muscular diseases or create treatments.

Civic Engagement on College Campuses

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A significant number of students are inclined to actively participate in activities, organizations, events, elections, and leadership roles on campus. This high-achieving mentality stays with these students all through their educational career, and fuels their successes in the real world. What if these motives that cause an interest to bring about change – a passion to spark innovation – could be identified? This study aims at recognizing these foundational influences by analyzing demographic information, grades, and perceived levels of engagement among first-year college students. Surveys will be distributed to a variety of groups across Kansas State University (KSU) including the residents of Haymaker Hall, the members of Black Student Union (BSU), the members of KSU's Student Governing Association (SGA), members of various Greek houses, as well as the students enrolled in Honors Leadership II (LEAD 252). Questions will be asked to quantify socioeconomic background, racial identity, high school involvement in extracurricular activities, perceived level of high school involvement, collegiate involvement in extracurricular activities, perceived level of collegiate involvement, and academic achievement. Findings from this research will contribute to how both high school and college student organizations outreach, the activities promoted within pre-collegiate institutions, and how specific groups of students – those with the most inherent susceptibility to lower levels of engagement – are identified and encouraged to become more civically-active. In the end, the findings from this research will help shape future generations of young people into responsible leaders and active, aware citizens.

Gender Bias in the Media

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As society evolves, there is an increase of gender diversity amongst most workforces. The focus of study for this research is on the gender divide within television news. The research focuses on the balance of news content delivery between males and females. Preliminary data indicates that males typically have more air time covering hard news such as politics, crime, and international affairs whereas women are noticeably presenting more soft news stories that target human interest, features, and education. The research will compare and analyze live streamed newscasts from the last week of June of 2016, from small to large designated market areas in the northwest region of the United States. Each newscast will be coded for market size, station affiliate, anchor gender, reporter gender, story topic and gender of expert/non-expert sources. When the coding has been finalized, the data will be able to show whether gender bias is relevant and if a particular gender of news talent is more prominently represented in the television news industry or if previous studies will be disproved. Research is currently in progress, however, it is possible that the gender bias identified in previous research will remain a prominent concern. The results from this research are crucial because it may show gender bias to have social influences. The end results are necessary in order to see if data from previous studies is still relevant and if gender segregation in the news is still evident. Although this research is primarily focused on gender representation and segregation in news broadcasts between two different designated market areas, data may show that the bias is much more than a media issue, it is possibly a national issue of unjust gender bias. This research will be presented as a case study of gender representation in news media and able to show if males and females are being given the same opportunities and privileges as their opposite sex colleagues.

Thyroid Stimulating Hormone regulation of Kir7.1 expression in the rat thyroid epithelial cell line, FRTL-5

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Thyroid hormones are critical in many bodily processes and their production is dependent on the thyroid's ability to concentrate I^- by uptake from the environment. Iodide enters follicular cells via a Na^+ I^- symporter, NIS, which couples I^- uptake to Na^+ entry. Consequently, NIS relies on the inwardly-directed Na^+ gradient maintained by basolateral Na^+, K^+-ATPase. Kir7.1 is a K^+ channel that is also located on the basolateral membrane of thyroid epithelial cells, which supports the notion that Kir7.1 supports pump activity by shunting K^+. This suggests that stimulators of I^- uptake, such as thyroid stimulating hormone (TSH), potentially regulate Kir7.1 total and/or surface expression. In order to test whether TSH alters total expression, FRTL-5 cells will be grown in the absence or presence of TSH. Total cell lysates will be evaluated for total kir7.1 levels by immunoblotting using a well-characterized anti-Kir7.1 antibody. This antibody detects an extracellular region of Kir7.1 which enables us to test for surface expression using a surface luminescence assay. We predict that surface luminescence and immunoblot will be increased if TSH does increase Kir7.1's total and/or surface expression.

Effects of HDAC inhibition and Environmental Conditions on H3 acetylation in Nucleus Accumbens

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Epigenetics, the study of how life experiences alter gene expression and histone acetylation, is a relatively new field which has gained major interest in drug addiction research. Differential environmental conditions early in life impact drug-taking and drug-seeking behaviors, as well as acetylation of several histones, including H3. We investigated the role of histone acetylation in differentially reared rats on drug-seeking behavior in an animal model of drug relapse. Rats were randomly selected and reared in three different environments: enriched condition (EC), isolated condition (IC) and standard condition (SC). Rats underwent surgery for indwelling jugular catheters that were used for amphetamine self-administration. A process of random selection was done to indicate which rats from each environment were administered a Histone Deacetylase (HDAC) inhibitor, Trichostatin A (TsA), during the extinction period to alter epigenetic function. After the sessions were complete, the brains were removed and prepared for immunoblotting to analyze the expression of H3 protein in the nucleus accumbens. IC rats administered TsA showed significantly decreased cue-induced reinstatement compared to EC and SC rats. These results suggest that isolated rearing environments alter HDAC function, leading to the hypothesis that there will be increased H3 expression in IC rats treated with TsA compared to IC rats treated with vehicle, while EC rats will have an overall increased expression of H3 within the nucleus accumbens. If the hypotheses are supported, it will suggest that enriched environments and TsA are increasing histone acetylation of H3 in a similar way, supporting that acetylation of histones increases transcription and decreases sensitivity to drug addiction.

The Cultural Appropriation of Native American Dress

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In fashion, Native American culture and dress is commonly misrepresented and oversimplified by non-native individuals, leading to offensive and inappropriate use. Appropriated dress of Native people has become prevalent in the fashion industry and particularly evident in pop-culture. From feathered head dresses to plagiarized textile prints, Native American culture is appropriated through dress. The objective of this research project is to explain cultural appropriation in fashion and provide an appropriate alternative to the offensive Native American dress. By analyzing Native dress worn by non-natives and explaining the reasons that the ensemble can misrepresent and oversimplify the Native community and culture, the research will help individuals understand the harmful effects that appropriated dress has on Native people. The research will define cultural appropriation and cultural appreciation, provide examples and background of traditional Native American dress, examples of appropriated dress, and provide appropriate alternatives of Native American inspired dress. The alternative examples will include purchasing dress from Native American designers and local businesses. Along with educating people about appropriation of traditional dress and culture, the objective of this research is also to show the importance of proper representation.

