

### 13TH ANNUAL RESEARCH POSTER SYMPOSIUM

K-State Student Union Ballroom Sunday, April 21, 2013 1:30 p.m.-3:30 p.m.



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Note: Mentors' titles have been omitted for the sake of consistency. For the complete list of collaborators and their credentials, please view the posters.

# The expression of a green fluorescent protein (GFP) in Fischer F344 ESC and generation of transgenic rats

Bui P<sup>1</sup>, Hong J<sup>2</sup>, and Weiss M.L.<sup>2</sup> <sup>1</sup>Department of Microbiology College of Arts and Sciences <sup>2</sup>Department of Anatomy and Physiology College of Veterinary Medicine

Embryonic stem cells (ESCs) were derived from wildtype (wt) Fischer F344 (F344) rats. The ESCs were cultured and maintained in an undifferentiated state using a defined media. Sublines were generated from the parental ESCs following stable transfection using a plasmid expressing enhanced green fluorescent protein (GFP) under the control of a human cytomegalovirus (CMV) immediate early (IE) promoter. Stabled, transformant colonies were selected using three rounds of G418 at 100 ng/ul and for expression of GFP under fluorescent microscopy. Selected ESC sublines were karotyped and only normal, male lines were used to generate chimeric rats expressing the EGFP reporter by blastocyst injection. Between 8-12 F344 ESCs were injected into 4.5 days post coitum (dpc) Sprague Dawley (SD) host blastocysts. 18 injected blastocysts were surgically transferred (nine per uterine horn) to 3.5 dpc pseudopregnant SD female. Four pups were born approximately 21 days later and three out of the four were positive for both F344 and SD genomic DNA (gDNA) via microsatellite genotype analysis. Chimeric rats were mated to wt SD to analyze for germline transmission via microsatellite genotype analysis and PCR for the GFP insertion.

Honors/Leadership: NIH Bridges to the Future; Honors Program; Mortar Board; Memorial Scholarship; Cancer Research Award; DSP Eclipse Award; Publication: "A focused microarray for Screen Rat ESC Lines." *Stem Cells and Development*, February 2013; *Proof of pluripotency of rat iPSCs missing* (letter to editor). , *Cell Proliferation*, April 2013; Accepted into Kent State Univ. College of Podiatric Medicine, class of 2017; Volunteer: Child Development Center, Mercy Regional Medical Center ER, Rake 'N' Run; Travel: Vietnam; Bilingual: English/ Vietnamese

#### **Creating Brushless Motor Units to Sweep Away the Competition**

Sonjay Baker, Miguel Valdes, Lucas Gorentz, Bryce Yohn, Erin Black, Warren N. White Department of Mechanical and Nuclear Engineering College of Engineering

The brushless motor units (Motorlabs) that are currently in the Controls Lab for the Mechanical Engineering Department at Kansas State University have been in use for the past decade. In this time, the technology that was used to develop these units has become obsolete, and they are no longer efficient to use for lab testing. In order to alleviate this stress on the Mechanical Engineering department, our research group has developed and is now manufacturing new Motorlabs to be used by the Control Systems class. Over the past two years, Mr. Valdes was part of a team that inspected the Motorlabs and created a wiring diagram, SolidWorks diagram, and parts list for a new model that could be developed. Beginning this fall our entire group, led by Kansas State faculty member Dr. Warren White, updated the SolidWorks diagram to suit the requirements that have recently been placed on the units. We were also tasked to find a new power supply for the Motorlabs are now up-to-date and we have successfully created six functioning units. From this point, we will create the remaining units until all of the outdated Motorlab models have been replaced. These new units will be capable of performing all processes available to the previous model in a much more space, cost, and power efficient manner.

**Baker Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Memorial Scholarship; Cargill Project IMPACT Scholar; Housing Leadership Award; Opportunity Scholarship; Soaring Eagles Leadership Team; Flint Hills Breadbasket, volunteer; Breakfast Coordinator, St. Paul's Episcipal Church, volunteer

**Valdes Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Engineering Tutor; Goodnow Hall Tour Team; Alternative Spring Break, Chicago; Douglass Center Volunteer; Travel: England, France, Switzerland



#### **Towards Boundary Detection During Breast Cancer Surgery**

#### Jenny Barriga<sup>1</sup>, Dinusha Udukala<sup>1</sup>, Hongwang Wang<sup>1</sup>, Deryl L. Troyer<sup>2</sup>, Stefan Bossmann<sup>1</sup> <sup>1</sup>Department of Chemistry College of Arts and Sciences <sup>2</sup>Department of Anatomy and Physiology College of Veterinary Medicine

Developing cancer diagnostics for recognizing early stage breast cancer, in combination with the exact identification of tumor boundaries during surgery, would be advantageous because the 5-year relative survival of breast cancer patients is much higher for early stage diagnosis (confined to original site: 98.4%) than diagnosis at later stages (spread to regional lymph nodes: 83.9%, spread and metastasized: 23.8%). In 2013, the National Cancer Institute anticipates approx. 230,500 new breast cancer cases and 40,000 deaths. Matrix metalloproteinases (MMPs) are proteases overexpressed in breast tumors and surrounding tissue. In most breast cancers, the MMP activity is highest at the boundary region between healthy and cancerous tissue. Therefore, luminescence-based nanoassays have the potential to mark the tumor boundary clearly, leading to the complete removal of cancerous tissue. Luminescence assays have the potential to be up to three orders of magnitude more sensitive, when compared to immunoassays. Furthermore, luminescence assays specifically detect chemically active proteases, whereas immunoassays detect a mixture of active proteases and zymogens. I have studied the MMP activity of 12 breast cancer samples from mastectomies, comprised of the tumor core, the boundary region, and presumably healthy tissue (adjacent to the tumors). The results will be presented, together with a statistical analysis.

Honors/Leadership: Academic Honors (4.0); Goldwater Scholarship Recipient; NIH Bridges to the Future; Internship: National Cancer Institute; Research Experience for Undergraduates, Kansas State University; Rake 'N' Run; Mittens for Many; Bilingual: English/ Spanish

## The Mexican *Cabaretera* versus the Hollywood *Show-girl* in the Melodrama/Film Noir Genre: A Comparative Analysis between Ninón Sevilla and Rita Hayworth

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In the context of the Hollywood and Mexican melodrama of the 1940s and 1950s, Rita Hayworth (1918-1987) and Ninón Sevilla (1921-) share several analogous characteristics. From Spanish background, both women are trained dancers who performed, since childhood, in various nightclubs in Cuba. Mexico, and the U.S.-Mexican border before becoming movie stars. Both dancers are considered Femme Fatales of the period because of their beauty, sex-appeal and the sensual corporeal expression they were able to convey through their swaying bodies in the films that made them famous: Gilda (1946) and Aventurera [Adventuress] (1949). However, there are also substantial variances between these dancer-actresses that are worth discussing. These disparities are mainly based on essential cultural differences. While Mexican cinema adapts the musical conventions of the Hollywood melodrama, the film production is not a mere copy of Hollywood. On the contrary, it reflects a Mexican essence in its stories. Although, many Mexican directors of this period were trained in Hollywood, there was a dominant national orientation in narratives such as the so-called "Cabaretera" films, a subgenre of the Mexican melodrama. Ninon Sevilla's characters are women who become "Cabareteras" (a hybrid of prostitute and dance performer) as a result of a family crisis, who leaves them without the moral and/or financial support of their families, such as in the case of Adventuress. With the "family" as a fundamental national institution, the Mexican melodramas of the 1940s and 1950s reflect family conflicts that appeared with postwar modernization. On the other hand, Rita Hayworth's "Show Girl" characters are metaphorical orphans, or women of unknown or dubious origins such as in *Gilda*. This paper compares Sevilla and Hayworth in light of the male gaze, archetypal imagery and the discourse of the nation.

Honors/Leadership: Honors Program; Presenter: No Limits, Gender Matters Conference, University of Nebraska - Lincoln; Nutrition and Health Society; LULAC; Bilingual: English/Spanish



#### The Protease Activity Correlated Significantly with Breast Cancer in Stage II, III and IV

Elizabeth A. Riedy<sup>1</sup>, Stefan Bossmann<sup>2</sup>, Dinusha Udukala<sup>2</sup>, Deryl L. Troyer<sup>3</sup>, and Gary Gadbury<sup>4</sup> <sup>1</sup>Department of Biochemistry and Molecular Biophysics

> <sup>2</sup>Department of Chemistry College of Arts and Sciences <sup>3</sup>Department of Anatomy and Physiology College of Veterinary Medicine <sup>4</sup>Department of Statistics College of Arts and Sciences

Numerous proteases (urokinase plasminogen activator, matrix metalloproteinases and cathepsins) that can be found in the blood of breast cancer patients are of proven diagnostic value. Compared to immunoassays, luminescence assays have the potential to be two orders of magnitude more sensitive and very importantly they are able to detect only chemically active proteases, whereas immunoassays detect always a mixture of active proteases and zymogens. I have analyzed blood samples that the Bossmann laboratory has received from the South Eastern Nebraska Cancer Center (SENCC). I have separated the blood serum from the red and white blood cells. I have used a series of fluorescent nanoplatforms that have been developed and validated in the Bossmann group to determine the protease concentrations of a series of cancer-related proteases (urokinase plasminogen activator, matrix metalloproteinases 2,7,9,11,13 and cathepsins B,D,L,K). These experiments were conducted in a blinded fashion. Of the samples, 25% (48 in total) came from healthy control subjects. Dr. Gary Gadbury, Department of Statistics at Kansas State University, has statistically analyzed my results and related them to the pathological information that is available from SENCC. MMP 7 and urokinase plasminogen activator were predictive of breast cancers in stage II. MMP 9 and MMP 2 were significantly enhanced in stage III. The study for nine proteases in total will be presented.

Honors/Leadership: Violinist; Developing Scholars Talent Show; Rake 'N' Run; Mittens for Many; Travel: Mexico

#### **Processor Perception of Mold in Meat Plant Environments**

Abigail Stedry, Alexandra Christiansen, Dylan Evans, Kelly Getty, and Elizabeth Boyle Department of Animal Sciences and Industry College of Agriculture

There is potential for mold to grow on product and on non-food and food contact surfaces in meat processing environments. The objective was to assess meat and poultry processors' perception of mold, mold incidence level, and control methods used by the Kansas meat and poultry facilities. A 54-question survey instrument was developed. A packet containing a survey cover letter, informed consent form, and a paper copy and online link of the survey was sent to 144 Kansas meat and poultry processing facilities with a 31.9% response rate. Of these 20, 19, 13, and 10 were federal, state, custom exempt or retail exempt facilities, respectfully, and from these, 11 facilities had a combination of inspection status. Facilities included slaughter (69.6%), further processing (82.6%), fabrication (43.5%), and/or retail exempt (54.3%), and processed beef (91.3%), pigs (87.0%), sheep (56.5%), poultry (34.8%), and other species (93.4%). Just over 37% of respondents perceived mold on meat to be a potential allergen for consumers. Reported incidence of mold in facilities was most frequent in summer (41.3%) and 82.6% agreed or strongly agreed that mold contaminated non-food contact surfaces should be cleaned and sanitized prior to processing. Respondents believed that a moist plant environment (82.6%) and increased cooler humidity (87.0%) contributed to mold growth in facilities. If mold was found anywhere in a carcass cooler, 10.9% of respondents believed this was not an issue, while 89.1% felt it was a sanitation issue. To sanitize non-food contact surfaces if visible mold was observed, 78.3% of respondents would at least use chlorine bleach or a similar compound, followed by 34.8% using hot water or quaternary ammonium compound alone or in combination with other sanitizers. Survey results indicate that processors are concerned about mold in plant environments and would use sanitation interventions for mold control.

Honors/Leadership: Cargill Scholarship; Memorial Scholarship; Ag Council Student Representative for MANRRS; Bilingual: English/Korean

#### Functionalization of Amine and Carboxylic Groups to Iron Fe<sub>3</sub>O<sub>4</sub> Magnetite

Daniel Buyanovski, Keith Hohn, Myles Ikenberry Department of Chemical Engineering College of Engineering

 $Fe_3O_4$  Magnetite particles functionalized with amine and carboxylic groups have a wide variety of uses in both the medical field and catalysis because the magnetic properties allow pinpoint delivery and the functional groups allow for other entities to be attached. Previous literature assumes that when ligands with both carboxylic and amine groups are used, only the carboxylic groups bind to the Fe<sub>3</sub>O<sub>4</sub> particles; however, our results suggest that amine groups may also bind to magnetite. For this reason, we are studying the binding of amines and carboxylic groups to magnetite. We synthesize functionalized magnetite by adding 11-Aminoundecanoic acid to magnetite particles and characterizing these materials using infrared spectroscopy, x-ray photoelectron spectroscopy, and acid-base titration. We have found that washing the samples before the ligand is added allows the amine groups to bind more readily to the Fe<sub>3</sub>O<sub>4</sub> particle. This is because washing removes ammonium, which is thought to compete with amines for surface sites.

Honors/Leadership: Fairchild Scholarship; Memorial Scholarship; Chemistry Magic, Developing Scholars Talent Show; Presenter: Introduction to Chemical Engineering, "Diaper Creation Project," Kansas State University; Rake 'N' Run

#### Environmental Sampling to Determine Risk of Pathogen Exposure in Association with Hand Hygiene Campaign among Veterinary Students

Monica Farfan<sup>1</sup>, Elizabeth Davis<sup>2</sup> <sup>1</sup>Department of Animal Science and Industry College of Agriculture <sup>2</sup>Department of Clinical Sciences College of Veterinary Medicine

Effective personal hygiene is an important factor to aid in the prevention of infectious disease. Certain individuals may be at increased risk to serious pathogen exposure based on their vocation. In particular, veterinary students are exposed to a variety of different animals and several potential zoonotic pathogens. Pathogen transmission may occur by human-human or animal-human contact. Disease prevention may be achieved through proper hand washing following animal handling and prior to meal-eating. The application of hand sanitizing foam or gel before meals and after class can be an important step in the reduction of pathogen transmission.

This investigation was performed in combination with a hand hygiene campaign aimed at improving awareness of the importance of hand sanitation in a veterinary setting. This investigation was aimed to determine whether pathogens were present in the environment where meal-eating occurred through environmental surveillance with aerobic and anaerobic culturing. The second aim of this investigation is to compare the types of pathogens identified in areas of the college where eating takes place with bacterial isolates obtained in a large animal veterinary environment.

Culture samples were taken from high traffic areas such as door handles of classrooms and bathrooms, tables, computers and writing utensils during club/organization meetings. Sterile swabs, soaked with sterile water, were used to obtain samples of surfaces in a  $10 \times 10$  cm area. Swabs were transferred to a sterile tube. Routine aerobic and anaerobic bacteriologic cultures were performed.

Overall, the data demonstrate that minimal bacterial contamination is present in areas where food-handling takes place when compared with the isolates obtained in a large animal veterinary facility. These findings suggest that although hand hygiene is an important component to reducing the risk of exposure to serious pathogens, exposure to clinical isolates is relatively uncommon in the sampled food preparation areas.

**Honors/Leadership:** Cargill Project IMPACT Scholarship; Memorial Scholarship; MAPS; MANRRS; HALO; Agriculture Ambassador; Telefund: College of Agriculture; Insect Zoo Open House; Travel: Equine Study Abroad Tour: Scotland, Ireland, & England; Bilingual: English/Spanish



#### How Status and Race Influence Intentions to Seek Help

Brooke A. Williams, Stuart S. Miller, Donald A. Saucier Department of Psychological Sciences College of Arts and Sciences

The extent to which individuals seek help from others may vary depending on the race of the potential helper. Aversive racism theory (Hodson, Dovidio, & Gaertner, 2004) predicts that even well-intentioned Whites still harbor negative, often unconscious, feelings toward Blacks, and when their behaviors can be attributed to factors other than racial bias, discrimination is more likely. Research conducted by Dovidio and Gaertner (1977) examining inter-racial helping behavior found that Whites do not show race discrepancies when help is offered to them (possibly to avoid being seen as prejudiced). However, when help must be actively solicited, Whites seek help less frequently from Blacks than from Whites. We hypothesized that this help seeking asymmetry may be exacerbated by status discrepancies (e.g., an employee/supervisor relationship), such that the perception that a potential helper is of lower status to oneself potentially provides a race-neutral justification for not seeking help. Thus, a White individual may not seek help from a Black individual, but believe that she is making that decision based on something other than the potential helper's race. Therefore, we manipulated the race and relative status of the potential helper in a help seeking scenario. White college students read one of four vignettes imagining themselves as a TA or student struggling with a task in a 2 (Participant's Status: authority or subordinate) x 2 (Race of Potential Helper: Black or White) between-groups design. Participants were also asked to complete measures relating to individual differences in tendencies toward group-based dominance and generalized prejudice (e.g., social dominance orientation, Sidanius et al., 1994; modern racism, McConahay, 1986). We hypothesized that individuals who more highly endorsed existing racial hierarchies and are more prone to racial prejudice would be less likely to seek help from a partner of a different race particularly when that partner is in a subordinate position relative to the individual. Our findings will help to extend psychological theories of racial bias by increasing our understanding of factors that affect decisions to seek help from others.

