



**Kansas State University's**

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**DEVELOPING SCHOLARS PROGRAM**

**12th Annual  
Research Poster Symposium**

**2012**  
Developing  
Scholars  
Program

**Kansas State Student Union Ballroom  
Sunday, April 22, 2012  
2:00 pm - 4:00 pm**

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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.

## **Increasing Safety Through Lighting System Improvements**

Kekoa Mendenhall, Aditya Gund, Margaret Rys  
Department of Industrial Engineering  
College of Engineering

The lighting systems on overhead guide signs have presented a particular problem because they can be expensive to maintain. With the advancing technology of highly reflective sheeting materials, many departments of transportation are eliminating lighting systems all together. After comparing survey responses from AASHTO to those received from Aditya Gund's survey, it was confirmed that a majority of states have already eliminated lighting systems. However, in some situations, there is still a need of additional light to increase visibility on certain overhead guide signs. In these situations, energy efficient and low-cost lighting systems need to be implemented. The possibility of more efficient lights could come from the use of LED lamps. With these newer, more efficient lighting systems employed, along with highly reflective materials, many states will potentially be able to save tens of thousands of dollars over the next several years, while still maintaining Federal Highway Administration (FHWA) standards.

**Honors/Leadership:** NIH Bridges to the Future; Electrical Engineering

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## **Poly arginine-coated, TAT peptide-attached magnetic nanoparticles (MNPs) as vectors for gene delivery**

Adrian Gomez<sup>1</sup>, Tej B. Shrestha<sup>1</sup>, Hongwang Wang<sup>1</sup>, Marla Pyle<sup>1</sup>, Stefan Bossmann<sup>2</sup> and Deryl L. Troyer<sup>1</sup>

<sup>1</sup>Department of Anatomy and Physiology

College of Veterinary Medicine

<sup>2</sup>Department of Chemistry

College of Arts and Sciences

Efficient delivery of exogenous genes to cells is a desirable goal in cancer gene therapy. Viruses, liposomes, nanoparticles, and cationic polymers have been used as vectors for therapeutic gene delivery. Low transfection efficiency and toxicity of these delivery vectors are the main concerns in cancer gene therapy. Iron/iron oxide core-shell magnetic nanoparticles (MNPs), which are basically biodegradable, can be used as vectors for therapeutic gene delivery. Here we hypothesized that poly arginine- (R9) coated MNPs with a cell penetrating peptide TAT (GRKKRRQRRRPQ) can be used as a vector and can internalize our gene of interest into cells. R9 will bind to DNA and TAT will assist in internalization of MNPs into cells. To test this hypothesis, R9-TAT-MNPs were synthesized. These nanoparticles were used as vectors to transfect neural progenitor cells (NPCs) with the green fluorescent protein (GFP) gene, and transfection efficiency was observed over time by fluorescence microscopy. We found expression of GFP in NPCs after 24 hours of removing excess R9-TAT-MNPs. Transfected cells expressed GFP for a period of up to two weeks indicating that R9-TAT-MNPs may have caused stable transfection in some instances by insertion of GFP gene into the genome of NPCs. These results suggest that R9-TAT-MNPs can be used as delivery vectors for gene therapy.

**Honors/Leadership:** Cancer Research; Summer Undergraduate Residency in Public Health SURPH; Golden Key International Honor Society, Multicultural Student Honor Society; Rake 'N' Run; Flint Hills Breadbasket, Mittens for Many; Bilingual: Spanish/English

## Implementing Design-Build

Alejandro De Luna, Raymond Buyle  
Department of Architectural Engineering and Construction Science  
College of Engineering

After researching collaboration between students in the Construction Science and Management, Architectural Engineering, and Architecture programs, in relation to collaborative project delivery methods, Professor Ray Buyle and I took an interest in the Design-build project delivery method and how it affects the building industry in comparison to the commonly used Design-bid-build project delivery method. To further explore this, the following aspects will be compared: History of Design-bid-build and Design-build; management concepts; legal contracts; applying the proper method; benefit comparison; and incorporating technology. These topics will be used to increase awareness of the proper use of the Design-build project delivery method.

**Honors/Leadership:** Professional Career Placement: Turner Construction Company; Sigma Lambda Chi; Steel Ring Engineering Honor Society; Garmon Social Justice Award; Memorial Scholarship; AFROTC Scholarship; S.M.A.R.T. Grant; The Builders' Association; AGC of Kansas; NACME Scholarship; JE Dunn Construction Science and Management Scholarship; ASC Competition; AEI Competition; Dept. of Architectural Engineering and Construction Science and Management Student Ambassador; Sigma Lambda Beta; Latino Immigrant Scholarship Chair; Martin Luther King Day-A Day On, Not a Day Off; Habitat for Humanity; Sunset Zoo Work Project; Alternative Spring Break- New Orleans; Rake 'N' Run; Bilingual: Spanish/English

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## Evaluation of a transdermal gel of the analgesic fentanyl

Alexandra Dominguez, Butch Kukanich, Bryan Meyer  
Department of Anatomy and Physiology  
College of Veterinary Medicine

Over the years, there has been an increased interest in animal welfare and more concern placed in an animal's comfort, in this case, dogs. There have been recent studies that involve finding novel methods of more efficient drug administration. The goals of these new methods are to reduce the abuse potential of the drug and provide an effective and long-lasting effect. The method of administration is also desired to be more convenient and easy.

For this study, the drug that was being used was fentanyl. For this drug, the method that we are aiming to improve is a transdermal patch. A patch on the skin would be much easier to administer, would be administered less frequently, and would be expected to have less adverse side effects than intravenous administration.

Using the fentanyl gel and drug concentrations that were found to have the greatest drug flux with the lowest concentrations of penetration enhancers and gelling agents, a gel was created. Six dogs were included in the initial study which is approved by the Institutional Animal Care and Use Committee at Kansas State University. We applied these gels to a shaved area on the side of the dogs. The dogs were then put in vests to keep them from removing the patches. Blood was collected from all of the dogs 1, 2, 4, 8, 12, 24 and 36, 48, 60 and 72 hours after patch application. These samples were then analyzed by liquid chromatography with mass spectrometry to measure the drug concentration found in the blood over time.

No adverse effects were observed after patch application. Two of the dogs were found to have had the patch slightly removed from the skin at the end of the 72 hours. Mean plasma concentrations peaked at 0.6 ng/mL at 12 hours.

Fentanyl was absorbed by transdermal delivery in dogs. The patch also had a longer lasting effect than the IV administered fentanyl. The peak concentrations were lower than the targeted concentration of 1 ng/mL. Further studies will assess higher doses and the second gel combination.

**Honors/Leadership:** Legacy Scholarship; Excell Volunteer; Vice President of Sigma Lambda Gamma; University Experience Peer Leader; Bilingual: Spanish/English

## **Protease-Based Cancer Diagnostics**

Elizabeth A. Riedy, Stefan Bossmann  
Department of Chemistry  
College of Arts and Sciences

There is evidence that the overexpression of proteases may be cancer-specific. The key groups of enzymes involved in invasion and metastasis are urokinase plasminogen activator (uPA), cathepsin B (CB), cathepsin D (CD), cathepsin L (CL), and various matrix metalloproteinases (MMPs); specifically, MMP9 is released by neutrophils (white blood cells) that are recruited by the tumor. The Bossmann Group has developed a nanoparticle-based system for measuring protease activity in tumors, blood, and urine. The nanoparticle is activated using the protease that is overexpressed to cut the peptide sequence (oligopeptide), specific to that protease, linked to the nanoparticle. The results have been very promising, and will lead to simple assay for early diagnosis of various cancers and new standard of care in cancer surgery.

**Honors/Leadership:** Violinist; Developing Scholars Talent Show; Rake ‘N’ Run; Travel: Mexico

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## **Gold Nanoparticle Behavior**

Antonio Rodriguez, Christopher Sorensen  
Department of Physics  
College of Arts and Sciences

Current leading research is being conducted on the “nano” scale. This research has discovered that due to the nanoparticle particle scale, many characteristics and behaviors of elements, in our case, gold, tend to differ from their larger counterparts. Our research, presented in the following, was conducted to try and determine some of the effects that occur when gold nanoparticles are placed in a solution of toluene. We measured contact angles of droplets composed of gold nanoparticles dissolved in toluene. The solution droplets were placed on glass slides coated with aluminum. These droplets were then subject to an applied voltage parallel to the substrate. Then the contact angle was measured as a function of the applied voltage and the concentration of the nanoparticle solution.

**Honors/Leadership:** Foundation Scholarship; Cargill Project IMPACT Scholarship; Mittens for Many; Bilingual: Spanish/English; Freshmen Leadership Council; SHPE

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## **Assessment of the Civic Engagement Capabilities of Local Government Websites**

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

Innovations in web technology have the potential to help city and county governments improve their delivery of services and engage local communities in governance. CivicPlus, a technology company that specializes in municipal websites, has created hundreds of sites for local governments throughout the USA for community engagement. Using civic engagement theories and best practices of online civic engagement, this research project audits 100 CivicPlus sites for their civic engagement capabilities. Results indicate that most cities and county governments place a heavy emphasis on using their websites to streamline delivery of services and little effort in promoting citizen participation and democracy. We suggest a civic engagement model for local governments that emphasizes the two dimensions of service delivery as well as participation of citizens in the local democratic process.