The Uptake and Secretion of Salt Ions by Saltcedars

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Flue gas desulfurization water is purposefully discharged into wells or bodies of water near coal-fired power plants. It contains compounds like sodium chloride, sulfate, and boron in large amounts that can kill plants. Boron in small amounts can severely hinder growth or kill many normal plants, so this is very dangerous to plants in our environment. Boron also does not just evaporate or leave the environment voluntarily; it spreads and must be contained. In our lab, we are looking to replicate the flue gas desulfurization water in order to see how it affects saltcedars. These plants are known for being hardy, invading many desert areas of the world as an invasive species. So far, we have learned that the saltcedars can tolerate high amounts of different salts and relatively high amounts of boron. This means that the plants we test can survive and even grow in harsh and toxic environments. We think that their ability to take up salt from the environment and secrete it onto their leaves could be part of the reason why they can survive such high amounts of boron. We plan to use inductively coupled plasma-atomic emission spectroscopy (ICP-AES) to evaluate what elements they secrete from their leaves and analyze their root membrane lipids in order to see how they take up ions in their roots. This makes them suitable for planting near Flue gas desulfurization water affected areas in hopes of stopping future contamination from spreading or even eliminating it from the environment.

Playing It Safe: The Threat of Appearing Racist Affects Perceptions of Subversive Racial Humor

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Subversive racial humor uses racial themes to criticize racial stereotypes rather than perpetuate them. However, previous research has demonstrated that White individuals frequently fail to grasp the subversive intent of such humor-instead, seeing it as disparaging (Saucier, O'Dea & Strain, 2016). Because finding humor in racial jokes could signal to the self or others that the perceiver is racist, we hypothesized that when individuals are primed with concerns about appearing racist, they will be less likely to say that subversive humor is funny and more likely to say that it is racist. In two studies, we manipulated the threat of appearing racist and presented subversive racial humor to participants. In Study 1, we found that participants who viewed subversive humor in the presence of a Black experimenter, versus a White experimenter, reported that the humor was less funny and more racist. In Study 2 participants were either led to believe implicit measures would reveal that they are prejudiced or that they were not prejudiced. We found that individuals in the high threat of appearing racist condition reported that the humor was less funny and less likely to have an anti-racism message, compared to participants in the low threat condition. Both studies demonstrate that while subversive humor's intentions are prosocial, individuals may deem it disparaging in an effort to not appear prejudiced. Therefore, although intending to challenge racial stereotypes and prejudice, subversive humor may inadvertently encourage the prejudicial beliefs it is intended to oppose.

Supporting Literacy Initiatives in Ethiopia: BCL

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This project explores the challenges and benefits of using a cascade model to provide professional development to librarians in Ethiopia. In partnership with Ethiopia Reads (ER), an NGO, the Book Centered Learning (BCL) project provides assessment-driven curriculum related to three areas deemed necessary for the development of high quality school libraries in government/public schools. Areas assessed include library organization, read-aloud protocol, and community access and advocacy.

Training module content is responsive to data collected in March 2015 and 2016 from 22 intervention school libraries and 8 control school libraries. Libraries selected to receive training represent rural and urban schools in nine regions in Ethiopia. Curriculum training for the ER Staff is conducted in Addis Ababa by U.S. educators in cooperation with the ER in-country director. ER staff then deliver the training to individual libraries on-site. Preliminary findings, based on rubric data and qualitative interview coding, has determined that librarian turnover creates a need for frequent training/ re-training opportunities. Additional resources, specifically children's books in local language and English, are needed. Librarians appear hesitant to participate in read-alouds, however there is evidence of read-alouds that have been implemented with some success. Recommendations include the development of a collaborative network for sharing innovative practices between librarians and a focus on increasing advocacy for libraries for young children and improving community access to books.

Collection of data has been suspended this spring (2017) due to political unrest in Ethiopia and will resume once staff feels it is safe to travel throughout the country.

Comparing Distribution System Design for Educational Supplies to Support Hurricane Recovery in Haiti

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Hurricane Matthew in October 2016 was the most powerful Caribbean storm in a decade, damaging many communities across Haiti. Numerous organizations are participating in the recuperation of the country. Education is essential for the country to recover and thrive, but many schools were damaged or destroyed. Therefore, organizations are helping through the provision services, allotment of education kits and other activities. Although all the organizations want to meet current needs, they often do not coordinate with each other, which impacts their effectiveness. The goal of this research is to quantify the differences in outcomes resulting from different distribution scenarios. The study considers eighteen highly impacted communes (Haiti's third administrative level) and the organizations working in each commune as published in "Humanitarian Data Exchange." The data are used as input to optimization models representing different distribution scenarios for education kits. One scenario requires each organization to have its own distribution center at each commune, the second model has a shared distribution center for all organizations serving in the commune and in the third model each organization has a single warehouse. The total distribution cost under each scenario is compared, providing quantitative information about tradeoffs in distribution system design. The insights acquired from this research have the potential to support more effective humanitarian relief efforts. There are thousands of humanitarian organizations operating around the world on a daily basis. Research to better understand and encourage coordination is critical to achieving the greatest impact.

Cloning and Overexpression of Human Ornithine Decarboxylase Gene

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Vaccinia Virus (VACV) was used for the eradication of smallpox and is now used as a vector for vaccine development against a variety of infectious agents as well as an agent for cancer development. Studying VACV infection will benefit the future application of this virus. Previous studies conducted in this lab revealed that inhibition of human ornithine decarboxylase (ODC1) gene expression by RNA interference (siRNA) inhibited VACV infection, suggesting that ODC1 is important for VACV infection. ODC1 is vital for the polyamine biosynthesis pathway. To further verify this observation, in this study the aim is to construct si-RNA-resistant ODC1 gene and overexpress it. To construct the si-RNA resistant gene, human ODC1 gene is cloned and inserted into pSG5 vector, namely pSG5-ODC1. The human ODC1 RNA is extracted and reversed transcribed into human cDNA. Polymerase chain reaction (PCR) is then conducted to amplify the ODC1 gene using the pair of primers. The gene is then inserted into a pSG5 vector plasmid. The plasmid is identified by PCR and then sequenced. It is then transfected into HeLa cells. After two days of the transfection, expression of the ODC1 gene is tested through Western blotting. The ODC1 gene cloning and overexpression was successfully conducted. Next we will examine whether the siRNA-resistant ODC1 rescues VACV replication.