**Honors/Leadership:** James R. Coffman Award of Excellence, Honorable Mention; Residential Learning Assistant, Kansas State First Cat Community; Project Presentations on Campus: Po Sen Chu, Donald A. Saucier & Brooke Williams: The Relationships Between Social Support and Three Forms of Sexism: Can Social Support Alleviate the Effects of Sexism?; Professional Conference Presentations: Folsom, L. A., Williams, B., Smith, S. J., Miller, S. S., & Saucier, D. A. (2012). Justifying prejudice towards pregnant women: Examining attitudes towards pregnant women on a college campus

#### The Influence of Palliative Care Center Architecture on Well-being

Kelsey Castinado, Susanne Siepl-Coates Department of Architecture College of Architecture, Planning, and Design

The study by Professor Siepl-Coates focuses on the personal experiences of users of the Palliative Care Center at Georg-August University Hospital in Göttingen, Germany. It is believed that the architecture of the Center does not affect just the patients; it also has meaning for the staff and the patients' families. The patients who all have terminal illnesses expressed that they want to be comfortable and feel at home. The current investigation is divided into two parts. In part one, observations were made by Professor Siepl-Coates for 10 days to get the full experience of the Center. Part two consisted of semi-structured interviews of five patients, family members, and nurses about their perceptions about the facility and its influence on the overall well-being of patients. Each person was asked a range of 10-20 open-ended questions. The questions were different based on the interviewee group. There was a common trend between the likes and dislikes of each group. Many of the patients were pleased with the conditions of the rooms and the general "at home" feeling presented. The patients responded to overall architectural conditions; they did not look at specific details. The family members were more opinionated about the way that something looked when they entered a room or the functionality of a detail. The health care workers took into account how the patients felt and applied that to their own thoughts. After completing the translations and transcriptions of the interviews from German to English, the meanings of each answer are now being assessed in terms of what they suggest about the design. The overall conclusion that has been taken from the research at this time is that the more the hospital room looks and feels like a person's home, the more comfortable the patients are. The project is ongoing.

Honors/Leadership: Gamma Phi Beta, Philanthropy Chair

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#### Evaluation of Recombinant Human Serum Albumin Extraction and Purification from Transgenic Rice Flour

Emma C. Brace, Lisa Wilken Department of Biological and Agricultural Engineering College of Engineering

The use of transgenic plant systems to produce a variety of recombinant proteins has been demonstrated, including rice seed-expressed human serum albumin (HSA). HSA, a single chain protein consisting of 585 amino acids, is the most abundant protein in blood plasma. The ability to effectively extract and purify rHSA from transgenic rice flour would allow it to be used in a variety of applications. The objectives of this research were to investigate extraction conditions suitable for subsequent purification using ion exchange chromatography. The ability to extract rHSA from transgenic rice flour at high enough quantities and quality would allow for it to replace HSA from human blood in medical applications, which would significantly lower risk of contamination with viruses and other disease causative agents. Considerations taken into account in designing processes to extract, purify, and quantify rHSA include the isoelectric point of HSA (pI=4.7) and the molecular weight (65.5 kDa). Buffer solutions at various pHs and ionic strengths were evaluated to determine the effect of time on the extraction of rHSA and native rice proteins. To evaluate extraction kinetics, clarified extracts were analyzed by Bradford Protein Microplate Assay and by gel electrophoresis. The concentration of rHSA extracted varied with pH but was independent of time, while the amount of extracted native proteins varied with pH and time. Batch binding studies were used to determine the compatibility of selected extraction conditions on the removal of native rice proteins using GigaCap S cation exchange.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Honors Program; Tau Beta Pi (Engineering Honorary); National Society of Collegiate Scholars; National Merit Walgreen Co. Scholarship; Kansas State Presidential Scholarship; Research Experience for Undergraduates, "Clean Energy Storage, Generation, and Consumption", University of Alabama; Presenter: ASABE (American Society of Agricultural and Biological Engineers) Conference; Flint Hills Breadbasket-Team Leader; Martin Luther King Day-A Day On, Not a Day Off; Society of Women Engineers; Engineering Ambassadors; President of the American Society of Agricultural & Biological Engineers; Alpha Chi Sigma; K-State Advancement of Women in Science & Engineering Shadow Days, volunteer; GROW Summer Workshop Mentor

#### **Exploring a New Architectural Application for Rubble Gabion Construction**

Hector Martinez, Michael D. Gibson Department of Architecture College of Architecture, Planning, and Design

Gabion construction is a highly efficient and inexpensive method for constructing massive walls from steel mesh and rubble. Mainly used for retaining walls and in erosion prevention, a handful of avant garde projects around the world have used this construction method for buildings. In these applications, gabions introduce some important limitations to the construction's accuracy and performance as a weather barrier.

The current research examines how gabions can be reconsidered as a construction system using emerging computer technologies for fabrication and design. As part of this research a gabion building system is proposed that uses material more efficiently with greater structural effectiveness. This experimental method seeks to better match the needs of architectural construction while preserving the advantages of building with gabions, including their potential use for low-cost construction around the world.

Prototypes of various scales, computer models, and computer simulation are used in the project to evaluate this experimental system for its constructability and its thermal performance, particularly as a part of a low-energy building strategy.

Honors/Leadership: Opportunity Scholarship; RTKL Merit Award ; National Organization of Minority Architect Students; Jardine Apartment RA; Hispanos Unidos en Manhattan; Rake 'N' Run; Travel: Mexico; Bilingual: English/Spanish



#### **Critical Power in the Upper Body**

Eduardo Acosta<sup>1</sup>, Ryan Broxterman<sup>2</sup>, Thomas J. Barstow<sup>2</sup> <sup>1</sup>Division of Biology College of Arts and Sciences <sup>2</sup>Department of Kinesiology College of Human Ecology

For high-intensity muscular exercise, the time-to-exhaustion (TTE) increases as a hyperbolic function of decreasing power. In this relationship the power asymptote, critical power (CP), represents a power output that can be maintained for prolonged periods of time without exhaustion, and the curvature constant (W') represents a finite amount of work that can be performed above CP. Previous studies using lower body cycling exercise have determined CP and W' with multiple constant power tests designed to induce exhaustion between 2-15 minutes. The purpose of this study was to test the hypothesis that CP and W' can also be determined for upper body cycling exercise. First, each subject performed a maximal test to exhaustion on an upper body cycle ergometer to determine the peak oxygen uptake (VO2peak) and the peak work rate (Wpeak). For the following four visits each subject performed three to four constant power upper body cycling exercise bouts designed to provide exhaustion times ranging between 2-15 minutes. These data were then fit with the hyperbolic function in order to determine CP and W'. To date, 45 subjects have completed the study (28 men & 17 women) with a mean VO2peak and Wpeak of  $2.0 \pm 0.6$  l•min-1 and  $97 \pm 31$  Watts, respectively. The constant power data was well fit with the hyperbolic function with a mean CP of  $62 \pm 21$  Watts and a W' of  $5.0 \pm 2.5$  kJ. The findings from the present study support our hypothesis, demonstrating that CP and W' can be accurately determined for upper body cycling exercise.

Honors/Leadership: NIH Bridges to the Future; Golden Key International Honor Society; Pre-Dental Club; Kansas Mission of Mercy Dental, volunteer; Bilingual: English/Spanish

#### Why IE? Solving Problems, Changing the World Valerie Rito, Andrew Waldman, Jessica L. Heier Stamm Department of Industrial and Manufacturing Systems Engineering College of Engineering

Evidence suggests that prospective engineering students are most drawn to statements that emphasize the ability of engineers to impact real-world problems and that this is especially true for students that come from underrepresented groups. One area in which engineers can directly improve people's lives is the humanitarian sector, and the application of industrial engineering (IE) skills in this sector is increasing. The purposes of this project are (1) to identify the motivating factors that lead students to study IE and (2) to spark students' interest in using IE tools, specifically operations research, to solve problems in the humanitarian sector.

Our poster illustrates three operations research problems we created that highlight obstacles the humanitarian sector faces. These problems are motivated by our prior case study research of humanitarian organizations. They are accompanied by teaching materials for college-level instructors to integrate humanitarian applications in operations research courses. By creating these teaching materials, we hope that students will learn the opportunities they have to help in the humanitarian sector.

We also report on the status of ongoing research in the form of a pilot survey, which seeks to find the reason behind current students' motivation to study industrial engineering. Results from this pilot study are expected to provide a better understanding of current students' motivation to study IE at Kansas State University and to guide future larger studies on this topic. These results also have the potential to help in future recruitment and retention efforts.

Honors/Leadership: Silver Key International Honor Society; NACME Scholar; Student Governing Association, Engineering Senator; Society of Manufacturing Engineers; Freshmen Leadership Committee- Secretary; Alpha Delta Pi; Bilingual: English/Spanish



### *Inactivate Me*: A randomized controlled trial examining the impact of increased sedentary time on chronic health outcomes

Chayce F.W. Wynn<sup>1</sup>, Sara K Rosenkranz<sup>2</sup>, Craig A Harms<sup>3</sup>, Mark D Haub<sup>2</sup>, Richard R Rosenkranz<sup>2</sup> <sup>1</sup>Division of Biology College of Arts and Sciences <sup>2</sup>Department of Human Nutrition <sup>3</sup>Department of Kinesiology College of Human Ecology

Note: Chayce Wynn is in the preliminary stages of this research project. He is in the process of learning the protocols in order to become integrated into the project.

Background: In recent years, the prevalence of metabolic syndrome, diabetes, obesity, and sedentary lifestyles have been on the rise. A sedentary lifestyle has been associated with obesity, reduced longevity, elevated biological markers of systemic inflammation and impaired health. Although sedentary behavior has been shown to be a risk factor for chronic disease that is independent from levels of moderate-to-vigorous physical activity, sedentary behavior has rarely been objectively measured, and few clinical trials have been conducted to examine the impact of sedentary behavior on health. Although extreme examples of the effects of sedentary behavior have been undertaken. Our primary aim is to determine the fundamental metabolic, cardiovascular, and pulmonary consequences of increasing time spent in sedentary behavior in college-aged men and women currently meeting physical activity guidelines. Our secondary aim is to determine whether increasing amounts of sedentary behavior, without changes in moderate-to-vigorous physical activity, increase markers of inflammation.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Martin Luther King Scholar; Cancer Research Award; Catalyst Honor Society; Wildcat Warm-up Counselor; Alternative Spring Break: Chicago; Basketball Coach for Manhattan Recreation; Floor Vice President, Goodnow Hall; Boys & Girls Club, volunteer; Rake 'N' Run; Martin Luther King Day-A Day On, Not a Day Off; Mittens for Many

#### Miles Davis: *Kind of Blue*

Daniel Dissmore, Wayne Goins Department of Music, Theatre, and Dance College of Arts and Sciences

The album *Kind of Blue* was recorded in New York City in 1959. Yet, the conception of the music was produced long before that. The music was a reflection of the life journey of each musician on the album. By far, Miles Davis was the most prominent musician at that recording session, and both the music and ensemble were put together as a result of his unique vision. This research project follows the musical journey that Miles Davis took in his life in order to understand how the beautiful piece of art that he created evolved, to learn from his legacy, and, as a direct influence, make beautiful music as he did. The research was divided into three parts: reading, listening, and playing. The primary sources of my reading were biographies about Miles Davis and Eric Nisenson's *The Making of Kind of Blue*. Primary choices of music listening were jazz works by Davis, especially *Kind of Blue*. The third portion of research involved application of what I read and heard through playing jazz on my trumpet. This application resulted in my growth as a musician, accompanying the other results of my project: a better understanding of the album *Kind of Blue*, as well as a better understanding of music in general.

Honors/Leadership: Medallion Scholarship; 1st Place, Developing Scholars Talent Show, Jazz Lab (2nd Trumpet); Jazz Combo; Concert Band (1st Chair); Cat Band; Chi Alpha; Rake 'N' Run



#### Solar Power Charge Station Fabian Martinez, Larry Erickson Department of Chemical Engineering College of Engineering

Over the past decades the United States has been dependent on oil and with the increase of plug-in hybrid electric (PIHV) and electric vehicles (EV) on the road, the dependence on oil has the potential to decrease. The production of electricity to power these vehicles will increase to meet the demand, putting a strain in the power grid. This can be solved by using solar powered charge stations (SPCS). A literature review has been conducted on the life cycle assessment for the SPCS, the environmental impacts, the economics, and the social values for the SPCS, PIHV and EV. SPCS is a clean alternative having lower emissions compared to natural gas or coal fired power plants. Also, SPCS is convenient in parking lots; they provide shade and cover from weather. There are many benefits for the SPCS, as well as the PIHV and EV compared with the internal combustion vehicle.

**Honors/Leadership:** NIH Bridges to the Future; National Action Council for Minorities in Engineering Associate Scholarship; Community Service: Engineering a Dream; Rake 'N' Run; Bilingual: English/Spanish

#### The effects of sucralfate on oral doxycycline absorption in dogs

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Sucralfate is a gastric mucosal protectant that is commonly used in companion animal medicine. Oral doxycycline is an antimicrobial frequently prescribed to canine patients. In a human study a significant decrease in oral doxycycline absorption was documented when aluminum magnesium hydroxide and doxycycline were administered concurrently. Veterinary formularies state the bioavailability of doxycycline may be reduced if administered with sucralfate (which breaks down to aluminum hydroxide in the gastrointestinal tract). However, studies to confirm reduced bioavailability of doxycycline with sucralfate in dogs have not been performed.

The objective of this study was to determine the effect of concurrent administration of sucralfate and doxycycline on the bioavailability of doxycycline. Additionally, the effects of staggering drug administration were assessed.

Doxycycline (dose~10 mg/kg) and sucralfate (dose 1 g total) were administered to five dogs. The study was approved by the IACUC at Kansas State University. Treatments included doxycycline alone, doxycycline concurrently with sucralfate, and sucralfate two hours after doxycycline. Doxycycline plasma concentrations were then evaluated with liquid chromatography with mass spectrometry.

There was no significant difference in the pharmacokinetic parameters: the area under the curve (total drug exposure) or maximum plasma concentration. We observed on numerous instances large fragments of sucralfate in the stool of the dogs, indicating the drug did not always completely disintegrate in the canine gastrointestinal tract. Further studies will evaluate the effects of a sucralfate suspension (sucralfate already disintegrated) to ensure the lack of effect was not just due to lack of sucralfate disintegration.

**Honors/Leadership:** Research Experience for Undergraduates: University of Montana; Legacy Scholarship; Presenter: OREOS Symposium for the University of Montana; Excell Volunteer; Enhanced University Experience Peer Instructor; Bilingual: English/ Spanish



#### **5 Alpha-Reductase Inhibitors for Prostate Cancer Prevention**

Irma L. Ailon, Alexander Opoku-Acheampong, Brian L. Lindshield Department of Human Nutrition College of Human Ecology

In the prostate, testosterone is converted to dihydrotestosterone (DHT) by  $5\alpha$ - reductase ( $5\alpha$ R) enzymes. DHT, the most potent form of the androgen, binds to androgen receptors to stimulate growth and development of the prostate.  $5\alpha$ R1 is highly expressed in the skin and liver and  $5\alpha$ R2 is highly expressed in the prostate. In prostate cancer,  $5\alpha$ R1 expression increases and  $5\alpha$ R2 expression decreases. Finasteride ( $5\alpha$ R2 inhibitor) and dutasteride ( $5\alpha$ R1 and  $5\alpha$ R2) are used to combat benign prostatic hyperplasia (BPH), a nonmalignant enlargement of the prostate. We set out to compare the effectiveness of finasteride and dutasteride to decrease prostate cancer development or progression in Transgenic Adenocarcinoma of the Mouse Prostate (TRAMP) mice. TRAMP X FVB mice were randomized into: Control, Pre-dutasteride, Pre-finasteride, Post-dutasteride, and Post-finasteride diet groups. Pre-diets started at 6 weeks of age, post-diets began at 12 weeks of age and the study was terminated when the mice were 20 weeks of age. There was a body weight decrease in Pre-dutasteride group and genitourinary tract weight decrease in Pre-finasteride, Pre and Post-dutasteride groups. The incidence of low and high-grade prostate intraepithelial neoplasia (PIN) as the most severe lesion in the anterior and dorsal lobes of the dutasteride groups increased and decreased, respectively. Increased incidence of poorly differentiated cancer showed as the most severe lesion in the dorsal lobe of Pre-dutasteride and both groups of finasteride.