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

### **3D Mobile Advertising: Hype or Help**

Blake Franklin, Esther Swilley  
Department of Marketing  
College of Business

Advertisers are using 3D advertisements on mobile devices. These advertisements are developed by advertisers to grab the attention of the consumers on mobile devices. Mobile devices offer the ability to make a consumer feel like they are a part of the product experience. Advertisers see 3D as a way to create images that seem to pop off the screen, helping to capture the audience and sell products. But, are these ads helping to attract attention through their novelty, or are 3D ads just another gimmick that consumers do not feel are credible? Our research seeks to understand if consumers will accept this new form of advertising. We are testing how consumers feel about 3D ads on their mobile phone, or their Tablet PCs. Using 3D ads, we examine the effect of these ads in the determination of ad credibility and usefulness when placed on a mobile device. How involved do consumers become when watching these types of ads, and how believable are 3D ads to consumers are some of the questions asked in an online survey. Students will be able to watch a 3D ad on their iPhone, iPad, or watch a video showing how a 3D advertisement works. Then, a short survey will be given. Analysis of the results through ANOVA will aid in the understanding of the differences between the respondents based on the mobile phone, Tablet PC or watching the video. Results should also allow for the evaluation of 3D mobile advertising as a mechanism for different products.

**Honors/Leadership:** Multicultural Student Honor Society-Vice President; Dean's Choice Scholarship; Housing Leadership Scholarship; Memorial Scholarship; Rusco Memorial Scholarship; Opportunity Scholarship; Cats for Cans; Martin Luther King Day-A Day On, Not a Day Off; Rake 'N' Run; K-State's Travel Club Vice President; K-State News Insider Feature Article

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### **The Effect of Extrusion Processing Conditions on the Retention of Organic Acid Preservatives and Mold Suppression in Aqua Diets**

Caleb Wurth, Leland McKinney, Greg Aldrich  
Department of Grain Science and Industry  
College of Agriculture

The inclusion of organic acid preservatives in aqua culture diets is a common practice to ensure feed safety through the suppression of mold growth during storage and handling before being fed. Often, preservatives are lost during processing resulting in unprotected feed being shipped globally. Transoceanic shipment exposes feed to very harsh temperature and humidity fluctuations that can lead to the growth of harmful molds. Because of the volatile nature of organic acids, correct inclusion rates and heat added through mechanical energy must be established and closely monitored during processing. A study was conducted to determine at what processing conditions and at what preservative inclusion rates can best inhibit long term mold growth. We analyzed three preservatives used by a major U.S. feed producer; Dry Calcium Propionate, Buffered Liquid Propionate carried on a dry carrier system, and Buffered Liquid Propionic Acid. Using a Wenger X-20 single barrel extruder, we processed the three experimental diets at three levels of specific mechanical energy by altering screw speed. We then processed the same experimental diets, varying the inclusion rates of the three preservatives. The samples were then subjected to a controlled environmental chamber, being exposed to fluctuating levels of heat and humidity simulating sea vessel storage containers. Tests run on the experimental sets were visual indications of mold on final product and propionic acid retention through HPLC after mixer, off extruder, and off dryer. This data will tell us at what point we are losing the volatile acid, and what processing conditions and inclusion rates exhibit the longest safe storage time in relation to the suppression of mold growth.

**Honors/Leadership:** Internships: Cargill/Horizon Milling; Animal Nutrition; Cargill Scholar; Grain Science Scholarships; Agronomy Agricultural Tour of Argentina; FFA ICAL Team Agricultural Study Tour of Colombia and Panama; Presented research for the Kazakhstan Department of Agriculture; Alpha Mu Grain Science Honorary; Executive Board; Agriculture Student Council; MANRRS; Feed Science Club; Phi Eta Sigma Honor Society; Pi Kappa Alpha True Pike Award; College of Agriculture Leadership Award; Zeta Phi Beta Outstanding Man on Campus; Dean and Director of Agriculture & KSRE Search Committee

## **The Effects of White Identity and Positions of Power on Help Seeking Behavior**

Brooke A. Williams, Stuart S. Miller, and Donald A. Saucier

Department of Psychology  
College of Arts and Sciences

Many people consider a power struggle to be an external conflict in which individuals attempt to gain power over others. However, we believe that a similar internal power struggle may take place when majority group (i.e., White) individuals believe that they have a right to authority over others of minority racial status. When these feelings are aroused, White individuals who more strongly identify with their race may be more likely to feel they cannot or should not ask for help from out-group members. Therefore, we are specifically interested in investigating how help seeking behavior is affected by authority or subservient positions of power as well as by White identification. In our study participants are asked to read one of four vignettes describing scenarios that correspond with the conditions in this 2 (Participant's Status) x 2 (Race of Potential Helper) between-groups design. Half of the participants are given a scenario where they are asked to imagine themselves as the TA for a class, while the other half are given a scenario where they are asked to imagine themselves as a student in the class. Within the two scenarios, half of the participants within each of these two conditions imagine a potential helping partner who is Black, and the other half imagine a potential helping partner who is White. The vignettes are followed by items that measure their behavioral, cognitive, and emotional responses regarding their decision to seek or not seek help from the partner. Participants also complete a White Identification measure. We hypothesize that when placed in a higher status position over a Black partner, White individuals who more highly identify with their racial in-group will be less likely to actively seek help even when aware that their counterpart may be qualified to help them. We also predict that highly identifying Whites will refuse to seek help significantly less when they are placed in a lower status position under a Black partner versus a White partner due to beliefs about the superiority of their in-group. Our research objective is to be among the first to examine how White racial identity may affect interracial helping interactions in the context of status hierarchies.

**Honors/Leadership:** 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

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## **The role of structural genes in the growth of porcine reproductive and respiratory syndrome virus (PRRSV) in cell culture**

Alexia Sampson and Raymond R.R. Rowland  
Department of Diagnostic Medicine and Pathobiology  
College of Veterinary Medicine

Porcine reproductive and respiratory syndrome (PRRS) is the most economically important swine viral disease. Infection with PRRS virus (PRRSV), the etiological agent of PRRS, results in reproductive failure in sows or gilts, and respiratory distress, poor growth performance, and increased mortality in growing pigs. Structural genes are determinants of virulence. To investigate the role of structural genes in the growth of PRRSV in-vitro, three viruses were tested that contained different combinations of structural genes from parental isolates. The hypothesis was that in comparison to the parental isolates the recombinant viruses will exhibit poor growth kinetics. The approach involves infecting confluent MARC-145 cells and harvesting virus at 12 hour intervals. The quantity of infectious virus in terms of 50% tissue culture infectious dose (TCID<sub>50</sub>) will be determined by virus titration for each time point. This data will be used to plot growth curves to compare the five viruses involved in this study. These results will provide insights into the extent that structural genes influence the propagation of PRRSV in-vitro.

**Honors/Leadership:** Cargill Internship, Ottumwa, Iowa; Garmon Scholarship for Social Justice; Pathways to Public Health; Developing Scholars Talent Show; Travel: Ghana

## Synthesis of Cancer Homing Sequences for the Treatment of Prostate Cancer

David Villanueva, Stefan Bossmann  
Department of Chemistry  
College of Arts and Sciences

Prostate cancer is the most common type of cancer found in American men. The American Cancer Society estimates that there will be roughly 241,000 new cases of prostate cancer in the United States in 2012. Of these, 33,750 men will die from prostate cancer. Nearly 1 in 6 men will develop prostate cancer in their lifetime; it is usually diagnosed after age 40. Interestingly, there is no mortality benefit discernible from prostate cancer screening. I have synthesized tumor-homing peptide sequences that have been discovered by Dr. Jeff Eskew, University of Kansas Medical Center. These homing sequences can “hitch a ride” with the transport mechanisms that are present in the tumor microenvironment and eventually cross the outer membrane of the cancer cell (cytosolic uptake) without undergoing endocytosis. I have linked these oligopeptides to diagnostic marker dyes of the cyanine type, iron/iron oxide core/shell nanoparticles, and organic nanostructures that are able to transfect tumor cells with plasmids expressing cell toxins (e.g. saporin). This strategy will permit exploratory thermochemotherapy (combined magnetic hyperthermia and chemotherapy), as well as the combination of genetic transfection and hyperthermia. We are in the process of exploring these strategies in a mouse xenograft model in collaboration with Dr. Deryl Troyer (Anatomy and Physiology) and Dr. Jeff Eskew (KUMED).

**Honors/Leadership:** Cancer Research Awards (3); Golden Key International Honor Society; Phi Theta Kappa Honor Society; Memorial Scholarship; LULAC Scholarship; Postmasters Convention; Rake ‘N’ Run; Special Olympics Volunteer; Bilingual: Spanish/English; HALO; LULAC President; Sigma Lambda Beta Secretary; Relay for Life Team Captain

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## Researching the Yale Center for British Art

Hector Martinez, Christopher Fein  
Department of Architecture  
College of Architecture, Planning, and Design

My research project is to investigate what makes the Yale Center for British Art (BAC) one of the greatest buildings designed by Louis Kahn. By closely analyzing this building through the use of sketches and diagrams, I was able to pick out what Kahn’s intentions and motives were in designing this building. Research helped me understand how Kahn developed his ideas and his thinking when it came to design.

Louis Kahn was born February 20, 1901; he spent most of his childhood in the Estonian Island called Saaremaa. Kahn’s family migrated to the United States fearing that his father could have been recruited into the Russian military during the Russian-Japanese war. Kahn received his bachelor’s in Architecture at the University of Pennsylvania and later also taught there for a couple of years. Throughout his career he designed some of the world’s most recognized buildings such as the Yale Center for British Art, the Kimbell Art Museum, the Trenton Bath House, and the Salk Institute for Biological Studies.

The Center for British Art (BAC) at Yale is located on 1080 Chapel Street in New Haven, Connecticut. The building process was from 1969 to 1974. This building was originally intended to serve as both a museum and a library. This building serves as retail on the main street floor with shops facing the streets. One of the most interesting features of the BAC is the entrance; it is located on the northeast corner. Opening at the corner provides appropriate transition between the streets outside and the courtyard. After entering, the portico offers shade, cover, but not enclosure, for visitors. The space then soars upward towards the natural source of illumination taking you from a low ceiling and transitioning into a large open courtyard also known as the Entrance Court. Louis Kahn favored unbroken corridors and this is how he designed the gallery spaces on the fourth floor. The BAC, Khan’s last building, stands as the exclamation point to his career.