Structure and function determination of VceAB MDR efflux pump proteins of *Virbrio cholera*

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A rising health concern is antibiotic drug resistance in bacteria. A component of multiple drug resistance (MDR) is the use of efflux pumps, a major intrinsic mechanism. In order to inhibit MDR efflux pumps, a greater understanding of the components and their interaction is necessary. VceCAB is an MDR efflux pump operon found in a diarrheal causing agent, *Vibrio cholerae*. The tripartite efflux pump is composed of VceC an outer membrane protein, VceA a periplasmic adaptor protein, and VceB a cytoplasmic membrane transporter. Structural analyses are needed for VceAB in order to comprehend function of the operon, as VceC has already been structuralized. A full length VceA-6His membrane protein (42 kDa) and VceB-6His membrane protein (55kDa) were over expressed in *E. coli*, purified using Ni-affinity column and obtained a diffractable crystals for VceA (at 2.4 Å resolution). Purified VceA protein was further confirmed by anti-VceA antibody and its efflux activity by genetic complementation assays. We observed minimal expression of VceB, even under slower growth condition at 17 C with or without IPTG inducer. VceB being a membrane transporter, it uses proton motive force as energy source for the pump activity and this may cause toxicity when we try to overexpress it. X-ray diffraction data was used to solve the VceA structure by molecular replacement using various homologs of VceA in the protein database as search models and no clear solution was obtained. This prompted us to attempt to prepare seleno methionine (SeMet) labeled VceA protein in order to solve the structure using anomalous scattering methods. Currently, we are optimizing growth conditions for VceB and crystallization conditions of SeMet-VceA protein to improve their purification and diffraction properties, respectively.

Determining ideal cell growth conditions and growth curve for hHela cell line

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The objectives of the experiment were to (A) determine the ideal PepGel Matrix concentration and seeding density for optimal hHela cell growth and (B) determine the growth curve for hHela cells under ideal conditions as a function of time. Prior to experimentation, hHela cells were recovered from cryogenic preservation and sub-cultured in Dulbecco's Modified Eagle's Medium (10% FBS 1% Glutamine 1% Penicillin/Streptomycin) until a passage number of three was attained. This practice ensured the cell line had adapted to culture conditions.

(A) The optimal conditions for hHela cell growth were determined by measuring cell proliferation rates at varying seeding densities and PepGel Matrix concentrations. The gel matrix, from which the cells were suspended, was composed of 65%-85% cell solution + DMEM, 10%-30% PG Matrix © and 5% PG Works © by volume. In Sample A, three sets of wells were seeded at concentrations of 10%, 20%, and 30% PepGel matrix. Each set consisted of two wells at seeding densities of 8*104 cells/ ml and 1.6*105 cells/ ml. Each set was inoculated on three separate 48-well plates and maintained in an environment at 37° C with 20% O2 and 5% CO2. The wells were harvested 6 days after inoculation. At the time of harvest, the cell viability and cell proliferation were determined for each well. The ideal PepGel Matrix concentration and seeding density for hHela cell line was determined to be 20% gel concentration and 8*10^4 cells/ml.

(B) The growth curve for the hHela cell line was determined by measuring cell proliferation rates at varying times after inoculation. Sample set A was inoculated on Day 0. The sample set consisted of nine wells inoculated at the ideal seeding density and PepGel matrix concentration. The nine wells were seeded in nine separate 48-well plates and maintained at 37° C with 20% O2 and 5% CO2. One well was harvested each day over a nine-day period. Cell viabilities and proliferation rates were determined for the wells at their respective time of harvest. The proliferation rates were graphically displayed as a function of time.

Latino English in the Heartland: A New Majority in Southwest Kansas

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Studies of Latino English have traditionally been centered on major population centers, like Los Angeles and New York City (Fought 2003, Mendoza-Denton 2008, Wolfram 1974), or on long established Latino communities in the Southwest (Schecter & Bayley 1997). However, changes to the meat packing industry created population movements in the 90s that have altered the demographics of numerous rural towns throughout the continental US (Kandel & Parrado 2005). As these changes have primarily attracted a Latino workforce, varieties of Latino English are now emerging across the US in these rural New Destinations, creating the opportunity to analyze initial stages of dialect contact. This current analysis contributes to previous research on Latino English in two ways: First, I document general features of the emerging Great Plains variety of Latino English; Second, I consider how these features compare to other varieties of Latino English to discern if there are Supraregional features that unite this variety of Latino English with other New Destination and Traditional varieties. This study focuses on Liberal, Kansas, a town where the Latino community has grown from 19.5% of the population to 59.1% of the population over the past twenty-four years (US Census). Findings from this study are an important addition to the current canon of Latino English from both theoretical and descriptive perspectives as New Destinations illustrate how substrate features can unite ethnolinguistic varieties even as local demographic and social factors create subtle differences.

Examining Carbon Nanomaterials Using a Scanning Electron Microscope

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Electron microscopes are used to examine micro and nano materials at high magnification that would otherwise be very difficult to study. The samples must not contain water, should be a good conductor of electrons, and be small enough to fit inside the microscope chamber. This semester I learned to operate a scanning electron microscope (SEM); I took high magnification images of carbon nanomaterials and compared the size with everyday materials. The nanomaterials were found to be approximately 10,000 times smaller than human hair. There are two main steps to operating a SEM: Sample preparation and imaging. First, place double sided carbon tape on the slope of a clean aluminum stub. Next, gently place a small piece of the sample vertically on the slope of the stub. The top edge of the sample should be aligned with the edge of the slope. Then place the stub in the SEM chamber and use the computer software to create a vacuum in the chamber. For imaging the sample, align the sample beneath the electron "gun" using joystick controls. Once the electron beam is turned on, the electrons are directed to "hit" the sample surface; during this process, some of the electrons are deflected by the sample—these electrons are collected by a detector to create a black and white image of the sample magnified up to one million times. Sharper images could be obtained by focusing the electron beam. This allows us to observe the 3D structure or materials on a very small scale.