Honors/Leadership: NIH Bridges to the Future; Memorial Scholarship; Developing Scholars Promise Award; Nutrition and Health Society, LULAC; Rake 'N' Run; Travel: Mexico/India/Guatemala; Trilingual: English/Awakateko/Spanish

#### Policy Changes Affecting Unauthorized Immigrants in the United States

Marcus Dominguez, Alisa Garni Department of Sociology, Anthropology, and Social Work College of Arts and Sciences

In April of 2010, the Arizona state legislature passed SB 1070, the "show me your papers bill," a set of laws enforcing federal immigration policy at the state level. Since then, several states began attempting to circumvent federal immigration policy by creating the conditions for "self deportation" (i.e., making their states inhospitable for unauthorized immigrants). By contrast, other states such as Illinois and California have changed state legislation to be more immigrant friendly—eliminating "US status" laws and retaining crucial public benefits for unauthorized immigrants. We comparatively examine how changing immigration policies affect recently arrived and long-term migrants in the United States. We focus on policies that affect unauthorized immigrants' access to work, education, housing, public benefits, and community services in states with open versus restrictive orientations (e.g., California and Illinois versus Arizona and Alabama, respectively). In Kansas, such policies remain undecided. By comparing the decision making process in Kansas with what has occurred in other states, we hope to learn more about how such decisions are made and how they affect unauthorized migrants in Kansas and beyond.

**Honors/Leadership:** Academic Honors (4.0); University Experience Peer Instructor; Floor Governing Board Representative; Deferred Action for Childhood Arrivals, Volunteer Service Program; Developing Scholars Talent Show Emcee; Resident Hall Student of the Month; Bilingual: English/Spanish



#### **Creative Fundraising Strategies for Successful Non-Profit Construction Organizations**

Ismael Hernandez, Ray Buyle Department of Architectural Engineering and Construction Science College of Engineering

Many non-profit organizations experience fiscal challenges related to realizing their mission if they do not incorporate effective fundraising strategies for their organization and operation. Non-profits usually rely on gifts of money, donations of supplies, and costs-savings through volunteerism to sustain their success. Beyond traditional, targeted grant writing and volunteer recruitment, some non-profits have developed an affiliated business and have used the revenue generated there to sustain its primary activities. An example of a non-profit construction organization sustaining itself by utilizing revenue from an affiliated business in its budget is the Habitat for Humanity's ReStore. Habitat for Humanity affiliates nation-wide build decent and affordable homes for low to moderate income families utilizing volunteer construction crews and donations of cash and materials. Many Habitat for Humanity affiliates have established their own affiliated businesses called ReStores that are basically hardware stores of used/new materials whose revenue is transferred back to its Habitat for Humanity to sustain its mission. Habitat for Humanity affiliates with ReStore businesses were studied to identify the impact of the ReStore's revenue on the overall budget of the non-profit. Those figures revealed the significance of the revenue from the business to its non-profit organization's budget; it has been demonstrated that the percentage of revenue to a Habitat for Humanity budget from ReStore-generated revenue is significant and it is postulated that, without the ReStore revenue, Habitat for Humanity affiliates would experience significant budget constraints that would result in either fewer homes built, or homes built with fewer amenities.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Gates Millennium Scholarship; K-State Memorial Scholarship; Ralph and Dora Rogers Scholarship; Association of General Contractors; JE Dunn Internship; KCK Housing Authority Internship; Rake 'N' Run; Flint Hills Breadbasket Food Drive; Mittens for Many; Martin Luther King Day-A Day On, Not a Day Off; 9/11 Day of Service, Alternative Spring Break: Chicago

#### Peptide Derived from $\beta_2$ Glycoproteint I Inhibits Melanoma Cell Growth in Vivo

Jazmin Zeledon <sup>1</sup>, Michael Pope<sup>2</sup>, Sherry Fleming<sup>2</sup> <sup>1</sup>Department of Psychological Sciences <sup>2</sup>Division of Biology College of Arts and Sciences

Melanoma is a deadly form of skin cancer which causes approximately 10,000 deaths in the United States each year. Tumor growth requires angiogenesis to provide oxygen and nutrients for the growing tumor cells. A serum protein,  $\beta 2$  glycoprotein I, inhibits angiogenesis. We derived a peptide,  $\beta 2$  296c-s from the binding domain of  $\beta 2$  glycoprotein I, which inhibits the tissue damage in mouse models of intestinal ischemia. We hypothesized that peptide  $\beta 2$  296c-s would also inhibit tumor growth by attenuating new vessel formation. In this study,  $2 \times 10^6$ melanoma (B16-F10) cells were mixed with matrigel and injected subcutaneously into C57BL/6 mice to induce aggressive tumors. Some mice received peptide  $\beta 2$  296c-s treatment after injection of tumor cells. Tumors were removed at various time points, size was determined, and tumors were stored for downstream analysis. Vascular markers endoglin, endosialin, VEGF, and endothelium marker CD31 were used in real-time PCR for molecular analysis. Innate immune cell secretion of tumorcidal oxygen and nitrogen radicals was also analyzed. Notably, peptide treatment significantly decreased tumor growth. In addition, vascular markers also decreased in peptide treated mice showing that endoglin, endosialin, and CD31 were down regulated in peptide treated tumors. These data suggest that peptide  $\beta 2$  296c-s may therapeutically prevent tumor angiogenesis and tumor growth.

**Honors/Leadership:** NIH Bridges to the Future; Psi Chi International Honor Society of Psychology; K-INBRE Symposium Conference 2011; LULAC; HALO; BESO; Cats for a Cure; Volunteer: St. Catherine's Hospice; Volunteer: Seven Dolors Catholic Church; Harvesters in Topeka; Bilingual: English/Spanish

#### **Dysfunction Junction**

Denise Durham<sup>1</sup>, Roger McHaney<sup>2</sup> <sup>1</sup>Department of Business Administration Department of Management <sup>2</sup>College of Business Administration

The prevalence of the Internet and how much it may be helping us or hurting us is a highly debated subject. Some authors have gone so far as to suggest that people using the Internet are becoming increasingly dumber. In this project, we look for clues in a compilation of the University's student message boards for a time period lasting approximately eight years. We are trying to discover whether or not writing levels appear to be declining. With increasing levels of Internet and social media use, if students are becoming less sophisticated as some suggest, their writing ability should show signs of decline.

The experiment began by extracting message content from the university's message board system for a specific online class. Care was taken to ensure all responses remain anonymous and are not tied directly to anyone's identity. Messages were retrieved longitudinally from the boards starting with the Fall semester of 2005 through the Fall semester of 2012. The gathered information was placed into Excel spreadsheets according to semester, question title, question and responses. Next, the responses were tested using a readability test called the Readability Calculator, which calculates the level of education needed for a person to easily read the passages. Values of particular interest were the Flesch-Kincaid Grade Level component, the SMOG component and Flesch Reading Ease component of the test. By using these, we were able to examine whether students' abilities to write have declined over time.

The data analysis was completed. Linear regression was used to determine if readability changed over time. The initial tests revealed no significant changes. Several additional analyses were conducted. Percent male/ female, percent upperclassmen, and other variables were added to regression. The results indicated that when percent upperclassmen were considered, student writing levels appeared to improve over time.

This study does not definitively prove that students are 'not getting dumber' based on their use of the Internet. However, it does provide evidence that student writing levels show signs of improving. This could be for a variety of reasons, including that Internet use requires more reading and writing than passive forms of media consumption such as watching television or listening to a radio. Additional study is needed to determine if the results of this study can be generalized to a wider population.

Honors/Leadership: Undergraduate Research Forum, Kansas State University; Memorial Scholarship; Rake 'N' Run; Martin Luther King-A Day On, Not a Day Off

#### **Optimal Model of Crowdsourcing in Integrated Marketing Communications**

Branford Harris, Sam Mwangi A.Q. Miller School of Journalism and Mass Communications College of Arts and Sciences

Crowdsourcing is a new marketing tool that has the potential to harness latent talent from the general public and use it to build brand equity in marketing, advertising, and public relations. Despite its success, there is no model for implementing best practices in crowdsourcing. This study seeks to identify characteristics of successful crowdsourcing through case studies of three companies (Threadless, iStockphoto, and Frito Lay). The study found that successful crowdsourcing must include a reward system, a large and diverse pool of contributors, and a network of interaction supported by a communication infrastructure such as the Internet. This research adds new knowledge to our understanding of crowdsourcing, and how it can benefit a brand's integrated marketing communications.

Honors/Leadership: Leadership Scholarship; Kansas Association of Broadcasters Scholarship; TakeFlight (KSU advertising agency); K-State Marching Band; NAACP Member; Travel: Canada

#### Using Algae Grown in Feedlot Lagoon Water for Biodiesel

William L. Duren<sup>1</sup>, David Steward<sup>2</sup> <sup>1</sup>Department of Electrical Engineering <sup>2</sup>Department of Civil Engineering College of Engineering

A source for clean and renewable fuel is a goal for many, and there are several different possible avenues. A very probable solution is growing algae and converting it into biodiesel. One promising approach to achieving this goal is using waste water as a growth medium for algae, eliminating the need for purchasing nutrients, and all the while being environmentally friendly. While Kansas does not have a dense enough population to produce enough waste to make a viable algae farm, it does have millions of cattle on feedlots. Our hypothesis is that it is possible to grow algae in feedlot lagoon waste water and convert it to biodiesel. The hypothesis will be tested on a lab scale in order to make sure lagoon water will promote growth. If the hypothesis holds true, it is significant, because a large portion of Kansas' diesel fuel consumption can be replaced with the more environmentally friendly biodiesel. Also, another benefit is that the dry biomass left from the algae can be used as food supplement for livestock, and a fertilizer for farmers.

Honors/Leadership: Academic Honors (4.0); Power and Energy IEEE Scholar; Memorial Scholarship; Foundation Scholarship; Eta Kappa Nu; Cargill Scholar; Internship: Burns and McDonnell; MAPS; Rake 'N' Run

#### Net Zero: Advancing in Building Technology and Efficiency

Eddy Gomez<sup>1</sup>, Raymond Buyle<sup>1</sup>, Mark Robins <sup>2</sup>, Gil Knier <sup>3</sup>, Erica Oberndorfer <sup>4</sup>, Phil Philippi<sup>5</sup> <sup>1</sup>Department of Architectural Engineering and Construction Science <sup>1</sup>College of Engineering <sup>2</sup>Metal Construction News <sup>3</sup>NASA Science Center <sup>4</sup>American Institute of Biological Sciences <sup>5</sup>Green Roofs Tree of Knowledge

With conventional energy prices on the rise, new, more efficient ways of energy production are sought. Net Zero construction is an alternative solution to increasing energy production. Net Zero Buildings are designed to sustain themselves by producing the energy they use, resulting in drastically decreased fossil fuel dependency. The planning/design process is a crucial segment to determining the overall success of a Net Zero structure. The roof of a building is considered the area in which the most energy reduction can occur. With that being said, this research focuses on Green Roof design and applications. A "green roof" is a vegetated roof, with live plants, soil and a membrane. They can range from a simple design to an intricate and very complex one. The vegetated roof has a natural cooling system by blocking and retaining solar rays. In turn, it helps to substantially reduce energy usage. They also help reduce the heat island effect. Though Net Zero construction has a price tag, the money spent up front will be made back through energy savings in the future. Since this is a recent, and still experimental, type of construction, the infrastructure system needs to be updated/improved and will vary from region to region. Net Zero construction is mainly used for large corporate buildings are a relatively new phenomenon, there is little historical data to document their feasibility.

Honors/Leadership: NACME Scholarship; Memorial Scholarship; National Society of Collegiate Scholars; Sigma Alpha Lambda; Rake 'N' Run

#### Monitoring Night-Time Well Being of Disabled Children at Heartspring

Austin White<sup>1</sup>, Hannah Gray<sup>2</sup>, Steven Warren<sup>1</sup> <sup>1</sup>Department of Electrical and Computer Engineering <sup>2</sup>Department of Biological and Agricultural Engineering College of Engineering

Sleep quality is important for a disabled child that needs to learn and behave well the following day. A bed sensor suite is being designed for children at Heartspring (Wichita, KS), where each specialized bed will contain multiple types of sensors and support tools to monitor a child while sleeping and report their status to the paraeducators that work the night shift, improving the ability of Heartspring clinicians to track child well-being. These tools will also help Heartspring staff correlate sleep quality and quantity with child behavior in the days that follow. The early part of this research involved the identification of the desirable data to aquire, accompanied by the selection of the preferred sensing devices and visualization mechanisms. The team is developing tools to gather physiological information such as movement, pulse rate, respiration rate, and body surface temperature. Additional parameters include enuresis (bed wetting) and ambient light, sound, and temperature. All sensing devices must be inconspicuous to avoid disruption of each child's environment as well as distractions which may tempt that child to play with the devices. Further, these devices must be durable, accurate, and reasonably priced. Development of a prototype, sensor-laden bed matched to the beds used at Heartspring is underway, and initial studies that involve Heartspring children are planned for Summer 2013.

**Gray Honors/Leadership:** Multicultural Engineering Program (MEP); Multicultural Ambassadors; MEP Gem Consortium; ROTC; Martin Luther King -A Day On, Not a Day Off

White Honors/Leadership: Cargill Project IMPACT Scholarship; Choctaw Nation Scholarship; MAPS; Rake N' Run; Volunteer at homeless shelter

#### **Characterization of T-DNA insertion mutants in pectate lyase gene of rice** Daniela Guereca<sup>1</sup>, Frank White<sup>2</sup>, Junli Zhang<sup>2</sup>

<sup>1</sup>Department of Microbiology College of Arts and Sciences <sup>2</sup>Department of Plant Pathology College of Agriculture

Bacterial blight of rice is an economically important disease worldwide and caused by the bacterium *Xanthomonas oryzae* pv. *oryzae*. During disease, the expression of a gene for pectate lyase is observed. To determine if expression of pectate lyase is important for disease development, plants harboring mutations in the gene for pectate lyase will be examined. Prior to measuring the effect of pectate lyase expression on disease, mutations in the gene for pectate lyase need to be characterized. A variety of rice mutant stock centers maintain large collections of rice lines with random T-DNA and transposable elements. The main purpose of this project is to screen the genotypes of the rice lines that putatively contain T-DNA insertions in the gene for pectate lyase. The approach will involve the amplification of genomic DNA segments corresponding to wild type and mutant alleles. Genomic DNA will be harvested from parental and mutant line leaf tissue. Amplification will employ the polymerase chain reaction (PCR). Two sets of primers are designed, one pair is to determine if the wild type gene present, while the other one is to determine if the rice lines contain T-DNA within the coding sequence of the pectate lyase gene. The identity of the amplified fragments will be determined by gel electrophoresis and DNA sequencing. Results to date indicate one individual of line 6 was a homozygous insertion mutant, two were heterozygous mutation lines, and others were wild type. All individuals of a second line (line 8) were wild type.