**Honors/Leadership:** K-State Opportunity Scholarship; Rake ‘N’ Run; Travel: Mexico; Bilingual: Spanish/English



## The Effects of Thermosensitive or Protease Sensitive Liposomes on the Treatment of Tumors

Chayce F.W. Wynn<sup>1</sup>, Matthew T. Basel<sup>1</sup>, Jamilla McKenzie<sup>1</sup>, Tej B. Shrestha<sup>1</sup>, Hongwang Wang<sup>2</sup>, Marla M. Pyle<sup>1</sup>, Stefan H. Bossmann<sup>2</sup>, and Deryl L. Troyer<sup>1</sup>

<sup>1</sup>Department of Anatomy and Physiology

College of Veterinary Medicine

<sup>2</sup>Department of Chemistry

College of Arts and Sciences

It has been recently found that liposomes (lipid-walled vesicles) have been used to target anti-cancer drugs. Although useful, liposome preparations are still less than ideal because of less-than-perfect specificity, slow release kinetics in the tumor, and leaking before reaching the tumor site. Thermosensitive liposomes, liposomes that dissociate at a specific temperature, can be targeted to specific sites in the body based on localized hot spots. To target the thermosensitive liposomes, tumor homing cells loaded with magnetic nanoparticles (MNP) are given systemically. These cells target the tumor building up MNP content. When exposed to alternating magnetic fields (AMF) the MNP heat rapidly causing a localized hot spot. The thermosensitive liposomes are then injected and release their contents at the tumor site. This method prevents the rest of the body from being exposed to the dangerous chemicals and also gives the administrator greater control over the drug. Here we report a thermosensitive liposome preparation that dissociates at 41°C. Liposomes were prepared using standard methods and contained varying amounts of lysolipid which controls thermosensitivity. Results showed that lower lysolipid content does not strongly affect the thermosensitive properties, although rate of release is increased at lower lysolipid concentrations.

Another liposome-based method being investigated is to use liposomes surrounded by a polymer cage connected by peptides that can be cut by tumor-specific enzymes. In this case, also, the protease-triggered, caged liposomes (PTCL) only release their contents in the tumor but not normal tissue. There are more experiments being conducted to further perfect these approaches with results to be seen in the near future.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Martin Luther King Scholar; June D. Hull Sherrid Cancer Center Scholarship; Floor Vice President; Goodnow Hall; Rake ‘N’ Run; Martin Luther King Day-A Day On, Not a Day Off; Mittens for Many; Alternative Spring Break: Chicago

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## The Life and Times of the Urban Core:

### A Content Analysis of Elijah Anderson’s *Code of the Street* through Chicago, IL Print Media

Derrick Wiggins, Donald Kurtz

Department of Sociology, Anthropology, and Social work

College of Arts and Sciences

The Urban Core in the United States has been an area of great transformation ever since the industrial revolution. The urban core saw the Great Migration of African-Americans from the South into cities (1910~1930) and “white flight,” a near exodus of Anglo-Americans from the urban areas to bordering regions to create or join suburban lifestyle. With this demographic shift, cultural understandings of crime and disorder often focus on aspects of urban life as a criminogenic origin. Elijah Anderson’s ethnography, *Code of the Street*, provides insight to the lifestyle, mindsets, and structure of those residing in the urban core. Anderson argues that there is a “code of the streets” in the inner-city neighborhoods. The code is based on the demand for respect and what those inner-city families will do to obtain it. The families of the urban core are broken into two distinct types: “decent” and “street.” The families considered “decent families” are more prone to middle class values and ideals, while the “street families” oppose the norms of mainstream society. The purpose of this research is to examine how the print media of Chicago presents the urban core and align those representations to Anderson’s “street” and “decent” families to understand why the urban issues and representations exist. The research has been conducted through content analysis of local Chicago newspaper articles and using the themes present in *Code of the Street*, we begin to explain the underlying themes not always shown in the print media and their application to social problems and broader understanding of inner-city life.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Charter Scholar; Student Life Outstanding Graduating Senior Award; Mortar Board; Jasso Scholarship; Garmon Social Justice Award; Service Learning in Kenya and Chicago; LEAD 1; HandsOn; Douglass Center Hand-to-Hand tutoring; Martin Luther King Day-A Day On, Not a Day Off; Alternative Spring Break: Chicago; Travel: Japan

## **Water and Food: The Effects of the Decrease in Water Supplies on Agriculture**

Emma C. Brace, David R. Steward  
Department of Civil Engineering  
College of Engineering

Increases in water use over the last several decades show correlation with a steady decrease in groundwater supplies in the United States. Meanwhile, the agriculture industry has continued to see relatively steady growth. The purpose of this research was to discover how water levels have been changing throughout the high plains region, and examine the implications on agriculture and the global water supply. Furthermore, the findings were to be used in conjunction with a related study on the possibility of farming algae. Available data sets containing information regarding groundwater levels in marked wells were sought from organizations such as the United States Geological Survey. Information regarding productivity of the agriculture industry was sought from the National Agricultural Statistics Service with the intent that these data sets will be matched and analyzed. Productivity of agriculture industries – such as grain production or beef – are examined in conjunction with water use in a region, and projections about the future water use and production capabilities of an area are made. As agriculture works to keep up with the ever-increasing global food supply demands, the relationship between water supplies and land use for agriculture grows more complicated even as the world's food suppliers hope to match supply to demand.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Tau Beta Pi (Engineering Honorary); National Society of Collegiate Scholars; National Merit Walgreen Co. Scholarship; Rake 'N' Run; Flint Hills Breadbasket-Team Leader; Martin Luther King Day-A Day On, Not a Day Off; Society of Women Engineers; Engineering Ambassadors-Executive Member, Public Relations Head; Secretary of the American Society of Agricultural & Biological Engineers; Alpha Chi Sigma; Women in Engineering & Science Program – GROW; CSI K-State Activity Facilitator; GROW Summer Workshop Mentor

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## **Screening of New Anticancer Drugs for Breast Cancer**

Felicia Walker, Thu Annelise Nguyen  
Department of Diagnostic Medicine Pathobiology  
College of Veterinary Medicine

Breast cancer is the second leading cancer diagnosis for American women. 1 in 8 women will develop some type of invasive breast cancer in their lifetime. Breast cancer death rates have been on the decline though; this is due to the advances and research in modern medicine. Even with the new studies and treatments for breast cancer, early diagnosis is key for having the best chance of survival with any cancer. The goal of this study is to characterize the anticancer activity of substituted quinolines (PQs), which have the unique ability to enhance gap junction intracellular communication (GJIC). Cancer cells exhibit many defects in intracellular gap junction channels (GJIC) that contribute to the loss of tissue homeostasis (excess cell proliferation, invasion, and metastasis). Intracellular communication in many organs is maintained via intracellular gap junction channels (GJIC). An increase in GJIC is directly related to the anticancer effect in human mammary cancer cell lines. Recently, new derivatives of PQs were synthesized. Thus, newly synthesized PQs were tested for anticancer activity by using cell viability assay, observing the effects of these drugs on human breast cancer cell lines such as T47D and MDA-MB-231. The results show that none of the newly synthesized PQs provides a significant difference from controls without treatment. Currently, more compounds are synthesized and focused on different strategies to target breast cancer.

**Honors/Leadership:** Memorial Scholarship; College of Agriculture Scholarship; Pre-Vet Club; Water Polo; Travel: Jamaica

## Removal of Sulfate from Wastewater

Fabian Martinez, Shane Morris, Mansour Ali, Jonggeun Sung,  
Madhubhashini Galkaduwa, Ganga Hettiarachchi, Larry Erickson  
Department of Chemical Engineering  
College of Engineering

The purpose of this research is to lower the concentration of sulfate from wastewater produced from the coal power plant, Jeffrey Energy Center. When burning coal, sulfur dioxide ( $\text{SO}_2$ ) is produced and to reduce the amount of  $\text{SO}_2$  before releasing into the atmosphere, the gas undergoes flue gas desulfurization (FGD) by wet scrubbing. The wastewater used for scrubbing is processed before releasing it into the environment but still contains a significant amount of sulfate. Experiments are being conducted to attempt to precipitate sulfate from the FGD water. One approach is to add calcium oxide to precipitate gypsum. Another approach is to add both calcium oxide and calcium aluminate to precipitate ettringite. For this experiment, 40 ml of FGD water is mixed with the stoichiometric amount of calcium aluminate which is 109 mg and then 173.28 mg of calcium oxide is added to the wastewater to get a pH 12. With the addition of calcium aluminate and calcium oxide the concentration of sulfate in the FGD water decreased by 69%.

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

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## Investigation of serine proteinase inhibitor activity in the plasma from an insect, *Manduca sexta*

Jamilah B. Watkins, Jayne M. Christen, and Michael R. Kanost  
Department of Biochemistry  
College of Arts and Sciences

*Manduca sexta*, or the tobacco hornworm, belongs to the insect order, Lepidoptera. Hemolymph (insect blood), which contains serine proteinases and serine proteinase inhibitors, is found inside of this insect. Some of these proteins function in aspects of innate immune responses. To visualize proteinase activity, various amounts of trypsin, chymotrypsin, and elastase were added to wells made in casein agar plates. A clear zone indicated that each enzyme digested the protein, casein, in the casein agar plates. Proteinase activity was determined by calculating the area of this clear zone. We hypothesized that serine proteinase inhibitors present in the plasma (hemolymph with hemocytes removed) of *M. sexta* larvae can inhibit trypsin, chymotrypsin, and elastase. To test this hypothesis and determine how much plasma is needed to abolish proteinase activity, different volumes of plasma were incubated with trypsin, chymotrypsin, and/ or elastase and added to casein agar plates. Results from this assay showed that trypsin, chymotrypsin, and elastase activity were abolished by different amounts of plasma, respectively. We are also investigating 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. Using these results as a basis for understanding serine proteinase and serine proteinase inhibitor activity, the ultimate goal of this project is to purify serine proteinase inhibitors from the plasma of *M. sexta* larvae using gel permeation chromatography and measuring proteinase inhibitor activity.