Effects of Sugar-Sweetened Beverages on Metabolic Syndrome Risk Factors and Insulin Sensitivity

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Sugar-sweetened beverages (SSBs) contribute to increasing rates of chronic disease in the United States. Previous research has shown that reducing SSB consumption contributes to improvements in metabolic health and insulin sensitivity in adults, but there is limited experimental research examining the consequences of adding SSBs to the diet. Therefore, the aim of the current study was to determine whether the addition of SSBs to the diet affects metabolic syndrome risk factors and insulin sensitivity. The current study compared the effects of adding one of three beverages to the diet: caffeine-free soda, 100% fruit juice, or water. College-aged (18-30 years; n=36) participants were randomized to a beverage condition and underwent a glucose tolerance test using their assigned beverage. Blood samples were collected at baseline and over a 2-hour post-consumption period to assess glucose and insulin levels. Participants were given a 3-week supply of their beverage and were instructed to drink two servings each day (~710 mL). Following the 3-week intervention, participants visited the laboratory to repeat all baseline assessments. Preliminary results (n=10) indicate no differences (p=0.99) in glucose incremental area-under-the-curve (iAUC) between the soda (2103.5 ± 1403.9 mg/dL x 2 hr) and juice (2090.2 ± 897.7 mg/dL x 2 hr) conditions. Upon completion of the study for all participants (n=36), results are expected to show no differences in metabolic syndrome risk factors and insulin sensitivity between the caffeine-free soda and 100% fruit juice conditions. Insulin sensitivity is expected to decrease following SSB consumption similarly for both SSB conditions, as compared to the water condition. These results will contribute to the current body of literature by elucidating the health outcomes associated with adding SSBs to the diet.

Characterization of Primary Human Hepatocytes and Hepatoma C3A Cells for Hepatic Functions and Molecular Mechanisms of Action of Gold Nanoparticle Toxicity

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The various in vitro liver systems have been utilized to investigate the potential adverse effects of xenobiotics, drugs, and nanoparticles. Cultures of primary hepatocytes and immortalized cell lines are widely used for liver toxicity testing. We investigated the cytotoxicity in primary human hepatocytes and hepatoma C3A cells exposed to 40 and 80nm gold nanoparticles (AuNP) with branched polyethylenimine (BPEI), lipoic acid (LA) and polyethylene glycol (PEG) coatings. Cytochrome P450 3A4 (CYP3A4) activity, reactive oxygen/reactive nitrogen species (ROS/RNS) and molecular mechanisms with 40nm BPEI-AuNP were investigated. The 40 and 80nm BPEI-AuNP were cytotoxic to human hepatocytes and C3A cells, whereas LA- and PEG-AuNP were not cytotoxic. All BPEI-AuNP showed time-and concentration-dependent increase in ROS/RNS in hepatocytes and C3A cells which correlated with cytotoxicity at 24h. All BPEI-AuNP inhibited CYP3A4 activity only in human hepatocytes. The 40nm BPEI-AuNP showed the high cytotoxicity and was selected for transcriptional profiling using the human molecular toxicology pathwayfinder RT2PCR array at a cytotoxic dose. Differentially expressed genes in hepatocytes exposed to 40nm BPEI-AuNP were mainly involved in phase I metabolism and the basolateral and apical transporters genes. In conclusion, human hepatocytes were the more predictive in vitro liver toxicity model, whereas C3A cells may be useful to study the role of oxidative stress in toxicity.

Exploring data from the 2MASS survey

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The Two Micron All-Sky Survey, or 2MASS, is an astronomical survey of the full sky in the infrared spectrum. 2MASS began operations in 1997 and eventually observed 300 million objects, including galaxies, stars, brown dwarfs, and minor planets in the solar system. The accumulated data and images are now in the public domain and contain an abundance of valuable information of those objects including their color in different wavebands, angular positions, photometric uncertainties, photometric biases, etc. The data catalogue also contains special point sources that correspond to bright stars, nebulae, and asteroids. The objective of this project is to explore the 2MASS data and analyze to what degree properties of the objects are correlated by constructing graphs of those properties in various combinations. We measured the luminosity functions of 2MASS galaxies in different magnitudes and obtained results that are consistent with the Schechter power law functional form. The 2MASS final data release also contains approximately 16,000 objects that, when compared to data from other surveys, were identified as asteroids. We would like to investigate whether or not it is possible to look at the catalogue of infrared point source data and determine with some degree of certainty that a source could potentially be an asteroid. This result could be relevant to various near-earth object programs.

Parent Report of Speech and Language Patterns of Young Children in a Clinical Sample

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In order to examine the sensitivity and clinical utility of the Caregiver/Parent Understanding-the-Child-Questionnaire (CPUCQ), the current study expanded on the initial sample of typically developing children to a sample of children with speech-language disorders. To explore how parents describe key developmental milestones, parents of young children receiving speech-language therapy services completed the CPUCQ. The purpose of this study was to make a comparison between the comments made by parents of children with and without speech-language disorders as well as a qualitative comparison between comments pre- and post-intervention. Participants were 14 parents who chose to utilize the CPUCQ optional comment fields taken from the larger sample of 34 preschool-age children. Comments were reliably aggregated into developmental themes established in the prior study with the addition of one receptive language category. Findings indicated that the parents of children with speech-language disorders generated more comments than the parents of typically developing children regarding speech clarity and aberrant behavior when communication challenges arose. Both groups made comments regarding the use of gestures. Findings from the pre- and post-intervention comparison were affected by a significant proportion of parents who made comments pre- but not post-intervention. Some parents who did include comments on the post-intervention questionnaire repeated pre-intervention information while other parents added comments they did not mention the first time. Overall, the CPUCQ demonstrated versatility for use with parents of children with and without speech-language disorders. The tool allows for more focused parent report for clinical use by speech-language pathologists and other early interventionists.