Honors/Leadership: NIH Bridges to the Future; Golden Key International Honor Society; HALO, LULAC, Semillas, Transfer Ambassadors; Travel: Mexico; Bilingual: English/Spanish

#### How Is Deoxygenated Hemoglobin Affected During Ramp Incremental Forearm Exercise Between Young and Older Males?

Jonathan Bernard<sup>1</sup>, Carl Ade<sup>2</sup>, Ryan Broxterman<sup>2</sup>, Thomas J. Barstow<sup>2</sup> <sup>1</sup>Division of Biology College of Arts and Sciences <sup>2</sup>Department of Kinesiology College of Human Ecology

According to the U.S. Census Bureau, there are roughly forty million people over the age of fifty in the United States. Arterial oxygen delivery to the muscle, in comparison to oxygen utilization of the muscle, is affected greatly with age. This study examined muscle deoxygenation during ramp incremental (RI) forearm exercise between young and elderly men. The study selected men who were not smokers, who exercised regularly, and did not take medications. The subject came to the laboratory at least 6 hours fasted and then lay in the supine position while performing the handgrip exercise. The handgrip exercise consisted of alternating squeezing and relaxing the hand repeatedly against a preset resistance. The resistance continually increased until the subject could no longer squeeze. Near-Infrared Spectroscopy and Pulsed Doppler Ultrasound were used to measure muscle oxygenation and blood flow through the brachial artery, respectively. Preliminary analysis suggests that older individuals extract more oxygen for a given work rate compared to young adults. This may be due to an altered muscle blood flow to metabolic rate relationship.

Honors/Leadership: Edgerley-Franklin Urban Leadership Scholar; Memorial Scholarship; Soaring Eagles Leadership Team; Volunteer: Mercy Regional Health Center ER; Alternative Spring Break: St. Jude's Hospital- Memphis, TN; Flint Hills Breadbasket; Martin Luther King-A Day On, Not a Day Off; Douglass Center Tutor; Lawrence Homeless Shelter Volunteer; Habitat for Humanity; Rake 'N' Run

Differential Pattern of Connexins in Mammary Cancer Cells of MMTV-PyVT Mouse Nallely Barron<sup>1</sup>, Stephanie Shishido<sup>2</sup>, Thu Annelise Nguyen<sup>2</sup> <sup>1</sup>Department of Microbiology College of Arts and Sciences <sup>2</sup>Department of Diagnostic Medicine/Pathobiology College of Veterinary Medicine

Breast cancer cells have reduced gap junctional intercellular communication (GJIC) and a high rate of cell proliferation in comparison to normal mammary cells. It has been shown in previous studies that primaquine compounds (PQ's) can increase GJIC and reduce cell proliferation. Previously the transgenic strain FVB/N-Tg(MMTV-PyVT)634Mul/J (also known as PyVT) was used as a model system for measuring tumor burden, drug sensitivity, and metastasis of mammary carcinomas. A continuous line of mammary tumor cells (named FMC2u) has been established and characterized from the malignant neoplasm of a female PyVT transgenic mouse. All lines showed substrate adherence and maintained similar morphological characteristics of the original tumor from which it was derived. Doubling time for these cells is 48 hours with high viability. The gene expression of gap junction proteins such as Cx43, Cx46, and  $\beta$ -Actin (control) will be measured for the FMC2u cell line. The results will address whether PQs have a direct impact on the expression of gap junction proteins, critical players in cell-cell communication.

**Honors/Leadership:** Academic Honors (4.0), NIH Bridges to the Future; Bluemont Scholarship; Ellis Foundation; Phi Theta Kappa; Research Experience for Undergraduates (REU), K-State Biology; Summer Undergraduate Research Opportunity Program (SUROP); K-INBRE presentation; Presenter: Phi Zeta Research Day; Presenter: Ecological Genomics Research Forum; LULAC; Travel: Mexico; Bilingual: English/Spanish

#### Dropping Out? PWI's and the Lack of Multicultural Student Retention

Tiana Brooks<sup>1</sup>, Dawne Martin<sup>2</sup> <sup>1</sup>Department of Fine Arts College of Arts and Sciences <sup>2</sup>Department of Marketing College of Business Administration

A major issue for predominantly white institutions (PWI's) is retaining multicultural students and seeing them to graduation. The main objective of this project is to determine why these students do not continue their education or graduate, and then create ideas and solutions to help improve multicultural retention rates. Based on past research, this research will identify contributing factors and build a model with these factors to guide the primary research. The goal is to identify and map out possible causes of leaving, as well as develop and answer questions as to why identified factors are present. Respondents, ranging from freshmen to graduates, including those who left the university, will be asked how they feel or felt about attending a school as a multicultural student and then finally, remedies will be developed to address the identified causes. Some variables already identified include financial stress, campus climate, academic preparation, school involvement or engagement, and personal factors such as motivation and self-esteem. After finding the common problems, solutions and ideas can be made to help make university life more comfortable, less hostile, and more available to multicultural students.

Honors/Leadership: Silver Medallion Scholarship; Cargill Scholarship; Black Student Union; Bilingual: English/German

#### **End-product Quality Improvement in Gluten-Free Muffin Formulations**

Mayra Perez-Fajardo, Hulya Dogan Department of Grain Science and Industry College of Agriculture

Celiac disease is a condition that damages the lining of the small intestine and prevents it from absorbing food properly leading to malnutrition. The damage is caused by consuming gluten. There is no cure for this disease and the only way to treat it is to follow a lifelong gluten-free diet. Thus the development of glutenfree products is a necessity right now, however gluten is found in flour which is crucial for the structure of a baked good. The challenge entails finding an additive to replace the flour while still producing a product that is acceptable to consumer's taste. The purpose of my study is to use Quinoa and Tapioca flour to produce a good quality muffin that will also give the consumer the nutritional values that gluten-free products often lack. Quinoa is a pseudo-cereal with good nutritional profile with additional nutraceutical value due to its high phenolic and antioxidant content. Meanwhile, Tapioca contains a high starch content that is low in cholesterol and unhealthy fats. Due to the many health benefits, these two gluten-free flours were chosen to be tested. The experiment was held in the Baking Science Lab in Shellenberger Hall. A basic muffin recipe was used. After mixing, 53.2 grams of batter batter was filled in the molds and baked for 20 minutes at 350°F. A control muffin was developed using wheat flour. The base-line samples were created by testing 100% Quinoa, 67% Quinoa+33% Tapioca, 50% Quinoa+50% Tapioca, 33% Quinoa+67% Tapioca, and 100% Tapioca. The height, density, macrostructure, microstructure, and texture were determined for all five types. A sensory panel also tasted all five muffins for their consumer acceptability scores. From the base line, the 67% Quinoa+33% Tapioca and 50% Quinoa+50% Tapioca were found to have the most promising scores. During the rest of the semester, these two formulations will be improved further by adding two hydrocolloids at 3 different levels. The end-product quality will be optimized regarding texture, density, macro and microstructure as well as overall consumer acceptability.

**Honors/Leadership:** Academic Honors (4.0); Memorial Scholarship; Cargill Project IMPACT Scholarship; MAPS; MANRRS; Rake 'N' Run; Four Paws Bake Sale; Border Angels; Travel: Mexico; Bilingual: English/Spanish

# Expression of Innate Immunity in *Frankinella occidentalis* during Tomato spotted wilt virus Infection

Joshua Ames<sup>1</sup>, Dorith Rotenberg<sup>2</sup> <sup>1</sup>Department of Microbiology College of Arts and Sciences <sup>2</sup>Department of Plant Pathology College of Agriculture

Arthropod vectors disseminate numerous and diverse viruses that cause diseases in humans, animals, and plants. All viruses are obligate, intracellular, and infectious agents, however, their relationship with the host varies from parasitism to mutualism. The aim of our research is to identify and characterize the ecological and molecular insect host factors associated with acquisition, infection, and transmission of a plant-pathogenic virus, Tomato spotted wilt virus (TSWV), by the primary insect vector *Frankliniella occidentalis*, the western flower thrips (WFT). TSWV infects, propagates, and spreads to various insect tissues with no apparent pathogenic effect on WFT. We hypothesize that virus titer is modulated by the combined activities of insect innate immune pathways known to be associated with known antiviral defense mechanisms in various well-characterized arthropod systems. The objective of our research was to determine the effect of TSWV on expression of four putative insect immune genes (i.e., Defensin-4, Caspase-1, STAT, and Serpin) in WFT during the virus transmission cycle. We hypothesize that there is a difference in magnitude of innate immune gene expression between virus-infected and non-infected WFT. To test this hypothesis, time-course experiments were conducted to determine TSWV titer and expression levels of the four WFT genes during virus infection and replication in larval to adult thrips using real-time quantitative reverse transcriptase-PCR. There was no significant effect of virus on gene expression at any given stage of development as compared to non-infected WFT (P > 0.1). However, linear regression analyses revealed subtle, yet significant positive relationships between virus titer harbored by WFT and the magnitude of gene expression of Caspase-1, STAT, and Serpin (P < 0.05). Regardless of virus infection, there were significant differences in innate immune gene expression among developmental stages (P < 0.05), revealing a possible link between innate immunity and WFT development. In conclusion, this research contributes new knowledge regarding quantitative associations between virus accumulation and gene expression in an insect vector.

Honors/Leadership: Ecological Genomics Undergraduate Research and Mentoring Internship; Summer REU/URM presentations 2011, 2012; Professional Conference Presentations: Ecological Genomics Symposium 2011, 2012; ASM-Capstone Travel Award: American Society of Microbiology

#### Coping, Hope, Life Satisfaction, and Relationship Satisfaction in Parents of Children with Down Syndrome: A Comparison of Prenatal and Postnatal Diagnosis Groups

Natira Staats<sup>1</sup>, Briana S. Nelson Goff<sup>2</sup> <sup>1</sup>Department of Psychological Sciences College of Arts and Sciences <sup>2</sup>School of Family Studies and Human Services College of Human Ecology

This study reviewed the coping, hope, life satisfaction, and relationship satisfaction of parents with a child diagnosed with Down syndrome. This study included a national sample of participants who learned of their child's diagnosis either from prenatal screening/testing (n= 105) or from a postnatal diagnosis (n=294). The main focus of this study included parents coping, hope, life and family satisfaction, and family functioning. These variables were explored using a t-test data analysis. The results indicated no statistically significant differences between the two groups on the measures of coping, hope, life satisfaction, or relationship satisfaction. The study does provide a quantitative analysis of parents' experiences related to their child's Down syndrome diagnosis based on the timing of the diagnosis, which is currently absent in the literature.

**Honors/Leadership:** NIH Bridges to the Future; Memorial Scholarship; Phi Theta Kappa Transfer Academic Scholarship; Rake 'N' Run; Big Brothers and Big Sisters, volunteer; Breast Cancer Research Foundation, volunteer; Bilingual: English/Spanish

#### A whole genome map of the black flour beetle, Tribolium madens

Stephanie Jacquez, Michelle Coleman, Susan J. Brown Division of Biology College of Arts and Sciences

Comparing the genomes of closely related species reveals signatures of genome evolution and is useful in the discovery of conserved regulatory regions. To begin a comparative genomics study of the genetic model organism Tribolium castaneum, the genomes of three closely related species, T. freemani, T. madens and T. confusum were sequenced using NGS technology, which produces tens of thousands of contigs that were assembled into thousands of scaffolds. Ideally, a single scaffold should be produced for each chromosome in a genome. In Tribolium 2n = 20 for T. castaneum, T. freemani, and T. madens, while 2n=18 for T. confusum. To validate these assemblies and connect scaffolds to chromosomes, we are using a novel technology to produce whole genome maps. This technology, offered by BioNano Genomics, is based on the ability to image single very long molecules of DNA that have been fluorescently labeled at specific restriction sites, by single stranded nicking, fluorescent labeling and repairing (NLR rxn).

Generating a genomic map is more efficient when analyzing a mostly isogenic strain, that is, when the diploid chromosomes are as close to identical in sequence as possible. To produce isogenic strains, brother sister mating are performed for several generations. I am inbreeding a wildtype strain of T. madens to produce a more isogenic strain for mapping. T.madens, also known as the black flour beetle, is native to Europe and North Africa. Although this beetle species is used in many research experiments, its genetic map is unknown. Once I have an inbred strain, I will isolate nuclei and embed them in low melt agarose (LMA) plugs to protect ultra long DNA fragments from degradation during further manipulations. HMW DNA will be isolated in the LMA plugs by treatment with Proteinase K and SDS to lyse nuclear membranes and remove histones and other proteins. After analysis on a CHEF gel to validate Mb size of the DNA, it will be ready for the NLR rxn.

**Honors/Leadership:** NIH Bridges to the Future; Golden Key International Honor Society; Multicultural Honor Society; Cancer Research Award 2011, 2012; Ecological Genomics Undergraduate Research and Mentoring Internship; Seaboard Foods Internship; Presentations: Ecological Genomics Symposium; Coauthored "Intratracheal administration of a nanoparticle-based therapy with the angiotensin II type 2 receptor gene attenuates lung cancer growth" *Journal of Cancer Research* 

#### Investigating the Effectiveness of Visual Cueing in Introductory Physics Problem Solving

Jeffrey Murray, Amy Rouinfar, N. Sanjay Rebello Department of Physics College of Arts and Sciences

Gaining access to cognitive resources is critical in facilitating improved performance in solving physics problems that require conceptual insight. Through dynamic visual cueing, we hope to activate students' prior knowledge to facilitate them to gain the necessary conceptual insight to solve the problem. In Part 1, we assess various levels of cueing to see which cues are most effective. Twenty-four introductory physics students solve four sets of conceptual physics problems with the purpose of evaluating the effectiveness of the visual cues. In Part 2 we use the most effective cues from Part 1, and investigate if the introductory physics students find them to be helpful. We use an eye tracker to record student eye movements while they solve insight problems to investigate how students' eye movements are related to the visual cues. The problem sets are divided into three parts; an initial problem, six isomorphic training problems, and one transfer problem in which the surface features have been changed. Students in the cued group view the cues during the training problems only, while students in the control group do not see the cues. Our goal is to find evidence of whether or not visual cueing enables students to activate the prior knowledge necessary to correctly solve the training problems and see if this has any impact on their ability to solve the transfer problem once the cues have been removed.

Honors/Leadership: McNair Scholars; Bluemont Scholarship; Research Experience for Undergraduates: Kansas State University; Physics Club; Rake 'N'Run; Mittens for Many

#### **Identifying Substrates of Patatin-like Lipases**

Morgan Armbruster<sup>1</sup>, Maoyin Li<sup>2</sup>, Mary Roth<sup>2</sup>, Ruth Welti<sup>2</sup>, and Xuemin Wang<sup>2</sup> <sup>1</sup>Department of Life Sciences <sup>2</sup>Division of Biology College of Arts and Sciences

Patatin-like lipases are a family of "lipid-cutting" enzymes that are very poorly defined in terms of substrate specificity. In Arabidopsis thaliana, this is a large gene family and various members can hydrolyze phospholipid, glycolipid, and tri- and di-acylglycerol substrates. Lipidomics, or comprehensive lipid analysis, including analysis of a large number of lipid molecular species, is a great approach to find out what these lipases may use as substrates and what they are actually doing in vivo. First, a biological lipid extract containing a large variety of lipids was incubated with or without a purified lipase. This was followed by lipidomic (mass spectrometry) analysis of the extracts treated with or not treated with the enzymatic incubation. Many lipid metabolizing enzymes are promiscuous and may show activity even when incubated with a poor, non-physiological substrate, but incubating the enzyme with a mixture allows the purified enzyme to choose and hydrolyze its preferred substrate. Analysis of the lipids in the extract with or without enzyme treatment should show what lipids were changed by treatment with the enzyme, revealing the enzyme's substrates and products. This project is testing the power of high throughput metabolic profiling of mutants to produce experimentally verifiable leads into uncharacterized enzymatic activities.