**Honors/Leadership:** Internship: Student Career Experience Program National Resource Conservation in Kansas; Boyd Hall Governing Board Floor President; Housing Leadership Award; K-State Student Advisory Council; Freshman Action Team; Minorities in Agriculture Natural Resources and Related Sciences; Rake 'N' Run

## 5-Alpha-Reductase Inhibitor for Prostate Cancer Prevention

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College of Human Ecology

Prostate cancer is the most diagnosed and second leading cause of cancer death in U.S. males. In the prostate, testosterone is converted to dihydrotestosterone (DHT) by 5 $\alpha$ - reductase (5 $\alpha$ R) enzymes. DHT is the androgen that binds with the highest affinity to the androgen receptor, stimulating growth and development of the prostate. There are two 5 $\alpha$ R isoforms: 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. There are two 5 $\alpha$ R inhibitors, finasteride and dutasteride, which are used to combat benign prostatic hyperplasia (BPH), a nonmalignant enlargement of the prostate. Finasteride is a 5 $\alpha$ R2 inhibitor, while dutasteride is a dual 5 $\alpha$ R1 and 5 $\alpha$ R2 inhibitor. 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; the study was terminated when the mice were 20 weeks of age. Prostate histopathology will determine whether the treatments altered the development or progression of prostate cancer.

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

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## Potential Contribution of CIC-2 Anion Channels to Porcine Colonic and Urogenital Secretion

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College of Veterinary Medicine

Experiments are being conducted to test for effects of eicosatetraynoic acid (ETYA), an arachidonic acid analog, on basal and forskolin-stimulated ion transport across selected epithelial tissues derived from pigs. The rationale for these experiments is that lubiprostone, a prostaglandin derivative that is used in the treatment of chronic constipation, is thought to have its effect by activating a particular type of anion channel that is designated as CIC-2. ETYA reportedly affects the same channel type although other effects of this compound have been reported. Cells lining porcine vas deferens were isolated and grown in culture until confluent. Vas deferens epithelial monolayers were mounted in Ussing style flux chambers and exposed to forskolin to maximally stimulate chloride and bicarbonate secretion, measured as short circuit current. ETYA caused a concentration-dependent reduction in short circuit current with half maximal inhibition occurring at approximately 3 micromolar. Subsequently, RNA was harvested from these cells, reverse transcribed, and PCR was used to detect mRNA coding for CIC-2. Descending colon was harvested from a six-week old pig and, after removal of exterior smooth muscle, the epithelium was mounted for ion transport studies. Initial results show that, in the same concentration range, ETYA causes a modest reduction in forskolin-stimulated anion secretion. Taken together, these results suggest that CIC-2 may contribute to anion secretion by both the urogenital and intestinal epithelia. However, a substantial portion of forskolin-stimulated ion transport is unaffected by ETYA suggesting that alternative anion secretion pathways also contribute to the responses. Studies employing more selective CIC-2 agonists and antagonists are clearly warranted. [Supported by NIH R01 HD058398]

**Honors/Leadership:** Acceptance to the University of Kansas's Medical School; NIH Bridges to the Future; Cancer Research Award; Johnson Cancer Center fundraising; Travel: Panama; Coauthored "Swine Models of Cystic Fibrosis Reveal Male Reproductive Tract Phenotype at Birth" published in *Biology of Reproduction*; Sigma Lambda Beta President; Flint Hills Breadbasket; Relay for Life

## **Building Accessibility for the Disabled**

Ismael Hernandez and Ray Buyle

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College of Engineering

A fact of life is that we as humans face disabilities at some point in our lifetime. A struggle that many disabled persons face is getting around, whether it is going to a grocery store or even getting around in their own home. There is a wide variety of disabilities that make it difficult for the disabled to get around, ranging from persons in wheelchairs to those who are visually impaired. This problem leaves questions as to what contractors should do to make it easier for disabled persons to access public and private spaces with different kinds of configurations. Reading through the Americans with Disabilities Act (ADA) guidelines, I found the foundation for how contractors can improve buildings to be more accessible through construction methods: scoping requirements and technicalities. Different resources such as online articles and books were found basing searches on types of disabilities, accessible building design plans, methods of constructing an accessible home, and experiences of disabled persons accessing buildings. I also read through first-hand accounts of disabled persons who struggle accessing public and private spaces. I was able to synthesize these resources and accounts with the ADA guidelines to have an understanding that all disabled persons are unique to their disability and therefore have different needs for accessibility. A conclusion to solving this problem of accessibility for all disabled persons has not been made because disabled persons' needs are broad, but there is room for improvements that contractors can explore.

**Honors/Leadership:** Gates Millenium Scholarship; Edgerley-Franklin Urban Leadership Scholar; Hispanic Scholarship; Association of General Contractors; 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

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## **PEPTIDE DERIVED FROM $\beta$ 2 GLYCOPROTEIN I INHIBITS MELANOMA CELL GROWTH IN VIVO**

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Department 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 peptide  $\beta$ 2 296c-s from the binding domain of  $\beta$ 2 glycoprotein I which inhibits the tissue damage in mouse models of ischemia. We hypothesized that peptide  $\beta$ 2 296c-s would also inhibit tumor growth by attenuating new vessel creation. 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 molecular analysis. Current data indicate peptide injections resulted in tumor growth inhibition. Vascular markers endoglin, endosialin, VEGF, and endothelium marker CD31 were used in real-time PCR for molecular analysis. Endoglin, endosialin, and CD31 showed a down regulation 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, Memorial Scholarship; K-INBRE Symposium Conference 2011; HALO; BESO; St. Catherine's Hospice Volunteer; Volunteer at Seven Dolors Catholic Church; Bilingual: Spanish/English

## **Impermeable Encasing Bacteria with Single Atom Thick Graphene Sheets**

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Department of Chemical Engineering  
College of Engineering

Sreeprasad T. Sreenivasan, Post-Doctorial Candidate and Phong Nguyen, Graduate Students

The goal of this research is to show a proof of concept of the ability of graphene to wrap a bacterium to enhance its electron microscopy by allowing bacterial imaging at full size. It is currently a challenge to image bacteria at its original size under an electron microscope due to the fact that bacteria with 70% water content shrink under the high vacuum of the microscope. Graphene provides a strong, impermeable and electron-transparent coating on bacteria, thus protecting it. To test this hypothesis, we grew bacillus subtilis and wrapped them in a graphene grown on copper and then etched away the copper layer. The bacteria wrapped in graphene is then placed in the electron microscope and compared to the size of the non-wrapped bacteria. Through this research it has been proven that by encasing bacteria within graphene the electron microscope will not affect the size of the bacteria, leading to more accuracy in the future studies. Experiments performed have shown that by the formation of wrinkles on graphene a band gap can be introduced. By wrapping bacteria within graphene these wrinkles have been produced. The lack of band gap has been hindering graphene's transistor applications. This research may provide valuable information for the development of electron-microscopy techniques in the biomedical industry and provide avenues to develop next-generation bio-nano systems as well as advance the efficiency of transistors.

**Honors/Leadership:** Memorial Scholarship; Multicultural Engineering Program; Society of Women Engineers; Congress Bundestag Youth Exchange; Rake 'N' Run; Mittens for Many; Habitat for Humanity; Travel: Germany, Belgium, the Netherlands; Bilingual: English/German

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## **Cyanobacterial identification by infrared spectroscopy**

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College of Veterinary Medicine

Cyanobacteria are photosynthetic prokaryotes that can form colonies in bodies of water, which are usually visible as algal scums under conditions that lead to rapid growth. Such conditions are referred to as algal blooms, and they are serious public health hazards because they often produce harmful toxins. Microcystins are common cyanobacterial hepatotoxins produced by species of Microcystis. Identification of cyanobacteria is often needed to identify and avoid potential poisoning risks, which is typically done based on morphological characteristics of cyanobacteria that can be seen using a light microscope. This method requires a trained microscopist. Attenuated Total Reflection Fourier Transform Infrared Spectroscopy (ATR-FTIR) has potential for identifying toxic genera of cyanobacteria without the need for a trained microscopist, by analyzing the unique infrared absorption patterns related to the mixtures of molecules on the outer surfaces of different organisms. Twelve algal scum samples from lakes and ponds in Kansas were smeared onto Whatman #1 filter paper, and air dried. After scanning all 12 samples, 10 peaks that represent characteristic absorption bands were recorded in terms of peak height. Species belonging to the genus Microcystis could be consistently identified following a process of multivariate analysis. The samples were rescanned at three intervals from October 2011 to November 2011 to determine if sample absorption spectra remained stable over time. The results showed that the absorption spectra remained consistent throughout the experiment, and that this method of cyanobacterial identification could be used as an alternative to microscopy.

**Honors/Leadership:** Cargill IMPACT Scholarship; MAPS; Minorities in Agriculture, Natural Resources and Related Sciences; Rake 'N' Run

## Technique for Tonicity

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College of Veterinary Medicine

Complications of blood tonicity can develop as a part of medical disorders in canines and can produce numerous complications. Brain damage, organ failure, anemia and even death can result from blood tonicity complications. However, tonicity cannot be easily measured with the current laboratory techniques. Therefore, the goal of this research is to develop a simple technique and apply it to clinically ill canines with various diseases. A handheld portable cell counting device, called a sceptor will be used to measure changes in the size of red blood cells (RBC) that have been exposed to solutions with various tonicities. RBC size is directly influenced by tonicity and it is possible that the tonicity of a solution can be determined by measuring changes in RBC size. The results show that the sceptor shows consistent measurements of canine RBC size and that RBC size changes linearly in relation to solution tonicity.