Detection of anti-staphylococcal activity by utilizing copper-dependent inhibitors with an extended thiourea group

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Multi-drug resistant bacteria are proving to be a major problem for the health care system. Current drug discovery screenings have failed to produce proper antibiotics for methicillin-resistant *Staphylococcus aureus* strains (MRSA). Copper has been proven to activate antibacterial properties of copper-dependent drugs that inhibit the growth of MRSA. We have developed a new drug discovery screening method that utilizes the properties of copper in order to distinguish anti-staphylococcus copper-dependent compounds. The screening of 10,000 compounds for anti-staphylococcal activity in copper revealed 53 of 129 active compounds exhibiting copper-dependency. The findings of an extended thiourea group called NNSN motif on copper-dependent compounds, resulted in copper-dependent and copper-specific inhibition of *S. aureus*. These compounds have been found to display effective anti-MRSA activity. Therefore, by developing a copper-based screening, we have discovered that copper-dependent compounds that contain NNSN, can be used to inhibit the growth of MRSA. The second step of this endeavor consists of the synthesis of multiple compounds with an extended NNSN motif. This research is guided by the paradigm that by systematically varying the substituents R1, R2, and R3, which have been identified as essential, an optimal drug candidate can be found. The activity measurements are being performed by Dr. Wolschendorf and his team at UAB.

Meat of the Matter: Productivity, Turnover, and Retention in Rural Midwest Meatpacking

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With the recent financialization of the U.S. economy, manufacturing and agricultural producers have been under pressure to adopt lean and flexible employment practices to reduce costs and boost productivity. These practices often include organizing work to involve strict task regimens and monitoring workers' movements to shave seconds off their production times. This can generate high employee turnover. At the same time, employers who continue to operate in the United States, rather than offshoring production, need a labor force they can rely on to provide stability and certainty in production, particularly when—as in agriculture—production is highly sequenced. How do agricultural employers remain competitive in an era of stringent international competition for growing shares of global markets while striving to create stability in their U.S. labor forces? Meatpacking is a strategic research site for examining my question because it tends to produce high annual labor turnover rates among its mostly immigrant labor force. Some workers, however, stay on the job for many years. To understand which practices help retain workers over long periods of time, I will conduct dozens of in-depth interviews with workers who have the longest work tenures in a meatpacking plant located in a remote, rural Midwest town. By examining their experiences of staying on the job, I hope to learn more about how workers and managers can create work stability in an economy increasingly characterized by precarity.

The Broiler Chicken as a Model for Protein Efficiency and Iron Bioavailability for Human Nutrition

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Anemia is one of the biggest problems in the world which affects a staggering amount of two billion people, about 30% of the world population. Anemia is a lack of healthy red blood cells that can cause many complications. Those in developing countries who receive food aid, such as fortified blended foods (FBFs), are at an increased risk for iron deficiency anemia as well as malnutrition. Our primary objective is to determine how growth and iron bioavailability of Corn Soy Blend Plus (CSB+), the current United States FBF that is provided, compares to our own formulated FBFs. For our research project we are testing the iron bioavailability in sorghum based fortified blended foods with the broiler chicken model. Corn and soy blended foods are being replaced with sorghum and cowpea then using boiling water to mix the blends with and feeding it to chickens. We have eight different blends and one control blend, which is regular chicken food, and we will analyze hemoglobin as well as liver ferritin (protein that contains iron) in all the chickens and see how iron absorption compares between different treatments. Our expected results are that our FBFs will result in higher iron and growth outcomes compared to the CSB+. This indicates that FBFs were more effective than CSB+. If these are the results it means that we found an effective food to increase iron absorption in individuals especially with anemia. The study lasted 6 weeks so the chickens could fully grow, but the data will take longer.

Novel regulation of the CRISPR/Cas9 gene editing system in *vivo*

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Budding yeast (*Saccharomyces cerevisiae*) has been a powerful model organism for research for many decades and recent Nobel Prizes in Medicine/Physiology have been given to yeast geneticists for their key discoveries. Yeast is the simplest Eukaryotic, single-celled micro-organism and is easily manipulated and studied in the lab. Clustered Regularly Interspaced Short Palindromic Repeats (or CRISPR) is a newly discovered antiviral defense mechanism from bacteria. In 2012, CRISPR systems were used to target specific DNA sequences demonstrating its potential for gene editing in all living creatures. In only five years, this genetic editing system is being used for basic research, curing genetic diseases, battling pathogens, and aiding in agriculture. This editing system uses the bacterial Cas9 enzyme and a short programmable sequence of RNA that are able to efficiently target the complementary DNA sequence in any genome and create a double-stranded break. DNA breaks are repaired in two ways—chromosomes can directly fuse (non-homologous end joining) or donor DNA can be added, allowing for homologous recombination and insertion of new sequence. One concern in the use of the CRISPR/Cas9 editing system is ensuring that the Cas9 protein has been delivered to the desired location in the genome without any "off-target" effects. Creating unique DNA target sites (using artificial DNA sequences) will aid in regulating how Cas9 can edit different positions within the genome. Future work on this project involves understanding how to manipulate Cas9, the programmable RNA, and engineered target DNA sites to allow for a more powerful gene editing system.