Honors/Leadership: James R. Coffman Award of Excellence; Cats for Pre-Health Resources Scholarship; Jack and Bertha Maes Pre-Med Scholarship; Cancer Research Award; Presenter: KINBRE Symposium; Winter Dance; Rake 'N' Run; Travel: Ghana

#### **Reservoir Water Routing Analysis**

Mark Mathis II, David Steward Department of Civil Engineering College of Engineering

This study analyzes reservoir water routing. Water routing from streams to reservoirs is the problem when severe flooding situations threaten regions of North America. Destruction of land, homes, and lives raises the question as to what is being done to prevent such devastation. In 2011 the largest reservoir system in the United States, responsible for draining one sixth of the United States. had undergone severe flooding. The Missouri River Basin, stretching 2300 miles long, has six mainstream reservoirs that currently operate with a capacity of 73.1 million acre feet (maf) of flood storage, but failed in time of severe flooding. Water routing between streams and reservoirs was the leading contributor to such severe flooding. Analyzing and recording each reservoir water elevation from the United States Army Corps: Missouri River Basin Water Management Division by the corresponding day throughout the month is the first step in resolving the Missouri River Basin water routing problem. Analyzing data from the United States Geological Survey (USGS) from each stream that flows into and out of each reservoir is the next step in resolving this water routing problem. Data from each reservoir stream-gag will help in understanding how water and land interact with each other and the effect water and land interaction might have with the movement of water up and down stream in time of severe flooding. Discovering more storm-effective and storm-reliable ways of routing stream systems to reservoirs ultimately reducing destruction of land, homes, and death toll is vital. After further research, water routing plans, between streams and reservoirs, will be designed for better performance in controlling water flow in and out of reservoirs during severe flooding situations.

Honors/Leadership: American Society of Civil Engineering; Air Force ROTC; Rake 'N' Run

### Genetic Analysis of Bacterial Sucrose Transport and Utilization in Bacterial Blight Disease of Rice

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Sucrose is often hypothesized to be an important nutrient for plant-associated bacteria, including plant pathogens. However, the requirement for sucrose in the ability of X. oryzae py. oryzae (Xoo), the causal agent of bacteria blight of rice, is unknown. Recent reports indicate that Xoo induces host plant cells to express a sucrose transporter and induction is critical for infection. We hypothesize that expression of the transporter leads to the leakage of sucrose into the extra-cellular spaces and xylem and, consequently, to the stimulation of bacterial growth and spread within the host. We propose to test the model by suppressing sucrose uptake by the bacterium during growth in the plant, with the prediction that disease in plants will be severely reduced if availability of sucrose to the pathogen is required for disease. We focused on four Xoo genes that are involved with sucrose transportation and utilization based on sequence similarity to known bacterial sucrose utilization genes. A sitespecific targeted mutagenesis strategy was designed that employs DNA primers for the genes. An internal portion of the gene was amplified using polymerase chain reaction (PCR) and cloned into the plasmid vector pCr2.6 using DNA topoisomerase. The vector is capable of replication in standard laboratory strains of Escherichia coli (E.coli) but cannot replicate in Xoo. The vector contains a gene for resistance to the antibiotic kanamycin (Knr), which allows for selection of strains that results from recombination of the plasmid into the targeted gene upon transient introduction of the plasmid into Xoo. The process generates a strain with two mutant copies of the target genes. We used PCR and DNA sequencing for verification that the proper recombination events were present in the antibiotic resistant isolates of Xoo. The effect of the mutations in sucrose transporter and utilization on the ability of Xoo to incite disease in rice was measured, comparing the mutant bacterial growth to the growth of the wild type strain. Future research will allow us to better understand the role played by sucrose transport in plant disease. The information may allow improvements in crop and world food security.

**Honors/Leadership:** NIH Bridges to the Future; Phi Theta Kappa Scholarship; Memorial Scholarship; Golden Key International Honor Society; Psi Chi; Annual Meeting of the Missouri Valley Branch of the American Society of Microbiology; Rake 'N' Run; Mittens for Many; Travel: Mexico; Bilingual: English/Spanish

#### Comparison Between Novel Peak Performance Leg Extension Ergometer and Established Cycle Ergometer Protocols

Luis F. Chavez, Marsha Newman, Carl J. Ade, Ryan Broxterman, Jesse C. Craig, Susanna Schlup, Samuel Wilcox, Thomas J. Barstow Department of Kinesiology College of Human Ecology

Critical Speed, Critical Power, and VO2 max tests are among the most widely used tests in the field of Kinesiology. These parameters have been characterized using ergometers such as a treadmill or a training cycle, both of which have become the standard for other novel testing protocol tools in terms of data results and their validity. **Purpose:** This lab is currently in the process of developing a new testing protocol utilizing a new type of ergomenter for use in maximal tests. This machine is designed to mimic the movements of a cycle ergometer while also incorporating classical weight lifting attributes. **Methods:** Subjects perform two maximal incremental tests to volitional fatigue, one on a traditional cycle ergometer, in which resistance is increased every minute until failure. On the new ergometer, the format of the test consists of continuously increasing stages, each having a set time of 1 minute and 50 seconds of continuous exercise followed by 10 seconds of rest, during which addition weight is added in increments of 51bs on each leg in preparation for the next stage. Subjects continue until volitional failure is reached. **Results:** Preliminary tests on the new ergometer have yielded results comparable to that of the cycle ergometer tests, but further tests are being performed to assess the exact parameters of this protocol for adjustment so that exercise on the device best mimics exercise on a cycle ergometer. **Conclusion:** Although preliminary tests have yielded promising results, further tests are still required to fully assess the validity of the results of this ergometer compared to those seen with a cycle ergometer.

**Honors/Leadership:** NIH Bridges to the Future; Golden Key International Honor Society; Cancer Research Award; Internship: Hopkins, Hopkins and Ackerman Optometry; Bilingual: English/Spanish

### Identifying porcine reproductive and respiratory syndrome virus surface proteins recognized by broadly neutralizing antibodies

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Porcine reproductive and respiratory syndrome (PRRS) virus first appeared in the late 1980's and has since caused large economic problems for the global swine industry. PRRSV is the most genetically diverse virus, which makes the design of vaccines extremely difficult. For example, following PRRSV infection, production of neutralizing antibodies (nAb) – important factors in host immunity – is weak and delayed, and is often directed at only genetically related isolates. Recent work analyzing over 1,000 PRRSV infected pigs identified a small population of pigs that produce nAb to a range of genetically diverse PRRSV isolates (bnAb). The objective of the current project is to identify surface proteins of PRRSV that are recognized by bnAb. The PRRSV genome codes for at least 6 surface proteins, including glycoprotein (GP) 2a, GP3, GP4, GP5, matrix (M), and envelope (E). Recombinant bacterial plasmids, each containing a gene for an individual surface protein fused with enhanced green fluorescent protein (EGFP), were transfected into HEK 293T cells, a mammalian cell line. Transfections were confirmed by visualization of EGFP using fluorescent microscopy. Proteins from successfully transfected cells were then isolated and visualized using SDS-PAGE. Isolated proteins will be reacted with sera from pigs with bnAb in a western blot. The results of this work will potentially identify PRRSV surface proteins that are targeted by bnAb.

Honors/Leadership: Pre-Vet Club; Rake 'N' Run; Mittens for Many; Bilingual: English/Spanish



#### A Preliminary Investigation of Risk-Taking Behaviors of Younger Drivers and Highway Crashes

Katherine Nguyen, Robert W. Stokes Department of Civil Engineering College of Engineering

Traffic crashes are the leading cause of death for persons age 16-25 in the U.S. (U.S. Department of Transportation 1995). Some researchers have suggested that young (16-25) drivers are at greater risk of being involved in a traffic crash than older drivers due to their propensity to take risks while driving. Risk-taking behaviors of young drivers may include speeding, running yellow lights, texting or calling, reaching for items, applying make-up, and talking to others. Factors that cause such behavior in young drivers may include peer pressure (showing off), distractions (listening to music, texting/cell phone use), logical reasoning capabilities, stress, anger, and lack of driving experience. Some researchers have suggested that: the logical reasoning and basic information-processing abilities of 16-year-olds are comparable to those of adults; adolescents are no worse than adults at perceiving risk or estimating their vulnerability to it; and increasing the understanding of the consequences of the risks associated with making a poor or potentially dangerous decision has comparable effects on adolescents and adults (Millstein & Halpern-Felsher, 2002; Reyna & Farley, 2006; Steinberg & Cauffman, 1996). Other researchers, however, have suggested that risk-taking is the product of both logical reasoning and psychosocial factors (Steinberg 2007). Logical reasoning appears to be fully developed by the age of 15, but psychosocial capabilities continue to mature into adulthood. It is not clear at this time if risk-taking is a product of logical reasoning skills, psychosocial factors, or a combination of both. Clearly, there is a need for additional research in this area. The basic objectives of this research are to: 1) identify specific risk-taking behaviors of young drivers that may contribute to traffic crashes; 2) identify specific factors that cause such behavior; and 3) identify potential remedial actions that could eliminate or reduce risk-taking behavior of younger drivers. The study objectives will be accomplished by conducting a review of the pertinent literature and by conducting a survey of younger drivers to identify their perceptions of risk-taking as it relates to the driving task. The survey will also attempt to identify the factors that contribute to risk-taking behavior by younger drivers.

Honors/Leadership: Kansas Honor Scholar; MAPS; Project Impact Scholar; Engineers Without Borders; Steel Bridge Team; Kansas State Club Volleyball Player

### Evaluation of the Pathogenic Potential of a Soil-borne *Stenotrophomonas* sp. on Perennial ryegrass (*Lolium perenne* L.)

Shauntá Pruitt<sup>1</sup>, Frank White<sup>2</sup>, Ken Obasa<sup>2</sup> <sup>1</sup>Department of Microbiology College of Arts and Sciences <sup>2</sup>Department of Plant Pathology College of Agriculture

Soil biota is comprised of a large collection of organisms that play different and sometimes essential roles to the soil ecosystem. Bacteria, represented by various species, constitute a significant part of the soil biota. Some soil bacterial species play beneficial roles. For instance, bacteria function in the decomposition of organic materials and as nitrogen-fixing symbionts in roots of legumes. Other species, including members of the genus *Pseudomonas*, and *Streptomyces*, are plant pathogens that cause diseases on important crops with resultant economic losses. The pathogenicity of soilborne-bacterial species, therefore, constitutes an important area of research in agricultural and horticultural systems. The objective of this research is to characterize and evaluate the pathogenic potential of soil-borne members of the genus *Stenotrophomonas* that were isolated from soils with creeping bentgrass (*Agrostis palustris*) cover that displayes foliar disease sysmptoms. Creeping bentgrass is a cool-season turfgrass used on many golf courses. The specific objectives are: (1) Determine the optimum growth temperature for the bacteria; (2) transform the bacteria to express the gene for the green fluorescent protein (GFP); (3) determine the effect of inoculation of cut leaf blades of creeping bentgrass and perennial ryegrass with a bacterial suspension; and (4) localize GFP-expressing transformants within the inoculated plants. The pathogenic potential of the strains will be assessed from the symptoms and distribution of the labeled bacteria.

Honors/Leadership: NIH Bridges to the Future, Golden Key International Honor Society, Rake 'N' Run; Developing Scholars Food Drive; Mittens for Many

#### Effects of Freezing and Thawing on Sperm-bound IgG and IgA

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A method for diagnosis of antisperm antibody (ASA) was recently developed at Kansas State University using fresh semen. The objective of this study was to determine if freezing and thawing affects the ability of the test to identify sperm-bound IgG and IgA. It was hypothesized that test results will be similar between fresh and frozen semen. Four adult bulls were used in the experiment. Four initial ejaculates were collected and frozen (negative samples). Then, the bulls were immunized with their own semen to induce formation of anti-sperm antibodies (ASA). Three weeks after immunization, four more ejaculations from each bull were collected and frozen (positive samples). The semen was thawed and washed by centrifugation; then anti-bovine IgG, anti-goat IgG isotype control, anti-bovine IgA and anti-mouse IgA isotype control antibodies were added for antibody staining. Propidium iodide was added to identify and exclude dead sperm from the analysis. A flow cytometer was used to determine the percentage of sperm with IgG and IgA bound to them. The percent of IgG and IgA-bound sperm was compared before and after freezing in positive and negative samples using a paired T test. There was a difference in ASA binding before and after freezing within negative IgG (p=0.0412) and IgA (p=0.0455) samples, but not within positive samples for IgG (p=0.0523) and IgA (p=0.0598).

		IgG	IgA
Negative	Pre-freezing	$0.52 \pm 0.27$	$1.21 \pm 0.30$
-	Post	$2.14 \pm 0.60$	$4.27 \pm 1.48$
Positive	Pre-freezing	$50.75 \pm 10.20$	$14.10 \pm 4.12$
	Post	$22.78 \pm 11.00$	$7.74 \pm 4.82$

Thus far, only seven semen samples have been analyzed. More samples are needed to determine if the trend seen among positive samples becomes significant. Based on these preliminary results, it may not be possible to evaluate ASA binding in frozen or thawed samples.

Honors/Leadership: : John Deere Multicultural Scholarship, Robinson Diversity Scholarship, Cargill Project IMPACT Scholarship; Phi Eta Sigma; MANRRS, President; Border Angels; KSU Blood Drive

#### Blogs, Pins and Reviews: Their Effects on Attitudes Toward Advertisements and Purchase Intentions

Phillip Hill, Ashlee Hampton, Esther Swilley Department of Marketing College of Business Administration

The research question this study tries to answer is: Do consumers rely on information from advertisements or information received from fellow consumers via reviews, blogs, or pins? This study examines the effects of social media consumer reviews, specifically, blogs, pins and reviews, on consumers' attitudes toward advertisements, and ultimately consumer purchase decisions. This research also searches to understand if social media has any bearing on purchase decisions when coupled with advertising. This study also examines the purchase decision as a gift or personal purchase in light of a social media consumer review. In order to answer this question, a theoretical framework was developed based on previous research in social media and advertising. The variables that are evaluated include attitude toward the ad, blog, pin or review; credibility of the ad, blog, pin or review; value of the ad, ad usefulness, product curiosity, product awareness and purchase intention. An online survey was developed and distributed to students in the College of Business. Analysis of variance (ANOVA) will be used to understand the differences in associations between the different types of social media reviews, as well as their influence on attitudes toward advertisements. It is hoped that the information gained in this study will aid marketers in understanding how consumer reviews can affect corporate advertising appeals.

Honors/Leadership: Leadership Scholarship; Multicultural Business Student Association, Vice President; Floor President, Goodnow Hall; Residence Hall Assistant; Fort Riley USO Volunteer; Rake 'N' Run

#### PHENOLOGY AND SEED PRODUCTION IN BIG BLUESTEM (Andropogon gerardii) ECOTYPES IN GREAT PLAINS RECIPROCAL GARDENS: THE ROLE OF SITE AND ECOTYPE

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Gibson, David<sup>2</sup>, Wilson, Laurel<sup>2</sup>, and Johnson, Loretta<sup>1</sup>

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BACKGROUND AND PURPOSE: Midwest grasslands are dominated by the forage grass big bluestem Andropogon gerardii that persists across a strong precipitation gradient (500 to 1200 mm/yr rainfall from western Kansas to Illinois). These grasslands have recently experienced severe drought, which is predicted to continue with future climate change. We used reciprocal gardens across the precipitation gradient to investigate seed production and phenology among bluestem ecotypes. Three ecotypes (each comprised of four populations from central KS, eastern KS, and southern Illinois) were reciprocally planted in Carbondale, IL, Manhattan, Hays, and Colby KS in 2009. In 2012, we recorded phenological stage from leaf emergence to seed set. At the end of the growing season, we collected and weighed seed from each site. Our main questions were: 1) is there variation among ecotypes and sites in seed production, and 2) is there ecotypic variation in phenology and time to flowering? We predicted that ecotypes should have the greatest seed production in the home environment and that the presumably most drought-adapted central KS ecotype will show advanced flowering in response to shorter growing season and drought.

RESULTS/FINDINGS: Leaf emergence varied significantly by planting site, but not ecotype. Plants in eastern sites emerged earlier than western sites. In Colby, Hays, Manhattan, and Carbondale, emergence occurred at Julian day 91, 84, 83, and 79, respectively. In contrast, time to flowering varied by both site and ecotype. The central KS ecotype flowered on average ~ 20 days earlier than eastern KS and southern IL ecotypes, independent of site. However, when planted in Colby, the central KS ecotype was the only one to flower. Seed production showed strong ecotype, site, and site x ecotype effects. As predicted, the central Kansas ecotype showed greater seed production in Hays, KS ('home site' advantage). In contrast, the southern IL ecotype in Hays produced 1/5 the amount of seed relative to the central KS ecotype. Furthermore, when southern IL and eastern KS ecotypes were planted even farther west in Colby, they did not flower and so could not produce seed. Our results provide clues as to how adaptable big bluestem may be in response to projected drier than current climates and will also help inform land managers about which ecotypes are best suited to restore grassland in the central US.