**Honors/Leadership:** Cargill IMPACT Scholarship; MAPS; Black Student Union Freshman Action Team; United Black Voices; Travel: Costa Rica

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## DRUG EFFECTS ON BEHAVIOR AND CORTISOL LEVELS DURING CASTRATION IN CALVES

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Iowa State University.

Calf castration is a common husbandry procedure in the U.S. Despite its high incidence, and growing interest in animal welfare, bovine pain management in the U.S. remains limited. There are currently no drugs specifically approved for cattle pain relief. Acute cortisol response has been used as an indicator of the distress associated with castration in cattle, and behavioral responses (e.g. foot stomps) are accepted as indicators of pain resulting from castration. The primary objective of this study is to analyze the effects of xylazine, flunixin and lidocaine as local anesthetic or analgesic drugs during calf castration. The principle variables analyzed are behavioral responses and cortisol levels in surgically castrated calves receiving these drugs. This study is part of a larger project also investigating electroencephalogram (EEG) parameters and cardiac responses in calves undergoing castration. Thirty-one Holstein calves were randomly assigned to the following groups; 1) castrated, untreated controls (placebo); 2) flunixin meglumine, immediately before castration; 3) xylazine immediately before castration; 4) lidocaine, ten minutes before castration. Calves were castrated using the “cut and pull” method: a surgical incision to the scrotum, with testes and spermatic cords exteriorized by blunt dissection. Based on preliminary descriptive analysis of behavior data, group 3, xylazine calves, displayed numerically fewer foot stomps during castration, while displaying numerically highest number of collapses. Group 2, flunixin calves, displayed a numerically higher foot stomp average during castration than the other groups. All variables are under statistical analysis. A general linear mixed model was fitted to each response.

**Honors/Leadership:** Acceptance to K-State’s College of Veterinary Medicine; NIH Bridges to the Future; McNair Scholar; League of United Latin American Citizens; Flint Hills Breadbasket; Theodore Roosevelt Fall Festival volunteer; Lee Elementary Carnival Volunteer; Bilingual: Spanish/English

## **Parenting a Child with Down Syndrome.**

Kelsey Ritz<sup>1</sup>, Dr. Briana S. Nelson Goff<sup>1</sup>, Nicole P. Springe<sup>2</sup>

<sup>1</sup>Department of Family Studies and Human Sciences

<sup>1</sup>College of Human Ecology

<sup>2</sup>Texas Tech University

The literature for parents raising children with Down syndrome (DS) is very dense and gives little positive reinforcement of the joys in raising a child with Down syndrome. This research will involve secondary data from online surveys of parents who are currently raising children with DS. The survey gathers information, through quantitative and qualitative questions, about the couples' relationship and their experiences of raising a child with DS, both negative and positive experiences. To date, over 500 participants have completed the national survey. Through this data we will gain insight into the factors and resources that were beneficial in coping with their child's diagnosis. The qualitative questions specifically ask about the couples' initial response to the diagnosis and their experience of receiving the news; particularly the grief and loss, experienced as well as hope and resilience in their journey. The research will also address genetic counseling and what parents should expect from these sessions. This project will be completed as a book chapter publication based on the quantitative and qualitative data to provide a mainstream publication for new families of children with DS. This information will help future parents and families through their experience of raising a child with DS.

**Honors/Leadership:** Memorial Scholarship; Student Governing Association Intern; Rake 'N' Run

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## **Enzyme additions to improve ruminal digestion of distiller's grains**

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College of Veterinary Medicine

Dried distiller's grains with solubles (DDGS) are a byproduct of the ethanol industry, and are rich in fiber, protein, and fat. DDGS are commonly used as feedstuffs in cattle diets. When fed in conjunction with certain types of grains, DDGS has been shown to decrease rumen pH. Low ruminal pH can have deleterious consequences for activity of proteolytic and cellulolytic enzymes, as it is outside their optimal range. As a result, digestion of protein and fiber decreases, and nutrients are therefore less available to the animal. Enzymes of fungal origin are able to withstand lower pH (pH 5.0 to 5.5) than those produced by bacteria and protozoa within the rumen. We hypothesized addition of fungal enzymes, with improved tolerance to low ruminal pH, would improve digestion of DDGS. To test this hypothesis, we utilized an in vitro system to measure production of fermentative gasses (a measure of fermentative activity) and disappearance of dry matter (indicative of the conversion of protein and carbohydrates to volatile organic acids). Ruminal fluid (50 mL) from a donor animal on a high grain diet was strained, combined with 100 mL of McDougall's buffer, and placed into 250-mL fermentation flasks containing 1 g of substrate consisting of a 50:50 mixture of ground corn and DDGS. Fungal enzymes were pre-diluted in McDougall's buffer and added to the flasks to provide enzyme at 0.1% of substrate weight. A total of eleven different enzymes were tested, including different types of proteases and carbohydrases. Gas production was monitored for 32 hours using the Ankom gas production system. At the end of the experiment, pH of the cultures was measured and contents of the flasks were dried to determine in vitro dry matter disappearance (IVDMD). Gas production was not significantly influenced by the length of the fermentation or the type of enzymes added. Enzymes from the same family showed consistent results. Proteases resulted in the highest gas production, followed by xylanases and then by  $\beta$ -glucanases. We think it is noteworthy to mention that excessive substrate from ruminal inoculum caused deviation in the results. In the future less viscous ruminal fluid should be used to confirm the results.

**Honors/Leadership:** Acceptance to Iowa State University's Immunobiology Graduate Program; NIH Bridges to the Future; Block and Bridle, Rake 'N' Run



## **Increase of Cell Communication in Colorectal Cancer**

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College of Veterinary Medicine

Many American citizens have lost their lives to colorectal cancer each year. Colorectal cancer cells have many unique properties compared to normal cells. One unique property is the loss of cell communication in cancer cells. A normal cell communication is consisting of multiple gap junction channels that help the cells to communicate between each other. Thus, preventing molecules to move from cell to cell through gap junction channels due to the loss of cell communication may contribute to cancer formation. The goal of the project is to examine the regain of cell communication in colorectal cancer cells. In order to test the loss of cell communication, scrape load / dye transfer assay was used to measure the gap junction activity. Human colorectal cancer (Caco-2) cells were maintained with proper cell culture technique and subsequently these cells were used in all of the experiments. One million cells were seeded on six-well plates. Cells were dosed with gap junction enhancer, PQ1, at various concentrations for 24 hours. A 100% of cell confluency was reached and gap junction activity was performed. Results show a three-fold increase of cell communication in the presence of gap junction enhancer, PQ1 compared to controls. In conclusion, an increase in cell communication can be achieved in the presence of PQ1.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Memorial Scholarship; Soaring Eagles Leadership Team; Flint Hills Breadbasket Drive; Martin Luther King-A Day On, Not a Day Off; Douglass Center Service; Alternative Spring Break; Chicago

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## **Cell Function and Development**

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Department of Biology  
College of Arts and Sciences

Macrophages are phagocytic cells that participate in the immune response when invaders are found in the body. They enter the bloodstream as monocytes and travel to different tissues to become macrophages. Macrophages engulf and digest cellular debris as part of their normal functions. Macrophages adapt when they travel to different environments. One of the tissues they travel to is adipose tissue where they clean up dead adipose cells. In addition, they respond to adipose tissue environment by releasing pro-inflammatory cytokines. In obese individuals, the interaction of adipocytes and macrophages can affect macrophage function and adipocyte development. Moreover, the production of pro-inflammatory cytokines leads to the development of metabolic syndrome, increasing risk for stroke and type 2 diabetes. Therefore, to further understand the relationship between adipocytes and macrophages we looked at the impact of conditions that induce the differentiation of pre-adipocytes into adipocytes on macrophages. To do this, we used the C2D macrophage cell line. We hypothesize that if the C2D macrophages are differentiated in similar conditions to that of pre-adipocytes they will acquire some characteristics of the adipocytes; for example, lipid accumulation. For this project, we compared 3T3L1 pre-adipocytes and C2D macrophages that were maintained separately in 60 millimeter tissue culture plates. At fifty percent confluency, cells were incubated in reagents known to induce pre-adipocyte differentiation into adipocytes. For the first four days this included insulin, dexamethasone, and isobutylmethylxanthane. On the fourth day the media were changed and cells were incubated in insulin alone. After eight days of differentiation, cells were incubated with 10 percent fetal bovine serum. C2D macrophages were examined for the accumulation of lipids and compared to adipocytes. Photomicrographs were used to document lipid drop accumulation in each cell type. We are currently collecting data.

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

## Do Healthy Children with Post-Exercise Bronchoconstriction Demonstrate Ventilatory Limitation during Exercise?

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**PURPOSE:** Typically, healthy airways dilate during and following exercise (bronchodilation) and ventilation is rarely limited during exercise. However, we have recently documented that many apparently healthy prepubescent children experience exercise induced bronchoconstriction (EIB). In a separate study, we have also shown that most prepubescent children's ventilation during exercise is constrained (expiratory flow limitation, EFL). However, it is currently unknown if there is a relationship between EIB and EFL in healthy children. We hypothesized that in those children who demonstrate the most EIB, they will also exhibit the most severe EFL.

**METHODS:** Data from previously published studies (56 pre-pubescent children, ages 8-11 yrs) was analyzed. Before and after a maximal exercise cycle-ergometer test ( $VO_{2max}$ ), all children completed pulmonary function tests (maximal flow volume loop MFVL; FEV1 forced expiratory volume in 1 sec) to determine the severity of the EIB. Expiratory flow limitation was determined by examining the extent of the expiratory flow portion of the exercise tidal volume loops intersecting with the MFVL during the exercise test. Relationships were then determined between these variables.