Analysis of Gait Using Falls Contribution Assessment Technology (FCAT)

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The implementation of telemonitoring in our healthcare system allows us to remotely monitor patients. Services like these are now being popularized by companies like Life Alert®, but they have the potential to be more than just a response system. Our research goal is to identify ways of giving early warnings if a patient is at risk of falling. To be able to do this you must first have a profile for each person. A person's profile is a series of comprehensive data points that can identify their walk. We are attempting to find factors that can construct an accurate profile, so if/when a patient wavers from it by too much a nurse can be alerted. This data was recorded using a Microsoft Kinect® and then put into Microsoft Excel®, and then a graph was created. This was done for a "slow" walk, as well as the patients normal gait. From these graphs and data, a profile was created using linear and quadratic regression models to fit the individual's graph. We have found out that it is necessary to have more than one variable in the creation of these profiles, and have been able to create the first forms of a patient profile. From this we can conclude that eventually with more development, we will be able to identify and assist people who are at risk of falling. This will help move the focus from rehabilitative treatment, to preventative treatment. This will help avoid a lot of hospital visits and therefore save vital resources for both the individual and the healthcare system.

Rapid Cell Freezing

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In order for us to study and advance biological research it is important that we preserve cell lines. Cell lines are prone to contamination and genetic drifts. When this happens it is very expensive and time consuming to reproduce the cell line. Due to the fact that we receive our cells from living specimens and that there is not an infinite source for valuable cells, we must ensure that we have an efficient and economical method to preserve cells. Previous research conducted by our lab has shown that with the use of nanotubes we can freeze water without expansion or production of ice crystals. This method has allowed us to create amorphous ice very quickly. This method opens new possibilities for cell preservation. The use of nanotubes will allow us to keep the cells alive and preserved by controlling frost and expansion at a very low cost. With the use of nanotubes and a high precision 3D printer we hope to create a product that will reduce the cost and time required for cell preservation.

The Effect of Grammatical and Typographical Errors on Brands and Advertising

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Companies have become lackadaisical in their editing of grammatical and typographical errors. This research seeks to understand if a grammatical error or a typo in an advertisement affects how the consumer feels about the quality of the product being advertised, the brand, or the credibility of the corporation. Basically, do these errors affect the image of the company? We seek to understand if consumers think of grammatical errors or typos in ads as lessening the value of a product, brand or firm. If consumers see the errors, we also want to know if the mistakes have any bearing on purchasing intentions. A student survey will be conducted, then a more generalized survey will be shepherded to understand if there is a difference in age, income, and education levels in terms of errors in advertising. Both known and unknown brands, as well as overt and less overt mistakes, are featured in the survey. Respondents must also take a grammatical test after the survey to check their knowledge of the errors.

Emotion Estimation Through Brain-Computer Interface

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In order to better understand the reasoning and motivation behind our actions, it is necessary to begin at a root of our decisions: our emotions. Emotions have the power to influence many essential factors of our daily lives such as the way students approach exams, how patients react to treatment, and which marketing tools have a positive appeal on consumers. We now have the instruments to analyze our driving force through the process of emotion estimation. Though other groups have claimed to detect emotion, the results have not proven that which is detected is emotion rather than a task-specific response. We will approach this matter by now incorporating two tasks for our measurements, the International Affective Picture System (IAPS) and the International Affective Digital Sounds (IADS), and use the technique of cross-task classification to confirm our results. Ultimately, our findings could allow us to better understand our human emotions and approach challenging situations or decisions with sharpened control.

Evaluation of Dehulled Faba Beans (Vicia faba L.) as a dietary ingredient in dog diets

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Novel ingredients help fuel growth in the $30 billion pet food market. Faba beans are common in human foods and may be beneficial in pet foods too. The objective of this experiment was to determine the effects of dehulled faba beans (FB) in an extruded diet on nutrient digestibility by dogs. The study was conducted as a replicated 4 x 4 Latin square design with 12 Beagle dogs fed diets containing 0, 10, 20, and 30% dehulled faba beans over 4 periods. Dogs were adapted to experimental diets for 9 days, followed by 5 days collection. Food and feces were analyzed for dry matter, crude protein, ash, and gross energy. Feces were also analyzed for acid insoluble ash as an indirect marker for fecal output. The apparent total tract digestibility (ATTD) of dry matter was highest ($P<0.05$) for FB0, FB10 and FB20 (average 86%), and lower for dogs fed FB30 (81.7%). Crude Protein ATTD was greater ($P<0.05$) for FB20 (89%), intermediate for FB0 and FB10 (average 87.45%) with FB0 similar to FB20, and lower for dogs fed FB30 (84.8%). Crude fat ATTD was greater ($P<0.05$) for FB20 (94.2%), intermediate for FB0 and FB20 (average 92.1%), and slightly lower for dogs fed FB30 (90.8%). Gross Energy ATTD was greater ($P<0.05$) for FB0, FB10 and FB20 (average 80%), and lower for dogs fed FB30 (72.9%). This study suggests that FB is an effective ingredient for use in commercial dog diet. Table 4. Apparent total tract digestibility (ATTD) of dogs fed diets containing increasing levels of dehulled faba beans, determined by external marker AIA.

Photonic Crystal Fiber Microcell Connectorization

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Optical frequency references are typically gas-filled glass cells which absorb laser light at specific wavelengths allowing one to precisely measure the frequency of that laser. Optical frequency references are used in many industrial applications such as optical telecommunications, medical imaging, and remote sensing. Current implementations of optical frequency references are gas-filled glass cells coupled to standard optical fiber, which are fragile, bulky, and expensive to manufacture. The group of Brian R. Washburn and Kristan L. Corwin in the Kansas State Department of Physics have developed optical frequency references on gas-filled photonic crystal fibers. These references are called photonic microcells (PMC), which are extremely portable and robust.

In our effort to develop a new generation of photonic microcells, we have demonstrated a method for making all fiber PMC that is completely compatible with industrial fiber components. This involved splicing, cleaving, polishing, and connectorizing the PMC. With certain programs using an Ericsson fusion splicer we taper and Q-tip the ends of fibers essential for making a cone shape inside the fiber for a better efficiency. We did this by modifying programs already in place in the splicing machine. Using epoxy and polishing films we were able to obtain clean splices and polished ends. We connected the PMC's to a stationed pump laser. As a result of the new connectorization method we have better long-term stability with the fibers because of the increased efficiency of wavelengths being pumped through the fibers.