**Honors/Leadership:** Honors Program; Memorial Scholarship; Medallion Scholarship; National Honor Society Scholarship; Sertoma Scholarship; Soaring Eagles Leadership Team; National Society of Collegiate Scholars; Rake 'N' Run; Flint Hills Breadbasket; Little Hands, Big Difference; Elementary Tutoring; Mittens for Many; Travel: 18 countries; Bilingual: English/Spanish

### Role of a Gene Homologous to Intron-encoded Endonucleases on Baculovirus Replication

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The Autographa californica M nucleopolyhedrovirus (AcMNPV) orf79 (ac79) is a gene conserved in most baculoviruses. It has homology to genes encoded by bacteria, ascoviruses, and iridoviruses. The predicted ac79product has a conserved domain that is homologous to UvrC or intron-encoded endonucleases. Characterization of a recombinant virus lacking ac79 showed that ac79 was required for efficient virus replication. We have constructed viruses with site-directed mutations within the UvrC domain. We will investigate the effects of these mutations on budded virus production and nucleocapsid formation. These results will help us define strategies used for virus multiplication.

**Honors/Leadership:** Cancer Research Award; Opportunity Scholarship; Denison Scholarship; Topeka Dia de los Muertos, Poetry Presentation; Developing Scholars Talent Show; Travel: Mexico; Bilingual: English/Spanish



#### A Proteomic Analysis of Molting Fluid from the Tobacco Hornworm, Manduca sexta

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When an insect outgrows its cuticle, it must shed its skin in a process called molting, which involves the degradation of their old cuticle while at the same time synthesizing new cuticle. During molting, a fluid is released into the space between the old and new cuticle, which contains proteins that help the insect breakdown and recycle the molecules in the old cuticle. My research pertains to the molting fluid of the caterpillar Manduca sexta, also known as the tobacco hornworm. As its name suggests, it feeds on the leaves of tobacco and other related plants (such as tomatoes), which makes it a nuisance to farmers. M. sexta is also important as a model organism for studies in many areas of insect biology. Our goal in studying M. sexta is to use proteomics to further our understanding of the function of molting fluid. Proteomic studies are in-depth analyses of all of the proteins found in an organism, which play important roles in metabolism and development. To achieve this goal, we have collected molting fluid from caterpillars that are about to molt and carried out biochemical assays to identify the proteins and examine their function. In a gel electrophoresis experiment, we identified several bands with protease activity, enzymes that cut other proteins at specific sequences. A two dimensional gel analysis showed that one protein (identified by mass spectrometry analysis as Ms008738) is very abundant during the molting process. Bioinformatics analysis shows that Ms008738 is a metalloprotease that is closely related in its amino acid sequence to angiotensin converting enzymes (or ACE). In humans, ACE play an important role in constricting blood vessels, yet *M. sexta* doesn't have a need for such enzymes, since its blood (or hemolymph) flows freely within its body. Our goal now is to clone the Ms008738 cDNA into bacteria so we can express the protein and analyze it further.

Honors/Leadership: NIH Bridges to the Future; Honors Program; Internship: KU Department of Pharmaceutical Chemistry Summer Research Program; Bilingual: English/Spanish

#### From Slates to iPads: The Evolution of Technology in the College of Education

Rebecca Renteria, Kay Ann Taylor Department of Curriculum and Instruction College of Education

In honor of Kansas State University's Sesquicentennial, the College of Education prepared an online exhibition displaying major changes in the history of its educational technology. In particular, this research, "From Slates to iPads," focused on the evolution of educational technology in the College from its origins in 1964 through the present. Historical archival online exploration included examining course catalogues from 1964-2008, yearbooks from 1964-2008, and identifying images from those two resources representing educational technology. Findings from the online research included the introduction of courses specifically for instructional media, audio-visual media, programmed instructional materials for educational technology as a whole. Images gleaned from the research depict educational technology use throughout the College of Education at various points in time. Interviews with College of Education faculty (former dean, current dean, and educational technology faculty members) yielded rich insights into the progression of educational technology in the college over the years.

Honors/Leadership: Edgerley-Franklin Urban Leadership Scholar; International Buddies; K-State Women's Rowing; Kindergarten Soccer Coach; Travel: Paris and London

### Measurement of physiological parameters in alpacas to predict parturition and neonatal outcome

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Normal gestation length in alpacas is variable (335 to 365 d) when timed from day of mating and there are no reliable predictors of the date of parturition or fetal readiness for birth. The objective of this study was to determine if the date of parturition or neonatal outcome could be predicted based on pre-partum concentration of calcium carbonate in mammary secretions, progesterone in blood, rectal temperature or sexual behavior. Daily data collection began at 335 d of gestation in 11 alpacas, until parturition. There was an effect of day pre-partum on milk calcium carbonate concentration (p = 0.0071). The sensitivity, specificity, positive, and negative predictive value of alpacas giving birth within 24 h of a positive result ( $\geq 200$  ppm) were 100, 18, 33 and 100 %, respectively. Sensitivity, specificity, positive, and negative predictive value of birth of a normal cria if a positive result was obtained within 24 h were all 100 %. Sexual behavior differed among days (p = 0.046). All the alpacas were sexually receptive or passive on the day of parturition, while 60 and 100% of them were non-receptive 24 and 48 h prior to parturition, respectively. Pre-partum changes in blood progesterone concentration and rectal temperature were not significant (P > 0.05). It was concluded that concentration of calcium carbonate in mammary gland secretions 24 h prior to parturition may allow prediction of neonatal survival. A calcium concentration < 200 ppm or non-receptive sexual behavior were good indicators of parturition not occurring within 24 h.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; McNair Scholars; Honors Program; Phi Kappa Phi; Gamma Sigma Delta; Project IMPACT Scholar; A.W. Michael and William Michael Scholarship; Fyfe Scholarship; American Society of Animal Science Scholastic Achievement Award; Gamma Sigma Delta Outstanding First Year Performance Award; Undergraduate Symposium at the State Legislature; Publication: Standardization of a method to detect bovine sperm-bound antisperm antibodies by flow cytometry. Theriogenology 2012;78: 1570-1577.; Pre-Vet Club; MANRRS; Travel: Mexico, Peru, Uruguay, Argentina, Israel, Jordan, Egypt, Netherlands, Austria, Spain, and Portugal; Bilingual: English/Spanish

#### **Childhood Obesity: A Growing Epidemic in the US**

Breyana Ramsey<sup>1</sup>, Janavi Kumar<sup>2</sup>, Koushik Adhikari<sup>2</sup> <sup>1</sup>Arts and Sciences Open Option College of Arts and Sciences <sup>2</sup>Department of Human Nutrition College of Human Ecology

Obesity, a rapidly growing and potentially devastating health issue, needs to be mitigated to help ensure a longer and healthier life span for our children. Obesity is fast becoming a major health issue as seen by the growing number of individuals considered obese, especially those in the adolescent age group. In the United States, nearly 17% of all adolescents and children (2-19 years of age) are obese. The prevalence of overweight and obesity, especially in adolescents, is increasing globally as well. In countries that are still developing and beginning to adopt Western customs, twice as many cases of obesity are appearing every couple of decades. These rates are similar to rates in the US. There are many diseases and health concerns that have been linked to obesity such as high blood pressure, diabetes, stroke, respiratory difficulties, coronary heart diseases, and certain types of cancers. Though the numerous effects of obesity have been conclusively shown repeatedly, the exact cause(s) of obesity are yet to be determined.

This paper aims to review the current status of obesity among US adolescents (12-19 years of age). This will be done by reviewing past research on adolescent obesity. This review will act as a basis upon which later data and information can be compared and analyzed. The main purpose of this review is to condense relevant information from previous research and data, and summarize the current status of obesity prevention. This information can be used to adapt current prevention methods and intervention programs designed to reduce the prevalence of obesity, and hopefully increase their success rate.

Honors/Leadership: Academic Honors (4.0); Memorial Scholarship; Fairchild Scholarship

#### Effect of Cryopreservation Time on Sperm Motility

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Rat spermatozoa cryopreservation has received great attention because of the importance of this species in biomedical research. Nonetheless, the cryopreservation technique in rat spermatozoa is still in the developing stage with low numbers of motile sperm after thawing. In this experiment, we studied the factor of cryopreservation-storage time. Sperm solution was cryopreserved in liquid nitrogen for 4 days, 2 weeks, and 8 weeks and the motility was compared after thawing. Sperm was collected from the caudal epididymis of five Sprague Dawley rats between 22 to 24 weeks of age. Thereafter, the sperm was frozen in medium developed by Nakatsukasa (Nakatsukasa E, et al., Reproduction, 2001). The sperm solution was then drawn into 12 0.25-mL semen straws and held at 0°C for 60 minutes. Then, the straws were placed 4 cm above liquid nitrogen level in the vapor phase for 15 minutes to freeze before submerging in liquid nitrogen. At each time interval, four straws were randomly selected from the 12 in storage and thawed and motility examined at each time interval. Post-thawed sperm motility was evaluated via manual counting of video obtained at 100x magnification.

Honors/Leadership: Big Brothers, Big Sisters; Multilingual: English/Mandarin/Cantonese/Vietnamese

#### Availability, Cost, and Nutrient Content of Sugar Sweetened Beverages on College Campuses

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Background: The consumption of sugar-sweetened beverages (SSBs), which includes carbonated soft drinks, fruit drinks, and energy drinks, has dramatically increased over the past three decades; thus contributing to the overweight and obesity epidemic. The SSB manufacturers have made it easier for consumers to get their products while increasing the size available from the 12-ounce can to the 20-ounce bottle. Purchasing SSBs from the vending machines has become a convenient option, but the financial and health implications associated with this behavior are often overlooked. SSB intake is displacing healthier beverages intake such as water and low-fat or fat-free milk. Americans are only consuming about half of the daily recommended servings of dairy. Milk contains essential nutrients such as calcium, vitamin A, vitamin D, vitamin B12, phosphorus, potassium and magnesium; however, SSBs lack these nutrients. Research shows excessive SSB consumption leads to health conditions such as obesity, diabetes, heart disease, and osteoporosis.

Objective: To evaluate the SSB availability, cost, and nutrient content on the Kansas State University campus in 2008 and 2012.

Methodology: In order to assess the campus environment, four buildings were evaluated that included the library, the student union, and two academic buildings. Data on the name/flavor, brand name, package size, price and the number of slots in which it appeared were collected. The nutrient content of these beverages were compared to those of low-fat and fat-free milk.

Results: There was a 56% increase in availability of SSBs from 2008 to 2012; the cost of SSBs increased 25% and there was no change in nutrient content.

Conclusion: This trend suggests that Kansas State University students are in an environment that supports an increased consumption of discretionary calories associated with added sugars which increases the risk for overweight and obesity, diabetes, heart disease, and osteoporosis.

Honors/Leadership: Memorial Scholarship; Schafer Human Ecology Scholarship; Pilots Program; Pre-Nursing Club; Rake 'N' Run; American Legion Volunteer; Travel: Canada

#### **Fabrication of Microfluidic Devices**

Zachary Jones<sup>1</sup>, Christopher T. Culbertson<sup>2</sup> <sup>1</sup>Department of Biological and Agricultural Engineering College of Engineering <sup>2</sup>Department of Chemistry College of Arts and Sciences

Microfluidic devices are becoming key components in the study of biochemistry. These devices provide a variety of functions; for example. They can integrate cell transport, manipulation, stimulation, and lysis with the separation and detection of analytes released by the lysis of such cells, thus automating such analyses. While the integration of multiple sample handling techniques has been demonstrated, there are some limitations to the ease in which pumping can be implemented. Currently I, along with Dr. Christopher Culbertson, are currently working to improve pumping ease and reliability. At present, pumps are generally large, off chip, and have to be attached via tubing. We would like to integrate small pumps directly on the chip itself. This will allow us to change the flow rate much more easily. To fabricate this pump we are using a process called soft lithography. Soft lithography uses photolithography to create a mold out of a photoresist. After the photoresist is made, a microfluidic device is formed by pouring and curing material called polydimethylsiloxane (PDMS). We use different molds to create multiple layers that can then be combined into one integrated device. This process then allows us to create multiple layers of channels smaller than human hairs that can be used to transport cells and generate peristaltic pumps. Soon we will begin doing experiments to determine what types of flow rates we can generate on the chips and then we will start moving cells and analyzing them.

Honors/Leadership: Edgerley-Franklin Urban Leadership Scholar; Medallion Scholarship; National Society of Collegiate Scholars; AICHE; Alternative Spring Break: St. Jude's Children's Hospital - Memphis, TN; Rake 'N' Run; Mittens for Many

Clinical Manifestation of Rabies among Horses in Kansas and Nebraska: 2001-2012 Felicia Walker<sup>1</sup>, Elizabeth Davis<sup>2</sup> <sup>1</sup>Department of Animal Sciences and Industry College of Agriculture <sup>2</sup>Department of Clinical Sciences College of Veterinary Medicine

Rabies is an invariably fatal zoonotic viral disease that causes neurologic disease in a variety of species that include horses. Although neurologic disease is most common, other forms of clinical disease have been reported that include lameness, colic or fever. Most commonly disease is observed in unvaccinated horses that are bitten by an infected small mammal such as a skunk or raccoon. Although uncommon, transmission of virus from infected horse to human is possible. Fortunately, horses that are properly vaccinated for rabies are protected from disease. However, in order to improve awareness regarding the potential for rabies infection among horses, it is valuable to be familiar with the clinical signs of disease among horses that test positive for rabies infection. The primary goal of this study was to determine clinical signs associated with disease among horses in Kansas and Nebraska that tested positive for rabies from 2001-2012.

An extensive data base search was performed to determine the clinical presentation for horses that were submitted for rabies testing at the Kansas State University Veterinary Diagnostic Laboratory (KSUVDL) using the standard method of direct fluorescent antibody testing on neural tissue. In total, 536 equine samples were submitted to the KSUVDL over the period of interest from 2001-2012. Among test positive horses the most common clinical signs involved the central nervous system, with the cortical form of disease most common (42%); brain stem rabies and spinal cord or paralytic rabies occurred with similar frequency (20%). Consistent with previous reports, rarely clinical signs other than neurologic disease presented as cases of rabies (18%).

Overall, horses which display abnormal neurologic signs and are unvaccinated for rabies should be considered to possibly be infected with the rabies virus. This information further supports previous recommendations that include appropriate preventative strategies should be implemented to minimize exposure to susceptible humans.

Honors/Leadership: Chester E. Peters Student Development Award; Resident Assistant for Boyd Hall

#### Nitrate supplementation augments cutaneous reactive hyperemia in healthy humans

Jena Eder, Jeremy Keen, Erica Levitt, Brett Wong Department of Kinesiology College of Human Ecology

Beetroot juice (BRJ) has been shown to increase levels of nitrates in the vascular system, which can subsequently be converted to NO through either NOS-independent or -dependent pathways. We tested the hypothesis that nitrate supplementation would augment cutaneous reactive hyperemia (RH) via NOS-independent mechanisms. Subjects reported to the lab for pre- and post-BRJ RH protocols. Subjects consumed concentrated BRJ (.45g nitrates; 5mM) for 3 days. Subjects were equipped with 2 microdialysis fibers (control and 20 mm L-NAME to inhibit NOS) on the left forearm as well as a blood pressure cuff for arterial occlusion. Arterial occlusion was performed for 5 minutes and the cutaneous RH was continuously monitored using laser-Doppler flowmetry (LDF). A total of 3 occlusions were performed with at least 10 min rest between occlusions. Mean arterial pressure was continuously measured and cutaneous vascular conductance (CVC) was calculated as LDF/ MAP and normalized to %CVCmax. BRJ significantly increased total RH (area under curve) at both control (pre: 2518±337 vs. post: 4562±481 %CVCmax\*sec) and L-NAME (pre: 2495±117 vs. post: 4408±901 %CVCmax\*sec) sites. There was no difference in total RH between control and L-NAME pre-BRJ or post-BRJ. These data suggest BRJ improves RH in the cutaneous microvasculature through NOS-independent mechanisms.