**RESULTS:** Compared to pre-exercise values, 13 children increased FEV1 post-exercise (bronchodilation) ( $3.1 \pm 0.4\%$ ), while 43 children decreased FEV1 post-exercise (bronchoconstriction) ( $-8.4 \pm 0.8\%$ ). EFL occurred in 53 of 56 children (95%) with a severity ranging from 5-100% of the exercise tidal volume loop. There was no relationship ( $P > 0.05$ ) between the change in FEV1 pre-post exercise and the amount of EFL. However, in those children that demonstrated clinically relevant EIB (i.e.,  $>10\%$  decrease in FEV1 pre-post exercise;  $n=22$ ), there was a significant relationship ( $r=0.66$ ) between EIB and EFL, suggesting the most severe ventilatory limits during exercise in these children. **CONCLUSION:** These data suggest that apparently healthy prepubescent children who exhibit clinically relevant post-exercise bronchoconstriction also demonstrate the most severe ventilatory limitations during exercise.

**Honors/Leadership:** Academic Honors; Foundation Scholarship; Soaring Eagles Leadership Team; Delta Upsilon Alternative Spring Break/ New Orleans; Flint Hills Breadbasket

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## *Ugly Betty's* Immigration Narrative: The Personal and The Political

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College of Arts and Sciences

Over the past two years, we have researched representations of U.S. Latino masculinity in popular culture and trends within the immigration debate in the United States. This year we synthesized this research and applied it to our findings to the character Ignacio Suarez from the television show *Ugly Betty*. Ignacio is the head of the Suarez family and also the center of an immigration narrative that results in his deportation and subsequent path to citizenship.

We are looking through key episodes of *Ugly Betty* that focus on how Ignacio is portrayed in certain situations and locations. Our central question follows: "What is the difference between how Ignacio is portrayed in the U.S. and in Mexico throughout the story arc?" The rationale is to understand how *Ugly Betty* responds to discussions about immigration. Our methodology is to analyze how he is represented vis-a-vis masculinity before he is deported, while he is in Mexico, and when he returns and begins his path to citizenship.

Our study situates Ignacio's story within the larger debates around immigration between 2006-2010 and seeks to find if there is a correlation between his level of masculine portrayals and his position as undocumented or documented citizen. Our study shows how Ignacio's story provides a personalized face to a narrative that may cause people to question their anti-immigrant perspectives.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Mortar Board; National Society of Collegiate Scholars; Multicultural Student Honor Society; Golden Key International Honor Society; Medallion Scholarship; Memorial Scholarship; Blue Key Scholarship; Union Program Council; Smurthwaite Leadership Scholarship House; Certified CASA volunteer; Martin Luther King Day-A Day On, Not a Day Off; Ogden Friendship House; Alternative Spring Break: Chicago

## **Sequence and expression analysis of putative homologs of insect immune-related genes in *Frankliniella occidentalis*, the insect vector of Tomato spotted wilt virus (TSWV)**

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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 thrips vector, *Frankliniella occidentalis*. We know that TSWV infects, propagates, and spreads to various insect tissues with no apparent pathogenic effect, and that vectoral capacity (i.e., the extent of transmission by adult viruliferous thrips) is positively associated with the amount of virus (titer) harbored by thrips. We hypothesize that the variation in titer in a population of thrips 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. Previous sequence analysis of a large collection of assembled and annotated thrips cDNA sequences that represent expression of diverse genes during development and through the virus infection cycle of the insect revealed the presence of putative homologs of genes associated with pathogen recognition, signal modification and transduction, and execution of defense against invading bacteria, fungi, and viruses (i.e., TOLL, IMD, JAK-STAT, apoptosis, and RNAi). Here we describe a subset of representative sequences that encode proteins in the TOLL, JAK-STAT and apoptosis pathways. Upon comparison of eight *F. occidentalis* sequences (open reading frames) with protein sequences in the non-redundant protein database of NCBI, predicted conserved domains characteristic of insect immune-related genes were identified. We are currently conducting time-course experiments to determine TSWV titer and expression levels of four of these genes during virus infection and replication in larval to adult thrips using real-time quantitative reverse-transcriptase PCR (qRT-PCR).

**Honors/Leadership:** Institute of Ecological Genomics Undergraduate Research and Mentoring Internship; 2011 Summer REU/URM presentations; Professional Conference Presentations: Ecological Genomics Symposium

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## **Tempering Conditions to Improve Waxy Wheat Flour Quality and Yield**

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College of Agriculture

The starch found in wheat endosperm contains both amylose and amylopectin. Waxy wheat differs from regular wheat by only containing amylopectin. Waxy wheat has been proven to postpone the staling of bread and has applications in practical baking. Additionally, the absence of amylose makes waxy wheat more susceptible to mechanical damage during milling causing more damaged starch granules which absorb more water. High water absorption makes it hard for the baker to know how much water to add during the mixing of the dough. The baker will add the average water required for hard winter flour, but since the flour being used is waxy wheat it will not be enough water. The purpose of our experiment epitomizes finding an efficient process of milling Waxy wheat to improve the flour quality and yield. The research will be conducted in a Shellenberger Hall milling lab for six weeks. Waxy wheat and a control group will be tested. The control group will be hard wheat with a similar hardness value as the waxy wheat samples. The Single Kernel Characterization System machine will be used to determine the hardness and initial moisture content of the wheat. Calculations will be done to determine the amount of water needed to make 14, 15.5, and 17% moisture content samples. Tempering will be done for 18 hours. Milling will be done using a Buhler Test Mill and the American Association of Cereal Chemists (AACC) methods will be followed. After milling, the color values of each flour sample will be found. The Mixolab will then be used to test the mixing and pasting characteristics of each sample. The data collected will be analyzed to find which sample produced the greatest flour yield, the best flour quality, and the best performing dough. The efficiency will aid in Waxy wheat becoming commercially available to produce better quality breads and noodles.

**Honors/Leadership:** Academic Honors; Cargill IMPACT Scholarship; MAPS; Minorities in Agriculture, Natural Resources and Related Sciences; Rake 'N' Run; 4Paws and Heifer International Fundraisers; Border Angels/No More Deaths Service Learning Trip; Bilingual: Spanish/English

## Composition, diversity, and resilience of fungal communities colonizing the roots of native and exotic hosts in an urban environment

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College of Arts and Sciences

The number of humans in cities and urban environments is rapidly increasing and its proportion now exceeds half of the global population. Consequently, urbanization, and its anthropogenically-driven impacts, are reconstructing our natural ecosystems into fragmented and severely altered novel environments. These novel, urban ecosystems are often unique in organismal composition and characterized by decreased biodiversity. The unique characteristics of the urban communities are in part attributable to conscious choices by city land management entities. In this study, we aim to better understand the consequences of choosing either a native (*Quercus macrocarpa*) or non-native (*Pinus nigra*) ornamental trees for the ectomycorrhizal fungi that are necessary for health and growth of most trees. We hypothesize that non-native trees host unique ectomycorrhizal fungal communities, whose species richness and diversity are lower than those of native trees. We cast our studies in the conceptual framework of “ecological memory” and predict that choosing the non-native trees will lead to a lesser resilience and therefore to a reduced ability of the urban systems to support fungal communities that resemble those commonly associated with native trees. We are currently conducting field studies in the city of Manhattan, KS, and complementary greenhouse manipulations in collaboration with United States Department of Agriculture Agricultural Research Station in Haysville, KS. The first results show that although both the native and non-native tree species are heavily colonized by ectomycorrhizal fungi, they differ significantly in root densities and therefore also mycorrhizal densities. Our on-going molecular analyses will compare fungal species richness, diversity, and community composition between the native and non-native hosts. The long-term goal of our studies is to evaluate the native and non-native species in the preservation of ecological memory and provide suggestions to the land managers on how to preserve the biological resources in urban settings.

**Honors/Leadership:** Institute of Ecological Genomics Undergraduate Research and Mentoring Internship; Baeten Farm Scholarship; Fairchild Scholarship; Travel: Rome, Italy; Professional Publication: KuKanich K., Ghosh A., Skarbek J., Lothamer K. and Zurek L. 2011. Surveillance of bacterial contamination in small animal veterinary hospitals with special focus on antimicrobial resistance and virulence traits of enterococci. *J. Am. Vet. Med. Assoc.* Vol 240, No. 4, 437-445; James R. Coffman Award of Excellence (First Year Scholar Honorable Mention); Rake ‘N’ Run; Flint Hills Breadbasket; Mittens for Many; Shoes 2 Share; Cats for Cans; Harvesters (KC);ASPCA Deployment to Mountain Home

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## Researching and Improving Controls Lab Machines

J. Miguel Valdes and Austin White, Warren White  
Department of Mechanical Engineering  
College of Engineering

Control theory for mechanical engineers often requires the use of DC motor with outputs to relay information back. This is called a “MotorLab”, and the MotorLabs in the mechanical engineering department are over a decade old and need to be replaced. We have created and tested a new MotorLab in order to enhance the learning experience in the dynamic systems and controls laboratory here at Kansas State University. This semester we have researched and gathered the parts to make a second, more marketable MotorLab machine. First we decided to market ourselves to other universities interested in upgrading their controls labs, and then we began researching materials that would work with our design and remain relatively inexpensive. Our work has involved looking over past CAD (Computer Aided Design) files and how we could improve their designs. We have researched new parts and also reinforced the machine. We then fabricated our parts and assembled our prototype. Since then we have continued to improve our prototype and have just begun work on a second model that can be used full time in the controls lab.

**Valdes’s Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; Purple and White Scholarship; Engineers without Borders; Engineering Tutor; Goodnow Hall Tour Team; Alternative Spring Break, Chicago; Travel: England, France, Switzerland

**White’s Honors/Leadership:** Cargill IMPACT Scholar; Memorial Scholarship; MAPS; American Indians in Science and Engineering Society; Rake ‘N’ Run

## Environmental Surveillance of an Equine Hospital Facility

Monica Farfan, Jennifer Free, Elizabeth Davis

Department of Clinical Sciences

College of Veterinary Medicine

Pathogenic organisms exist in a variety of environments. It is important to maintain hospital environments in sanitary condition, despite the fact that patients may enter with pathogenic challenge. Also, frequent use of cleaning agents may result in organisms that are resistant to cleaners and antimicrobial medications. This project focused on determining the prevalence of bacterial contamination among various surfaces in the KSU equine hospital. This information will help increase awareness of zoonotic diseases such as clostridium and salmonella species in a hospital setting. Awareness of this information will aid in increasing hand hygiene while decreasing eating/drinking around animals.