Physical Activity Portrayed in Popular Online Magazines

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The use of online magazines has increased with the use of technology. Because magazines are a common source of exercise information for the general public, it is important to examine how physical activity is portrayed through popular media. For this study, we selected 10 articles each from 10 popular online magazines (e.g., Teen Vogue, Cosmopolitan, Family Circle, Reader's Digest, etc.) with a health/fitness section, targeting ages ranging from teens to older adults. For each article, we coded how exercise was portrayed in terms of location, necessity of additional equipment, and descriptive keywords used to hook readers' attention. Results showed there were no significant differences by age; but there were overarching patterns with regard to location, equipment, and keywords. Out of 125 references to location, 60% mentioned home based exercise, 28% referred to a gym setting, and 12% mentioned outdoor exercise. Out of 100 articles, 65% recommended exercise that required additional equipment. And out of 114 keywords coded, 60% used words such as easy/quick/anywhere, 17% used challenging/tough, 13% used fun, and 10% used secret/magical. Based on these results, we found popular magazines emphasize workouts that are quick, easy, and can be completed anywhere. Because time and cost are prominent exercise barriers, we discovered the majority of online magazines analyzed were working to accommodate these barriers and promote self-efficacy to fit exercise into one's daily life within the general public.

The Drivers and Consequences of Recent Urbanization in Vietnam

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In the last two decades, Vietnam has been urbanizing at a rate of 3.4% per year as a result of rapid economic growth, and 34% of the country's population currently lives in cities. Urbanization is transforming Vietnam's economy and society as well as its urban and rural landscape. The migration of rural residents, particularly the young, to cities in search of better employment and educational opportunities is the important driver of the recent urbanization. The Red River delta around the capital city of Hanoi in the north and the southeast region centered on the Ho Chi Minh City in the south have become particularly important magnets for rural migrants. These two regions have received much of the recent foreign investments in Vietnam and migrants have flocked there to take the new jobs resulted from the investments. This has led to increased geographic concentration of population. While cities expand rapidly and are becoming increasingly crowded, Vietnam's rural population decreased from 1990 to 2015, which has adversely affected the rural economy. The cottage industry that played an important role in village life has shrunk substantially, and food security has also become an important issue as urban expansion and infrastructure developments encroach upon farmland. How to minimize the negative consequences of rapid urbanization and industrialization is a challenge facing Vietnam in the years ahead.

Progression Elevated Gene-3 Promoter Controlled Expression of Proteins Selectively in Tumor Cells

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The progression elevated gene-3 (PEG-3) promoter drives a rodent gene that has shown strong activity in tumor progression. Demonstrating tumor specificity and activity in at least five different human cancers, it is considered a novel promoter for tumor-specific gene expression. In this study, we aim to use the PEG-3 promoter to ultimately express a therapeutic gene, cytosine deaminase (CD), specifically in cancer cells. This CD "suicide" gene encodes an enzyme which catalyzes the conversion of a nontoxic prodrug, 5-fluorocytosine, into a toxic drug, 5-fluorouracil, to kill tumor cells selectively. Here, we are expressing firefly luciferase 2 (luc2) or an enhanced cyan fluorescent protein (eCFP). The PEG-3 promoter will drive the expression. Cancer cells and normal cells will be transfected, and the expression level in the two types of cells will be compared. To test this, the PEG-3 promoter and the eCFP or luc2 reporter genes will be designed and subcloned in a pcDNA3.1 vector. *In vitro* transfection of mammalian cells will allow us to introduce the genes into normal cells and cancer cells. Qualitative real time polymerase chain reaction will allow us to confirm the transcription of the gene in the cells. Fluorescence microscopy or bioluminescence will then allow us to check the expression of the reporter genes. These results are expected to yield further understanding of the tumor-specificity of the PEG-3 promoter. Demonstrating the controlled expression of the "suicide gene" in cancer specific regions is of interest because it has the potential to serve as a method to treat cancer without affecting normal tissue.

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Factors That Influence the Acquisition of a Small Wireless Company

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In the wireless industry, new companies are continuously popping up, especially in areas with low barriers to entry. With large players that serve most of the United States such as Verizon Wireless, Sprint, AT&T, and T-Mobile consistently looking for new ways to grow their customer base, acquisition becomes a very viable solution. Acquisition is an opportunity for the seller to turn a quick profit and an opportunity for the buyer to grow their company and make an investment that will potentially increase profits. There are many different factors that can make a small wireless company an attractive buy for the larger companies in the industry. This project looks at customer base size, quality of equipment, customer demographics, and market regions to decipher what factors make the biggest impact on a buyer's decision to acquire.

Does inflammation modulate insulin control of lipid metabolism in early lactation dairy cows?

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The purpose of this study was to understand how anti-inflammatory treatment influences the response in lipid metabolism during a 2-hour insulin infusion. Approximately 1 day after giving birth cows were allocated to either sodium salicylate (SS) or control treatments, and also to milking frequencies of 1 or 3 times/day to alter nutrient demand. On day 5 of the study, the cows were fed small portions of feed every two hours to stablilize nutrient influx, then 2 separate intravenous infusion periods were undertaken. In the first 2 h, glucose was infused to maintain blood glucose concentrations at 60 mg/dL in all cows, and in the second 2 h, insulin and glucose were infused to elevate plasma insulin while continuing to maintain 60 mg/dL blood glucose. Prior to infusions and at the end of each infusion phase, blood plasma samples were collected for analysis of non-esterified fatty acids (NEFA; a measure of adipose tissue released of lipids) and beta-hydroxybutyrate (BHBA; a ketone body produced by metabolism of fatty acids). Responses were analyzed to determine effects of SS, milking frequency, and their interaction on changes from baseline concentrations of NEFA and BHBA. As expected, insulin infusion decreased both NEFA and BHBA concentrations, and glucose infusion also modestly decreased NEFA concentration. During the glucose infusion period, SS and milking frequency tended to influence NEFA concentration ($P = 0.08$), with SS increasing NEFA for cows milked once/day and decreasing NEFA for cows milked 3 times/day. During insulin infusion, BHBA was significantly increased by SS, but only in cows milked 3 times/day ($P = 0.01$). Anti-inflammatory treatment in early lactation cows alters ketone body metabolism in cows with high nutrient demands, suggesting that inflammatory profiles influence metabolic adaptations to lactation.