Honors/Leadership: NIH Bridges to the Future; Osage Nation Higher Education Scholarship; Transfer Ambassador; Block and Bridle; K-State Women's Rugby

#### **The Impact of Brand-Event Fit on Sponsor Gratitude** Phillip R. Gomez, Kevin P. Gwinner Department of Marketing College of Business Administration

Sponsorship is an opportunity for businesses to enhance their brand among potential consumers. Many factors play a role in how effective sponsorship can be on consumers and a company needs to recognize this in order to get the most benefit from their investment. Perceptions of gratitude toward a brand for sponsoring the event are one aspect of the positive benefit sponsors can receive. Gratitude perceptions are important because past research has shown a positive relationship between gratitude and purchase intentions. This study explores the role of sponsor-event fit and sponsor motivation in predicting gratitude perceptions. Using survey data from over 200 Kansas State University students, we explore the relationship between fit, motivation to sponsor, and gratitude. Findings indicate that the relationship between sponsor-event fit and gratitude is fully mediated by sponsor motivation when the motivation is to help the consumer or help the event. A sponsor motivated by a motivation to help the firm does not mediate the relationship. Further, sponsor-event fit serves as a cue for discerning the motivation of the sponsoring firm, such that high fit sponsor-event pairings are perceived to be motivated more by motivation to help either the consumer of the event.

**Honors/Leadership:** Mortar Board, Vice President; Delta Alpha Pi Honor Society; Dean's Choice Scholarship; Memorial Scholarship; College of Business Ambassadors; Alpha Kappa Lambda Fraternity, President; Academic Decathlon; Rake-N-Run; Multicultural Business Student Association (MBSA): Marketing Club; US Youth Soccer Midwest Regional Championships Tournament Referee

#### SOURCES OF WELL-BEING AMONG OLDER AMERICANS: THE VALUE OF RACE IN LATER LIFE

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The relationship between well-being, health, and race has received inconsistent attention in the well-being and quality of life literature (Andrew & Withey, 1976; Hayward & Heron, 1999; Laditka, Corwin, Laditka, et al., 2009). It is commonly believed that as one ages there is a decline in health, and that this is linked to poorer wellbeing or outlook on life (Rowe & Kahn 1998; Scheier, Carver & Bridges, 1994). However, recent studies (Chong, Ng, Woo & Kwan, 2006; Hsu, 2007, Phelan, LaCroix, & Larson, 2004, Laditka, Corwin, Laditka, et al, 2009) have called into question the conventional wisdom about well-being and aging, particularly with regard to race and ethnicity. To examine this phenomenon this investigation used a gerotranscendence theoretical perspective (Tornstam, 1994) which describes how individuals progress toward aging. The basic premise is that one's life experiences can be used as a social blueprint about what one can expect their later life. To test for the long-term chronic stressor of race, we split the sample into two groups, Whites and African Americans (the predominate groups found in the sample). Each group was almost evenly divided in the original sample of 1,500 persons. African Americans accounted for 48.9% (734) of the sample while Whites rounded out the sample at 50.6% (759). Approximately 0.3% (7) did not meet race/ethnicity criteria delineated in terms of this study. The final model revealed that the overall variance in well-being differed by race grouping, with 80.0% (R2 = .798) for Whites and approximately 41.0% (R2 = .406) for African Americans. The findings show that the link between race and wellbeing continues to exist.

Honors/Leadership: Foundation Scholarship; Cargill Project IMPACT Scholarship; MAPS; AIAA Engineering Design Team Participant; Freshman Leadership Council; SHPE; Alternative Spring Break; Goodnow Floor President; Developing Scholars Food Drive; Mittens for Many; Bilingual: Spanish/English

#### Conditions needed to be a viable source in a mostly abandoned oil field

Roberto Diaz, Matthew W. Totten Department of Geology College of Arts and Sciences

The Aldrich oil field is located in Ness County; this field is primarily made up of oil wells that have been plugged and abandoned or are dry and abandoned. Although there is a township in a particular section that does not correlate well to its surrounding areas, this section has very healthy oil production and it has sustained this production flow through time. The study will look at the databases provided by Kansas Geological Survey and determine if this information would be sufficient to explain why this section is still producing while its neighbors aren't producing. The data that is provided by the Kansas Geological Survey is data from recent and previous leases to the oil wells. This data is in the process of being input into PETRA, a special program that is used to evaluate oil fields. The use of oil pressure through time is currently being investigated to see the curve of production. Another avenue that is being researched is total production of the wells and its correlation to surrounding wells in the same section. At this moment there are not any viable results. This will change when the mapping of the oil field is completed and analyzed in PETRA. When the analyzing of such information comes to fruition, the optimal results should show patterns as to how and where the oil is coming from. This research can later be used to find other locations that would mimic the conditions required to continually produce oil in a mostly abandoned oil field.

**Honors/Leadership:** NIH Bridges to the Future; Presenter: Computer Logins, Black and Veatch; LULAC; HALO; Rake 'N' Run; Children's Carnival; Father of Lena; Travel: Mexico; Bilingual: English/Spanish

#### Effects of High Intensity Interval Training on Respiratory Muscle Fatigue in Healthy Men

K. Matthew Castinado, Stephanie Kurti, Craig A. Harms Department of Kinesiology College of Human Ecology

PURPOSE: Previous research demonstrates that respiratory muscle fatigue (RMF) occurs during prolonged aerobic exercise at >85% of an individual's maximal aerobic capacity (VO2max). High intensity interval training (HIIT) is a time efficient strategy to stimulate adaptations that are comparable to traditional aerobic training. However, it is not known if RMF also occurs during HIIT. We hypothesized that RMF would occur during and following a session of HIIT.

METHODS: Eight healthy men (21.7+1.7 yrs) with normal pulmonary function initially performed a graded exercise test until exhaustion on a cycle ergometer to determine VO2max. Subjects then, in random order, completed two trials of HIIT exercise  $(7 \times 1 \text{ min}, 2 \text{ min} \text{ recovery between bouts})$  and three trials of continuous exercise (CE) tests until exhaustion (~5 min) on a cycle ergometer at a similar (p>0.05) exercise intensity (~90% peak power; determined from the VO2max test). Maximal inspiratory pressure (MIP) and expiratory pressure (MEP) were measured pre- and post- exercise for both HIIT and CE, and following each exercise interval in HIIT. Decreases in maximal pressures compared to baseline were used to determine RMF.

RESULTS: There was no difference (p>0.05) in MIP or MEP pre- or post- exercise for HIIT (MIP pre: 134 + 51 post: 132 + 5 cmH2O; MEP pre: 138 + 41 post: 148 + 46 cmH2O) or CE (MIP pre: 135 + 54 post: 133 + 52 cmH2O; MEP pre: 146 + 46 post: 142 + 38 cmH2O) indicating no RMF occurred with either type of exercise. Also, there was no difference (p>0.05) in MIP or MEP following any of the exercise bouts with HIIT compared to baseline values.

CONCLUSION: These data suggest that respiratory muscle fatigue does not occur during or following a session of HIIT. The lack of RMF under these conditions is likely due to the relatively short bouts of exercise associated with HIIT.

**Honors/Leadership:** Academic Honors (4.0); Foundation Scholarship; Kinesiology Telefund Scholarship; Soaring Eagles Leadership Team; Chimes Junior Honorary; Alpha Epsilon Delta Pre-Medical Honor Society Associate Member; Kinesiology Student Association; College of Arts and Sciences Ambassador; Flint Hills Breadbasket; Travel: Haiti for missions work

#### **Role of ECM29 in Protein Homeostasis During Aging and Oxidative Stress**

Brianne M. Pierce<sup>1</sup>, Jeroen Roelofs<sup>2</sup> <sup>1</sup>Department of Microbiology <sup>1</sup>Division of Biology College of Arts and Sciences

The proteasome is a large complex protease that is well conserved among eukaryotes. Protein degradation by the proteasome is important in a wide range of cellular processes, such as apoptosis and DNA repair. Proteasomal malfunction has been linked to neurodegenerative diseases and the proteasome inhibitor bortezomib is an FDA approved drug for the treatment of multiple myelomas. Using Saccharomyces cerevisiae (baker's yeast) as a model our lab identified several mutants with high levels of the proteasome-associated protein Ecm29. Phenotypic analysis (Fig 3) and in vivo degradation assays (Fig 1-2) show that binding of Ecm29 results in inhibition of proteasomal activity. As proteasomes play a role in oxidative stress and aging, we hypothesized that Ecm29 will affect cellular fitness under these conditions. We are studying the role of Ecm29 in aging by performing chronological life span assays on wild type yeast and yeast lacking ECM29 (ecm29 $\Delta$ ). Preliminary results suggest that yeast lacking Ecm29 have an extended lifespan compared to wild type (Fig 4), implicating Ecm29 in the aging process of yeast. We speculate that the absence of Ecm29 will improve the clearing of proteins damaged that accumulate in aging or by oxidative stress. To test this we will determine the levels of oxidized proteins under different conditions by detecting protein carbonylation (a marker of oxidative damage). We anticipate these results will address if improved aging in the absence of Ecm29 is due to differences in oxidative stress response. We anticipate that this work will provide new clues towards the role of human Ecm29 in aging and neurodegenerative diseases.

Honors/Leadership: University Honors Program

## Charge Separation in Wild-Type Bacterial Reaction Center from *Rhodobacter sphaeroides* and its M214G Mutant

Dalia Camacho, Khem Acharya Department of Chemistry College of Arts and Sciences

Bacterial reaction centers (RCs) undergo multi-step electron transfer processes in order to convert solar energy to useful chemical energy. RCs from *Rhodobacter sphaeroides* contain a special pair of two bacteriochlorophylls (BChl a), two monomeric BChl a, two bacteriopheophytins (BPheo), two quinones (QA and QB), and one carotenoid. Light is absorbed by the special pair (P) and an electron is transferred via a monomeric BChl a (BA) to a BPheo (HA) in a few picoseconds, followed by electron transfer to the first of two quinones (QA), and finally to a second quinone (QB) [Kirmaier et al. Biochim. Biophys. Acta 1985, 810, 49]. Although there have been many studies regarding the excitonic structure and electron transfer dynamics in bacterial RCs, some issues related to electrochromic effects and the position of the upper excitonic component of P (i.e., P+) are yet to be fully understood. In this work we compare various optical spectra of the wild-type (WT) RC from *Rhodobacter sphaeroides* and one of its mutants (M214G), in which glycine replaced the M214 leucine present in the WT RC. Glycine has a substantially smaller volume than that of the native leucine. Comparative study of the WT RC and M214G mutant indicates that the large bleach near 810 nm in the absorption spectrum of the WT RC upon formation of the P<sup>+</sup>Q<sup>-</sup> state is caused primarily by an electrochromic shift of the absorption band(s) of the monomeric BChls (BA and BB), rather than bleaching of the P+ exciton band. From these results, it is clear that the P+ transition in the WT RC contributes to the absorption near 800 nm, while both the P+ and P excitonic components in the M214G mutant are blueshifted by about 10 nm.

**Honors/Leadership:** NIH Bridges to the Future; Memorial Scholarship; Golden Key International Honor Society; Society of Hispanic Professional Engineers; National Association of Multicultural Engineering Program Advocates (NAMEPA) Region D Meeting; LULAC; Boys & Girls Club Literacy Event, volunteer; Relay for Life, volunteer; Bilingual: English/Spanish

#### Green Design, Is it Really Worth It?

Alex Martinez, Todd Gabbard Department of Architecture

### College of Architecture, Planning and Design

The idea of sustainability is an important force in the design world. With depleting natural resources and the cost of energy increasing, designers have begun to look into ways for a building to operate in the most efficient means. For an owner, this means saving money and at a larger scale it means helping out the environment. When a key characteristic of a building is sustainability, that building's lifespan is increased. It is this increase in building life that designers strive for and the answer has been found in sustainability.

Most people will look at a building and see nothing more than its beautiful exterior, overlooking everything that creates a green building. The lack of awareness among people outside the design world is a key factor why one does not see more sustainable designs in our every day society. Clients – in particular housing clients – are generally unaware of important sustainable strategies that can increase the quality of the interior environment and lower the total life-cycle cost and environmental impact of their homes.

The purpose of my research is to make people outside the design world aware of green design (sustainability) within a residential setting. I chose 3 residences ranging in scale from small to very large. Each house is located in a different climate zone to show the range of green design. In my research I have found that going green is easier than it is made out to be. One can make simple changes to a design that can create a large difference in the efficiency of one house. Also green design uses less energy so in the long run these houses end up paying for themselves due to their sustainable characteristics. It is clear to see that with sustainability a building becomes a machine of efficiency. This allows users to enjoy the space knowing that it has little impact on the world around it. Sustainability, in the future, will become the norm in design creating a better environment for all people to live in.

Honors/Leadership: GI Forum Scholarship; Mid-Western Exchange Program; Travel: Mexico



#### Loading Nanoparticles into Tumor Homing Cells

Alejandro Marquez<sup>1</sup>, Matt Basel<sup>2</sup>, Adrian Gomez<sup>1</sup>, Hongwang Wang<sup>2</sup>, Marla Pyle<sup>3</sup>, Stefan Bossmann<sup>2</sup>,

#### Deryl Troyer<sup>3</sup>, <sup>1</sup>Division of Biology <sup>2</sup>Department of Chemistry College of Arts and Sciences <sup>3</sup>Department of Anatomy and Physiology College of Veterinary Medicine

Magnetic hyperthermia (MHT) is an experimental cancer treatment that has progressed to clinical trials. MHT uses magnetic nanoparticles (MNP) to generate localized heat by exposing the MNP to an alternating magnetic field (AMF). Current work with MHT utilizes direct injection of the MNP into the tumor site. While this is useful for superficial tumors, direct injection will not work for deep or diffuse tumors. Here we examine the ability of tumor homing cells to load with MNP.

MNP were synthesized by the Bossmann lab and were suspended in PBS for studies. MNP were loaded on Raw264.7 cells (monocyte/macrophage-like cells, Mo/Ma). After 24 hours, cells were washed and the loading and toxicity were measured. Prussian blue staining was used to visualize MNP loaded in the cells. Ferrozine was used to quantify the amount of iron loaded. MTT and cell counts were used to determine MNP toxicity. After loading, the ability of the Mo/Ma to heat in an AMF was tested. Loaded cells, free MNP or controls were placed in an AMF until a stable temperature was reached.

Two different MNP preparations were tested (8 nm MNP and 30 nm MNP). Both showed moderate toxicity acceptable for Mo/Ma loading. Both preparations also showed substantial cell loading, but the 30 nm MNP showed higher loading than the 8 nm MNP. The 8 nm MNP did not show significant heating when exposed to AMF, so further studies were halted. The 30 nm MNP showed good loading inside of the cells and showed significant heating when exposed to an AMF compared both to a blank control and free MNP.

Cell loading of MNP is a viable option for delivering MNP to tumor sites. These MNP could be used to target deep and/or diffuse tumors and expand the ability of MHT treatment to a larger variety of cancers.

Honors/Leadership: NIH Bridges to the Future; Golden Key International Honor Society; Rake'N' Run; Bilingual: English/Spanish

### Mapping weight distribution of patients with unilateral lower-limb orthotics or prosthetics using force and pressure sensors

Kevin Garman<sup>1</sup>, Steven Warren<sup>2</sup> <sup>1</sup>Department of Biological Systems Engineering <sup>2</sup>Department of Electrical and Computer Engineering College of Engineering

Individuals with a unilateral orthopedic/prosthetic condition tend to favor their "strong" side, making them prone to short and long term injuries. In patients utilizing a lower-limb orthotic/prosthetic, this may lead to (a) habits that can cause the lower-limb apparatus to hinder range of motion and assistive progress and (b) bruising and other sores along the initial contact zones, when the apparatus is placed incorrectly. These problems are exacerbated most in nonverbal, disabled patients that cannot express their discomfort. This proposal is the design and implementation of a sensor array that will be placed in the shoes of an orthotic/prosthetic wearing patient to map the patient's weight distribution on both the "strong" side and the side containing the assistive device. The proposed instrumentation will be used to map weight distribution of patients at Heartspring (Wichita, KS) – a KSU research partnering center for assisting children with special needs. Data collected will be analyzed to determine when the individual starts to lean more towards their "strong" side, which indicates an improper installation of the device along the patient's leg, or the development of a detrimental habit that could cause excess strain on the "strong" side over time. Ultimately, we would like the caretakers at Heartspring to better identify problematic situations experienced by their lower-limb orthotic/prosthetic-wearing patients that simply do not have the verbal skills to communicate the details of the pain or discomfort caused by their assistive device.