Sampling methods included sterile dry swabs placed into empty tubes; sterile swabs dipped in saline solution and placed back in the tube of solution, sterile swabs dipped in an empty tube, and gel swabs. Aerobic and anaerobic culture was performed for all areas. When a swab was collected, sample areas included either 5x5 cm or 10x10 cm surfaces that have direct animal-animal contact or human-animal contact. Samples were then cultured on blood agar to determine the presence of alpha and beta hemolysis. MacConkey and Hektoen Enteric agar were utilized to observe Gram-negative bacteria such as *E. coli* and *Salmonella* spp., and Brucella agar to observe only hemolytic colonies such as *Clostridium* spp. The data collected revealed that the equine hospital contained a variety of environmental pathogens, but do not present a strong concern. However, at one sampling we isolated *Clostridium perfringens*, which can be associated with food poisoning in people and serious disease in equine patients. Subsequent sampling following routine cleaning resulted in negative culture samples.

Collectively, the data collected from this investigation demonstrate that even though pathogens are present in the environment they are commonly in low numbers and removed with current cleaning protocols. It is important to note that hand-washing and routine hygiene practices should be followed, as serious pathogens may exist in any environmental setting.

**Honors/Leadership:** Cargill IMPACT Scholarship; MAPS; Minorities in Agriculture, Natural Resources and Related Sciences; Hispanic American Leadership Organization; Travel: Ireland, Scotland, Great Britain; Bilingual: Spanish/English

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## Elucidating the Order of Events in a Signaling Pathway

Morgan Armbruster, Ruth Welti

Department of Biology

College of Arts and Sciences

If bacteria, such as *Pseudomonas syringae* DC3000, infect the plant *Arabidopsis thaliana*, the plant responds by producing two known “signaling compounds”: salicylic acid and jasmonic acid. These two compounds are responsible for regulating genes that are responsive to the stress caused by the infectious bacteria. *Arabidopsis thaliana* does not only make salicylic acid and jasmonic acid, but also an array of oxidized membrane lipids as well. In addition, other modified membrane lipids are made. The purposes of these oxidized and otherwise modified lipids and why they are formed quickly are currently unknown. The production of lipids altered by infection was measured when salicylic acid and benzothiadiazole (a compound working much like salicylic acid) were applied in varying exposure routes to *Arabidopsis thaliana*. These routes of exposure include spraying, sub-irrigation, and infiltration. At various exposure times leaves of *Arabidopsis* tissue were removed and analyzed to determine if salicylic acid and benzothiadiazole affect the production of oxidized and modified lipids. Measuring of the lipids is done by mass spectrometry. Preliminary data show that benzothiadiazole inhibits the formation of some oxidized lipids. For future research, this project will expand on the effects of the same compounds, as well as jasmonic acid and jasmonic acid derivatives, on oxidized lipid production in mutant *Arabidopsis thaliana* plants with modified pathways in oxidized lipid production.

**Honors/Leadership:** James R. Coffman Award of Excellence; Cats for Pre-Health Resources; Jack and Bertha Maes Pre-Med Scholarship; Cancer Research Award; Developing Scholars Lollipop Lecture Series; KanDance; Winter Dance; Rake ‘N’ Run; Travel: Ghana (summer 12)

# EFFECT OF SUBSTITUTED QUINOLINES ON GENE EXPRESSION OF GAP JUNCTION PROTEINS

Nallely Barron and Thu Annelise Nguyen  
Department of Diagnostic Medicine/Pathobiology  
College of Veterinary Medicine

Breast cancer is caused in part by the inability of cells to maintain normal internal environments. A key to maintain an internal balance for a normal cell is the ability to communicate with the surroundings; however, in cancer cells there is a disruption of cell-to-cell communication. A type of cell-to-cell communication is called gap junction intercellular communication (GJIC). GJIC consists of channels that allow the transfer of information from one cell to neighboring cells. These channels are formed by multiple gap junction proteins, connexins (Cx). Previous studies have shown that primaquine compounds (PQs) have a high binding to connexins, which are the basic units to form gap junctional channels. In breast cancer cell lines, PQs lead to an increase GJIC through the formation of gap junctions and reduce cell growth. The purpose of the study is to determine if PQs have an impact on the DNA/RNA level of gap junctions in breast cancer cell lines. T47D breast cancer cells were treated with PQs at various concentrations and time points. The total RNA was purified. Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) was used to obtain complementary DNA (cDNA) for Cx43, Cx46 and  $\beta$ -Actin as the control. The cDNA for Cx43, Cx46 and  $\beta$ -Actin was quantified using QIAxcel technology to measure gene expression. The results suggest that PQ1 causes an increase of GJIC in part by increasing connexin expression. Further analysis of other breast cancer cell lines is currently being investigated.

**Honors/Leadership:** NIH Bridges to the Future; Bluemont Scholarship; Ellis Foundation; Phi Theta Kappa, K-INBRE presentation; LULAC

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## A focused microarray for screening rat ESC lines.

M.L. Weiss<sup>1, 2, \*</sup>, H. He<sup>1</sup>, P. Bui<sup>1</sup>, B. Ryba<sup>1</sup>, M.A.K. Rumi<sup>3</sup>, M.J. Soares<sup>3</sup>, D. Dutta<sup>3</sup>, S. Paul<sup>3</sup>, M. Kawamata<sup>4</sup>, T. Ochiya<sup>4</sup>, Q. Ying<sup>5</sup>, and J. Hong<sup>1</sup>

<sup>1</sup>Department of Anatomy and Physiology, Kansas State University College of Veterinary Medicine, Manhattan, KS; <sup>2</sup>The Midwest Institute of Comparative Stem Cell Biology, Kansas State University, Manhattan, KS; <sup>3</sup>Department of Pathology and Laboratory Medicine, University of Kansas Medical Center, Kansas City, KS, <sup>4</sup>Division of Molecular and Cellular Medicine, National Cancer Center Research Institute, 5-1-1, Tsukiji, Chuo-ku, Tokyo, Japan, <sup>5</sup>Department of Cell & Neurobiology, Keck School of Medicine, University of Southern California, Los Angeles, CA

We developed a DNA microarray to use as a simple one step characterization step of gene expression of rat embryonic stem cells (ESCs). Here we compare undifferentiated germline-competent ESCs, chimera-competent ESCs, ESC differentiated for 5 days and 10 days to embryoid bodies (EBs), and rat trophoblast stem cells (TS), extraembryonic endoderm cells (XEN), mouse embryonic fibroblast feeder cells (MEFs). The aim of the microarray described here is to efficiently screen rat ESC lines by the detection of pluripotency-associated gene expression and differentiation-associated gene expression. Our data show excellent repeatability between users and good discrimination between cell types. We found unexpectedly that Cdx2, a gene that directs early trophoblast genesis, was expressed in undifferentiated rat ESCs. We hypothesize that Cdx2 expression by rat ESCs leads to decreased efficiency to enter the germline and that culture conditions that decrease Cdx2 expression might increase germline-competent ESC transmission efficiency.

**Honors/Leadership:** NIH Bridges to the Future; University Honors Program; Mortar Board; First Year DSP James R. Coffman Honorable Mention; Memorial Scholarship; Cancer Research Award; Flint Hills Breadbasket; Rake 'N' Run; Mittens for Many; Alternative Break: New Orleans; Reading is Leading; First Book Charity Donation; weekly reading at Child Development Center; weekly ER volunteer at Mercy Regional Hospital; Academic Decathlon XIX; Bilingual: Vietnamese, English; Transfer Ambassador Program; Vietnamese Student Association

## **New Fundraising Platforms: The Smartphone Application**

Oscar Rodriguez, Kathy Vratil Brockway  
Department of Arts, Sciences, and Business  
K-State Salina

The purpose of this research is to investigate the usefulness and cost effectiveness of smart phone applications in fundraising for not-for-profit organizations. The study will determine if fundraising capabilities for not-for-profit organizations that already have a web presence can be enhanced with a phone app. The study will focus on the HeroRAT organization. ([www.apopo.org](http://www.apopo.org)) HeroRAT already has a Facebook, Youtube and Flickr presence. The research will include designing, creating, and publishing an app specific to HeroRAT. The app will include a photo gallery, a minesweeper game, an information page, and a link to the HeroRAT donation website. The question to be answered is 'By utilizing an app, can a not-for-profit organization build a community of online activists and donors? The knowledge gained by the study will assist other not-for-profit organizations with utilizing the mobile aspect of fundraising and embracing complete social media integration. The research goals of the project include conducting a critical literature search into mobile giving effectiveness, application of a virtual fundraising campaign, and evaluation of the cost-effectiveness of online fundraising platforms.

**Honors/Leadership:** Edgerley-Franklin Urban Leadership Scholar; High Plains Engineering Technology Scholarship; SIFE Scholarship; Elite Scholarship; Information Technology Internship GE Aviation Internship; SIFE National Presentation in Minneapolis, Minnesota; SIFE Foster Kids Project; SIFE Bone Marrow Drive; SIFE president; Rake 'N' Run; Bilingual: Spanish/English

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## **Breast Cancer Diagnostics Using Human Blood and Urine Samples**

Pamela Maynez, Stefan Bossmann  
Department of Chemistry  
College of Arts and Sciences

Developing cancer diagnostics for recognizing breast cancer at the localized stage would be very advantageous, because virtually all breast cancer mortality occurs after the cancer has metastasized. In 2012, the National Cancer Institute anticipates more than 200,000 new breast cancer cases and 40,000 deaths. The 5-year relative survival decreases to 23.4 percent at the distant stage, from 83.6 percent at the regional stage and 98 percent at the localized stage.