Posters at the Capitol Presenters

Investigating the molecular mechanism underlying the anti-cancer action of dietary flavonoids

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Flavonoids are plant-derived metabolites that have been shown to have anticancer properties. However, the biochemical mechanisms underlying flavonoid action is currently unknown. By investigating the regulation of gene expression in development using Arabidopsis as a model system, several regulatory proteins have recently been shown to be stabilized by natural compounds of the flavonoid biosynthesis pathway. This finding, combined with another recent study that shows that the dietary flavonoid fisetin induces apoptosis in human cancers by inhibiting the transcription factor Heat Shock Factor 1, led to the hypothesis that fisetin stabilizes HSF1 by direct interaction. Our results from differential scanning fluorimetry (DSF), a thermal shift assay, suggest promising binding of HSF1 to the flavonoids fisetin and quercetin. After separating the different forms of HSF1 using fast protein liquid chromatography, our results from Native-PAGE following treatment of HSF1 with fisetin indicate fisetin binding to the monomeric form of HSF1. Furthermore, we have uncovered another novel mechanism of action that fisetin could directly bind to SUMO (ubiquitin-like modifier) in a concentration-dependent manner. Since trimerization and post-translational sumoylation of HSF1 under heat shock is critical for its activation and DNA binding, by stabilizing monomeric HSF1 and SUMO, fisetin could inhibit tumor proliferation. This is the first study to have shown that HSF1 can directly bind flavonoids. Our current efforts are aimed at co-crystallization of HSF1 and SUMO with fisetin. Since fisetin has chemotherapeutic potential, promising novel drugs that more efficiently stabilize HSF1 and SUMO could be developed as innovative therapies to combat cancer progression.

Hostility as a Mediator between Trauma Exposure and Health Outcomes in Married Soldiers

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Military personnel consistently report high levels of mental (Sen, Seal, Miner, Bertenthal, & Marmar, 2007) and physical health problems (Hoge, Terhakopian, Castro, Messer, & Engel, 2007). Further, suicide rates among veterans are roughly 50% higher than their civilian counterparts (Kang, 2015). However, few empirical studies have explored the pathways by which trauma exposure negatively impacts health outcomes. Conflict in romantic relationships has been associated with decreased health quality (Choi & Marks, 2008). Yet, close interpersonal bonds have been found to buffer the negative impact of traumatic stress (Johnson & Williams-Keeler, 1998). Thus, the couple relationship is an important unit of analysis for exploring factors that influence the outcome of trauma exposure. Using a sample of over 21,000 active duty soldiers, this study examines the mediating role of relationship conflict between lifetime trauma exposure and health outcomes (i.e., depression, generalized anxiety disorder, bipolar disorder, PTSD, sleep problems, and chronic pain).Using cross-sectional data from All Army Study (AAS), results indicate that PTSD symptoms, compounded with reported negative relationship functioning and satisfaction, resulted in an increase in negative health outcomes associated with trauma exposure (insomnia and chronic pain). As predicted, when higher reported levels of relationship functioning and satisfaction were paired with PTSD symptoms, a significant decrease in negative health outcomes associated with trauma exposure (insomnia and chronic pain) were reported. These findings support the conclusion that the couple relationship is an important unit of analysis for exploring factors that influence health outcomes of trauma exposure when treating PTSD.

A viral oxidoreductase modifies viral structural proteins, a requirement for virus infectivity

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Baculoviruses are enveloped, rod-shaped viruses with circular, double-stranded DNA genomes that infect insects. They have two virus forms: budded virus and occlusion-derived virus. The budded virus specializes in cell-to-cell infection within the insect, while the occlusion-derived virus specializes in infection between insects. The baculovirus *ac92* gene is a sulfhydryl oxidase present in all baculoviruses sequenced to date, suggesting that it has an essential function for baculovirus replication. During sulfhydryl oxidation, thiol groups from cysteines in specific proteins are oxidized to form disulfide bridges within or between proteins. Ac92, the product of *ac92*, is an envelope-associated protein of the budded and occlusion-derived viruses; its oxidation substrates may also be envelope proteins. Deletion of *ac92* affects the phenotype of each virus form: lack of infectious budded virus production and singly-enveloped instead of multiply-enveloped nucleocapsids in the occlusion-derived virus, suggesting defects in assembly. This project identifies viral proteins oxidized by Ac92 using two methods. First, we developed an assay in which viral proteins will be modified by alkylation and identified using mass spectroscopy methods. Second, we will purify tagged viral proteins by affinity chromatography and identify the pulled-down proteins. We hypothesize that the virus encodes a sulfhydryl oxidase gene to carry out this reaction in the nucleus and cytoplasm of infected cells, cellular compartments where this reaction is unfavorable. We further hypothesize that sulfhydryl oxidation of envelope proteins renders more stable and infectious viral particles. This information may translate into methods important to design better vaccines and therapeutic agents.

University Award for Distinguished Undergraduate Student in Research

Paved with Good Intentions: Perceptions of Racial Microaggressions

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Racial microaggressions are subtle slights against people of color that demean targets in different ways. Across three studies, we investigated how third-party observers perceive microaggressions by having participants rate examples of racial microaggressions as harmful, intentional, and racist. Factor analyses revealed poor fit for a two-factor microinsults/microinvalidations model (based on Sue et al., 2007), but did support a two-factor subtle/blatant model. Perceived racism was more closely related to perceived harm than intent for subtle (but not blatant) microaggressions. Additionally, perceptions of harm, intent, and racism were positively related to tendencies to perceive racism (e.g., Miller & Saucier, 2016) and negatively related to colorblind racial attitudes (Neville et al., 2000), but less related to awareness of one's own subtle biases (Perry et al, 2015). Racism takes many forms, but whether observers perceive subtler expressions of racism may depend on whether they are sensitive to the harm that microaggressions cause.