Honors/Leadership: University Honors Program

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#### LED Lighting and Its Use in Contemporary Fixtures

Xavier Gavin, Michael D. Gibson Department of Interior Architecture and Product Design College of Architecture, Planning, and Design

LED lighting technology has begun to alter the manner and locations in which lighting can be integrated into different architectural spaces. This allows LED lighting to be utilized for different tasks such as working on computers, reading, and other tasks. As LEDs become increasingly popular with commercial and residential consumers, the fixtures which house them logically should change in size and in form to accommodate the advantages of LEDs, especially miniaturization of fixtures and the minimal power that these lights require. The purpose of this study is to explore the relationship between these advantageous characteristics of LEDs and how fixtures of the future will better accommodate user needs for different settings in different cultural situations. Due to the small and compact nature of the bulbs, LEDs can be small, adaptable, self-powered light sources that can integrate into daily life in a very different way than traditional light fixtures that are fixed and tested by domestic electrical services. This study uses prototyping of fixtures, and measures the success of fixtures based on how well fixtures can meet required lighting standards and the ease and recyclability of the fixtures themselves. Original prototypes successfully proved that LED lighting can be integrated into fixtures that can change to meet different lighting needs; however an even more adaptable, smaller device is sought compared to the previous prototypes. By consolidating the fixture to its most basic components, and extremely stripped-down and simplified LED circuitry, a new fixture design is in development that further pushes the themes of simplicity, portability and adaptability beyond the initial prototypes.

Honors/Leadership: Edison's Scholarship; K-State Proud Scholarship; Memorial Scholarship; Bluemont Scholarship; Phi Eta Sigma; Second Place - Japanese Competition, Chicago; Developing Scholars Talent Show Visual Arts Winner; Japanese Language Club; Travel: Mexico

Bacteria-produced magnetic nanoparticles for potential use in magnetic hyperthermia

Adrian Gomez<sup>1</sup>, Deryl Troyer<sup>3</sup>, Marla Pyle<sup>3</sup>, Tej B. Shrestha<sup>3</sup>, Sivasai Balivada<sup>3</sup>, Matt Basel<sup>3</sup>, Stefan Bossmann<sup>2</sup> <sup>1</sup>Division of Biology

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Magnetic hyperthermia (MHT) is one of the leading treatment procedures currently being used in cancer therapy. During MHT, magnetic nanoparticles (MNPs) are injected directly into a tumor and exposed to an alternating magnetic field (AMF). AMF exposure causes MNPs to generate heat resulting in hyperthermia and subsequent attenuation of tumors. Most research has focused on chemically synthesized magnetic (Fe<sub>3</sub>O<sub>4</sub>) MNPs for MHT. *Magnetospirillum magneticum strain* AMB-1 is a magnetotactic bacteria that synthesizes lipid-encased MNPs in chains known as magnetosomes. These magnetosomes can potentially be used for MHT. In the present study, magnetosomes separated from *Magnetospirillum magnetics* and increased iron content and heated to a higher temperature during AMF exposure compared to magnetosomes separated from micro-aerobically cultured bacteria had increased iron content and heated to a higher temperature during AMF exposure compared to magnetosomes separated from micro-aerobically cultured bacteria had increased iron micro-aerobically cultured bacteria. These magnetosomes can be used as an alternative source of MNPs as heat-inducing agents in cancer therapy.

**Honors/Leadership:** Accepted into UMKC School of Dentistry; NIH Bridges to the Future; 14th Annual Undergraduate Research Forum; Summer Undergraduate Residency in Public Health (SURPH); Internship: Admissions Enhancement Program at UMKC; Honors Program; Cancer Research Award; UMKC - Diversifying the Dental Profession Scholarship; Golden Key International Honor Society, Multicultural Student Honor Society; Phi Kappa Phi; Phi Theta Kappa; Pre-Dental Club Oral Health Presentations Program; Academic Volunteer Tutor; Kansas Dental Charitable Foundation – Kansas Mission of Mercy; Flint Hills Breadbasket, Volunteer; Bilingual: English/Spanish

#### Inactivation of a gene to produce a commercial organic acid

Obdulia Covarrubias Zambrano<sup>1</sup>, Lynn Hancock<sup>2</sup>, Benjamin Katz<sup>1</sup>, Deane Lehmann<sup>1</sup>, John M. Tomich<sup>1</sup> <sup>1</sup>Department of Biochemistry and Molecular Biophysics <sup>2</sup>Division of Biology College of Arts and Sciences

*Propionibacterium acidipropionici* is a species from the classical group of *Propionibacterium*. These bacteria received their name due to the ability to produce propionic acid. *P. acidipropionici* has been used for centuries in dairy products to improve the taste of yogurt and cheeses among other products. The biochemical pathway that leads to the production of propionic acid involves, as its final step, the conversion of the 4-carbon dicarboxylic succinic acid to the 3-carbon propionic acid. In this experiment, inactivation of the converting enzyme, CoA transferase, should arrest the production of propionic acid and increase the accumulation of succinic acid. *P. acidipropionici* was subjected to molecular biological techniques to produce this modified organism. Standard techniques have and will be used to first produce a gene fragment capable of disrupting the CoA transferase. This DNA segment was then inserted into the functional gene in order to inactivate the functional gene. To date, I have generated the DNA fragment to knockdown the gene. Experiments are in progress to make the enzyme deficient strain. Once this organism is in hand, I will check organic acid production to see if the conversion of succinic acid to propionic acid is abolished. This modified bacterium should allow for the production of succinic acid under more aerobic conditions, which is an advance over current succinate produce this 4-carbon acid for commercial production.

Honors/Leadership: NIH Bridges to the Future; Research Experiences for Undergraduates (REU): University of Minnesota; McNair Scholars; Mortar Board; Golden Key International Honor Society; Transfer Ambassador Program/Phi Theta Kappa

### IDENTIFICATION OF A SERINE PROTEINASE INHIBITOR FROM THE KUNITZ FAMILY IN THE PLASMA OF AN INSECT, *MANDUCA SEXTA*

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*Manduca sexta*, or the tobacco hornworm, belongs to the insect order, Lepidoptera. Hemolymph (insect blood), contains serine proteinases and serine proteinase inhibitors. Some of these proteins function in aspects of innate immune responses. To measure proteinase activity, various amounts of trypsin, chymotrypsin, and elastase were added to wells made in casein agar plates. We investigated the activity of serine proteinase inhibitors found in naïve plasma and in plasma from larvae that were injected with *Micrococcus luteus* against the proteinases mentioned above. The objectives for my current project is to investigate the function of a hemolymph protease inhibitor from *Manduca sexta*. I have isolated this inhibitor from hemolymph and assayed its activity, and it has been identified by mass spectrometry as a member of the Kunitz family of proteinase inhibitors. Now I plan to clone its cDNA, make it as a recombinant protein, and study its inhibitory activity as a potential regulator of proteases involved in the immune system of *Manduca*. Using these results as a basis for understanding serine proteinase and serine proteinase inhibitor activity, the ultimate goal of this project is to understand the biological function of this Kunitz inhibitor in insect immunity.

**Honors/Leadership:** Multicultural Student Honor Society; Internship: KUMC Health Sciences Enrichment Institute Program; International Leadership Association Conference; Kansas-IDeA Network of Biomedical Research Excellence (K-INBRE) Symposium; Housing Leadership Award; K-State Student Advisory Council; Black Student Union; Minorities in Agriculture Natural Resources and Related Sciences; Captain Housing and Leadership Scholars; Rake 'N' Run

#### **Flow and Task Experience** Eduardo Solorzano-Torres, Patrick Knight, Christopher Waples Department of Psychological Sciences College of Arts and Sciences

The concept of flow has been a topic of research since the 1960's. Flow is a mental stage in which a person is fully immersed in the activity he or she is doing. In order to achieve a high level of flow, the person performing the activity must be fully involved as well as enjoying the activity he or she is doing. When a person is experiencing a high level of flow he or she loses awareness of time, people, bodily need, and other distractions due to the fact that all of his or her attention is on the task at hand. In order to have a better understanding of when a person experiences a higher level of flow, we took participants and had them complete various tasks that could cause a person to experience flow. We have four conditions in which the participants completed the exact same task but with different rewards. The tasks assigned to the participants were number searches as well as Raven's Progressive Matrices.

In the first condition, we had participants complete the task without giving them information about the rewards that other participants were receiving for their time. For the second condition, we paid the participants five dollars in cash, but they were unaware that other participants were not getting paid for the activity. On the third condition, we told the participants that some of the previous participants had received cash for their time but unfortunately they would not be getting paid. Finally, on the last condition, participants were paid, and they were also made aware that some of the other participants had not been paid. The participants were given thirty minutes to complete as many number searches as possible in that time, and they were to write down the time it took them to complete each number search. After the number searches the students completed questionnaires that asked about their experience while completing the number searches. After the questionnaires, participants were given twelve Raven matrices, which they had to complete in the time remaining. The matrices and the number searches were both checked for accuracy.

We hypothesize that the participants who were paid and were informed that some of the other participants had not been rewarded the money would experience the highest level of flow due to the fact that they knew they gained more for the tasks than others who did the exact same thing. We expected that the participants who were also paid but not informed about the others who did not receive cash would experience the second highest level of flow. We also expected that the participants who did not get paid, but were made aware that some participants did, would experience the lowest level of flow because they knew they were getting rewarded less than others for the same task. No final conclusion has been made since we are still collecting data.

Honors/Leadership: NIH Bridges to the Future; Rake 'N' Run; Travel: Mexico; Bilingual: English/Spanish

#### In vitro bioavailability of vitamin A and iron in novel micronutrient fortified-blended foods Marleen Sanchez, Kavitha Penugonda, Brian L. Lindshield Department of Human Nutrition College of Human Ecology

The primary fortified blended food (FBF) that is provided for food aid purposes is a micronutrient fortified corn-soybean blend. However, corn requires a lot of water to grow, and given climate change there are questions about whether it is sustainable to grow it in areas where intensive irrigation is required. Sorghum, also known as milo, is a grain that requires less water and is more drought tolerant than corn. In addition, it is cheaper to purchase and is not genetically modified. The latter is a preference of some countries where food aid is distributed. But sorghum is known to contain anti-nutritional factors, phytates and tannins, which decrease the bioavailability of minerals. Cooking extrusion is a mechanical food processing technique that has been shown to decrease the levels of phytates and tannins in the final product. In addition to sorghum, cowpeas might be an alternative to soybeans in FBF for countries that would prefer non-genetically modified crops. Our objective is to determine the bioavailability of iron and vitamin A, which are two of the most common micronutrient deficiencies worldwide, from extruded sorghum-soy and sorghum-cowpea FBFs compared to the traditional corn-soy FBF using an in vitro digestion/Caco-2 cell culture model. After going through peptic and intestinal digestion, vitamin A and iron bioavailability will be determined by measuring retinol and ferritin levels, respectively. Our findings will be used to formulate and develop new extruded FBFs for food aid purposes.

Honors/Leadership: NIH Bridges to the Future

#### A New Approach Towards Predicting the Outcome of Treating Triple-Negative Cancer

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Triple-negative breast cancer (TNBC) comprises any breast cancer that is not characterized by expression of the estrogen receptor (ER), progesterone receptor (PR) or Human Epidermal Growth Factor Receptor 2 (Her2/ neu).1 This is a very heterogeneous group of cancers, which accounts for up to 25% of all breast cancer cases in the US. Although 50% to 75% of all basal-type breast cancers are triple-negative, there is no standard protocol to identify them as of yet.1 Many TNBCs react well to (aggressive) chemotherapy, whereas others do not. It is of importance for the development of a new standard of care that TNBC is clearly NOT a homogeneous group. Great differences in response to treatment and relapse pattern are observed, with respect to the ER-, PR-, and Her2/ neu-expressing cancers.2 Therefore, it would be highly advantageous to develop analytical methods to distinguish subgroups of TNBCs.

Matrix Metalloproteinases (MMPs) are a family of zinc containing endopeptidases. They are synthesized as inactive zymogens or proMMPs, which will later be activated by serine proteases or other MMPs. MMPs degrade the proteins that make up the extracellular matrix (ECM) and the basement membrane (BM).2 Interestingly, the major producer of the MMP's are the stromal cells surrounding the tumor.2 MMPs are vital to cancer survival and progression for several reasons – they cleave cell surface bound growth factors from the stromal and epithelial cells and release them to interact with the cancer cells to stimulate growth, and they play a role in angiogenesis by releasing pro-angiogenic factors and starting pro-angiogenic protease cascades.

I have measured the activity of MMP-11 and MMP-13 in the blood serum of a group of 20 women who have been diagnosed with TNBC using the nanoplatforms for protease detection that have been developed by Dr. Stefan Bossmann and Dr. Deryl L. Troyer. The samples have been provided by Priyanka Sharma, MD, Hematology and Oncology, The University of Kansas Hospital.

Gli1 is an established oncogene that is expressed in TNBC. It enhances migration and invasion via upregulation of MMP-11.3 There is an emerging paradigm in the recent literature that some of the same factors that drive epithelial–mesenchymal transition (EMT) upregulate MMP13 expression (e.g., TGFb, IL1b, TNFa), indicating an association of MMP13 with invasion and metastasis.4 MMP-11 and MMP-13 can be detected using fluorescence-based assays within 60min. The MMP-activities will be compared with the complete histology of the TNBCs that will be performed by Dr. Sharma. The goal of this study is to verify/falsify these two pathways in patient-specific TNBC pathology, with the goal of developing better predictors for cancer treatment and survival.

Honors/Leadership: NIH Bridges to the Future; Phi Kappa Phi; Hiser Scholarship; Cancer Research Award; LULAC, Vice President; Miss Latina Belleza, 2011; Bilingual: English/Spanish

#### Mechanisms of Leg and Capillary Blood Flow Responses to Knee Extension Exercise

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Previously in the laboratory it was found that the femoral artery had faster blood flow adjustment compared to capillary blood flow during exercise. The article, "Human femoral artery and estimated muscle capillary blood flow kinetics following the onset of exercise" by Allison J. Harper, raised the question of what was going on with the capillary blood flow that was causing it to be slower than the femoral blood flow. The focus of this study was to evaluate the control of the leg blood flow during exercise. Methods: The subjects used for this study were all male. The time constant represents the time it takes for a response to reach 63% of its steady state value. In particular, it shows us how fast a variable is changing. Baseline measurements were taken at rest; then the subjects began unloaded knee extension exercise, and then transitioned to loaded exercise. Blood pressure cuffs were placed on both legs below the knee to occlude blood flow to the nonworking lower leg. Deoxyhemoglobin+deoxymyoglobin (HHb) was measured in the rectus femoris using near-infrared spectroscopy (NIRS). The measurement site was shaved and marked for accurate probe placement and wrapped to assure the probe stayed in place. Pulmonary Oxygen uptake (VO2) was measured breath by breath throughout the entire test, with the nose clipped closed so the subject could only breathe through the mouth. Femoral artery blood flow was measured continuously using Doppler ultrasound. Skin blood flow was measured on the thigh and calf with laser Doppler fluxmetry (LDF). Blood pressure was measured throughout the test using finger plethysmography.

Subjects performed multiple transitions from rest to exercise in both the uncuffed and cuffed conditions. These trials were then averaged together and compared across the different test conditions. Kinetic analysis (curve fitting with exponential functions) was run for each variable to find the time constant for each variable.

Results: These numbers are based on 3 male subjects' results, which have successfully finished the study. Average- this was constant for all variables.

Variables	Uncuff	Cuff
FABF (Femoral Artery Blood Flow)	21.6 s	28.6 s
Qcap (muscle capillary blood flow)	55.6 s	54.8 s
VO2 (muscle oxygen uptake)	49.2 s	45.4 s
HHb (de-oxyhemoglobin concentration)	20.6 s	21.5 s

Conclusion: There are no major differences between the uncuffed and cuffed time constants. This suggests that the lower leg is not serving as a reservoir for blood that flows through the femoral artery but it is a reservoir for the working muscle capillary. This research will help us understand how blood flow is controlled during exercise in healthy people, to compare later with blood flow in patients with cardiovascular disease, since we will have a better understanding on the kinetics of femoral and capillary blood flow in the legs.

Honors/Leadership: NIH Bridges to the Future; Golden Key International Honor Society; LULAC, Transfer Ambassadors, Semillas; Martin Luther King -A Day On, Not a Day Off; Bilingual: English/Spanish