Numerous proteases (urokinase, matrix metalloproteinases and cathepsins) that can be found in the blood and urine 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 and urine samples that we have received from the South Eastern Nebraska Cancer Center (SENCC). This analysis is performed in these steps:

- 1) Separating blood serum from the red and white blood cells.
- 2) Centrifuging the urine to separate the sediment.
- 3) Fluorescent nanoplatforms that have been developed and validated in the Bossmann group have been used 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). .25% of the samples (36 in total) have come from healthy control subjects. I have statistically analyzed my results and I was able to relate them to the pathological information that is available from SENCC. This test is able to recognize breast cancer patients. Blood samples are more indicative than urine samples.

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

**Data Fusion Algorithm for Mapping Crime**  
Perla Salazar, Marianne Korten, and Charles Moore  
Department of Mathematics  
College of Arts and Sciences

Topanga, also known as Division 21, is a new division of the Los Angeles Police Department (LAPD). One of the major problems the Topanga Division faces is burglary from motor vehicle (BFMV), and one of the ways the LAPD seeks to address the problem is through crime mapping. Crime mapping is part of a broader initiative to utilize data to inform and direct police work, commonly known as Smart Policing Initiative (SPI). This project is a particular application of the SPI philosophy to managing BFMV crime in the LAPD Division of Topanga. The goal of the project is to improve hot-spot mapping through data fusion algorithms to produce relative probability density estimates of crimes occurring in a given region. We develop and improve upon algorithms that make use of Maximum Penalized Likelihood Estimation and Kernel Density Estimation to produce hot-spot maps as well as utilize our own weighting algorithms to analyze the data. Upon further analysis and experimentation we expect our algorithms will be able to create improved predictive hot-spot maps. We expect our algorithm will allow us to place invalid regions, areas where crime cannot occur, in the maps. An increased understanding of the distribution of these crimes in the Topanga area may serve the LAPD in reducing the occurrence of BFMVs and focusing valuable resources on problem areas.

**Honors/Leadership:** NIH Bridges to the Future; Waldemar J. Trjitzinsky Memorial Scholarship; I-Center Undergraduate Mathematics Scholarship; UCLA Internship: Research in Industrial Projects for Students (RIPS); Developing Scholars Lecture Series; McNair Scholar; Nebraska Conference for Undergraduate Women in Mathematics; Society for Advancement of Chicanos and Native Americans in Science (SACNAS), MKN McNair Heartland Research Conference; The National Alliance for Doctoral Studies in the Mathematical Sciences; K-State Undergraduate Research Forum; Rake ‘N’ Run; Bilingual: Spanish/English

**Parenting a Child with Down Syndrome: Medical Issues and Associated Complication**

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College of Human Ecology

Department of Applied and Professional Studies

<sup>2</sup>College of Human Sciences, Texas Tech University

A review of the literature detailing positive experiences of parenting a child with Down syndrome has revealed current literature to be limited. The current research will evaluate the responses of more than 500 parents, who have completed an online survey, to understand the positive experiences and outcomes from parenting a child with Down syndrome. The current research study will result in a book chapter that will detail common medical issues which are associated with children who have Down syndrome. The research will provide manageable information to parents, particularly of young children, about these common medical issues. This research began by first evaluating parents’ responses to previously completed online surveys. Then parents’ responses, and additional searches, were used to compile a list of the most common medical issues associated with children who have Down syndrome. Once this was complete, information on these common medical issues was gathered through literature searches. After the literature searches are complete, the information will be used to provide parents with relevant information and resources that can be easily navigated.

**Honors/Leadership:** NIH Bridges to the Future; Developing Scholars T-Shirt Design Contest Winner; Bilingual: Spanish/English



## **The Impact of Venue and Fan Motivations on Sports Fan Behaviors**

Phillip Gomez, Kevin P. Gwinner  
Department of Marketing  
College of Business

In addition to winning and fielding a competitive team, collegiate sports have many fan-related goals. Among them are increasing game attendance, merchandise sales, and driving traffic to athletic department web sites. These marketing-related goals are explored in this study. Specifically, fan motivations were examined for game attendance, venue factors, and identification with the team as factors influencing these fan-related behaviors. Data was collected via a survey from 5,713 fans at Kansas State University and The University of Tennessee. Results will provide insight into the factors having the most influence on these fan related collegiate sport goals.

**Honors/Leadership:** Mortar Board; Delta Alpha Pi Honor Society; Dean's Choice Scholarship; Memorial Scholarship; College of Business Ambassadors; Multicultural Business Student Association (MBSA); Marketing Club; US Youth Soccer Midwest Regional Championships Tournament Referee

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## **In Group Out Group Effects and the Role of Demographic Similarities on the Propensity to Invest In and Report Religious Affiliated Scams**

Reginald Phelps, Joseph C. Ugrin  
Department of Accounting  
College of Business

Religious affiliated scams are the most prevalent type of affinity fraud scheme (SEC 2011). They are typically investment frauds that prey upon members of social groups with church congregations being particularly affected. In an affinity fraud scam, the perpetrator often exploits the trust and friendship that exists in groups of people that share the same characteristics. Over the years, these types of scams have grown rapidly. Religious affiliated affinity frauds have become so pervasive that legislators are starting to take notice and draft special legislation to fight them. For example, in the state of Utah, where residents have been particularly affected by affinity fraud through church affiliations, legislators have proposed ratcheting up legal sanctions for such offences (Peterson, 2010). However, due to the tight-knit structure among the groups like church congregations, it can be difficult for law enforcement officials to detect that fraud has been committed because victims often do not notify the authorities that a fraud has taken place, allowing the perpetrator to 'get away with it.' Defrauded individuals are also reluctant to pursue their legal rights, and often prefer to try to work things out within the group. Some members, even after being defrauded, remain loyal to the offender (SEC, 2011).

Recidivism is a significant problem as the typical offender is often calculating and thoughtfully conceives his or her crime repeating the fraud over and over. This is at odds with common perceptions that offenders fall into committing fraud due to external pressures such as economic difficulty (Dorminey et al., 2010). Thus, the calculating predator may not stop until caught and punished. Considering that affinity fraud is not likely to be uncovered; it can only be stopped if reported.

By definition, affinity fraud scams are influenced by the relationship between the perpetrator and the victim. This study aims to test that assumption on demographic characteristics that have been consistently linked with whistleblowing including age, gender, race, and economic status. The current study tests if those individual characteristics relate significantly to people's propensity to fall victim to and report church affiliated scams. Social Identity Theory (Tajfel and Turner, 1986) serves as a lens to help readers understand why church parishioners are more susceptible to being defrauded and less likely to report the perpetrators and why. By doing so, the study should be of interest to researchers who study fraud and forensics and to law enforcement officials.

**Honors/Leadership:** Cargill IMPACT Scholar; MAPS: Business Administration Dean's Scholar, Wal-Mart Dependent Scholar, Admiral Frank B. Kelso Scholar, Era P. Jones Lion's Club Scholar

## Effects of Environmental Conditions on Pavlovian Fear Conditioning

Emily Reinhardt, Mary E. Cain, Sofia Sabates

Department of Psychology  
College of Arts and Sciences

Environmental enrichment leads to improved memory and decreased anxiety levels. It is hypothesized that enrichment will alter both the extinction and retrieval of fear due to plasticity in brain regions important for learning altered by enrichment. The present study examined the extinction of Pavlovian conditioned fear in IC (isolated) and EC (enriched) rats. Twenty-eight male Sprague-Dawley rats arrived at 21 days of age and were randomly assigned to either EC or IC conditions. After rearing for 30 days the rats began acquisition in an operant chamber. Rats were trained to press for sucrose on a VI-90 schedule during 60-minute sessions. Conditioning was introduced to all rats in two 2-day cycles. Each session consisted of 4 CS (conditioned stimulus)-US (unconditioned stimulus) pairings, during 90-minute sessions. The CS (60-sec tone, 3000-Hz) was paired with the US (0.5-sec shock, 0.6-mA) and the lever-pressing of the rats during the CS period was used as the measure of fear. Five 2-days cycles of extinction were then presented. Half of the rats in each rearing condition extinguished in Context A (normal operant chambers). The other half extinguished in Context B, which had different floors, walls, and scents. Eight CS-alone presentations were introduced during the 90-minute extinction sessions. After extinction, rats were presented with eight CS-alone presentations in context A to measure the renewal of fear. After a week of rest, all rats were placed in Context A and received eight CS-alone presentations to measure the spontaneous recovery of fear. According to prior experiments, it is hypothesized that the EC rats will show faster extinction rates to a fear conditioned stimulus compared to IC rats. EC rats will also show a greater renewal of fear. Both of these hypotheses can be explained by region specific plasticity of the rat's brain which is affected by enrichment.

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

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## Evaluation of Rectal Temperature to Predict Parturition in Alpacas

Simone Holliday, Maria Ferrer

Department of Clinical Sciences  
College of Veterinary Medicine

An alpaca's gestation length can range from 330 to 380 days, generally resulting in a single cria, a baby alpaca. The difference in days is very critical. Not knowing when an alpaca will birth can be tense. If the owner wishes to attend birth, he may have to take multiple days off work. Knowing when an alpaca will give birth and being able to attend birth may be vital for the mother and offspring's life. A manner of prediction of the parturition of some animals is to take the rectal temperature. Maternal body temperature decreases briefly 48 – 72 hours before parturition. We are experimenting to ensure that this fact can apply to alpacas. Seven alpacas were included in the experiment. The alpacas were located at a Kansas State University large animal research facility where other animals surround them. We began to take the alpaca's temperature when she was between 325 – 330 days of gestation. The rectal temperature of the alpaca was taken daily in the morning using a digital thermometer until parturition. The effect of day pre-partum on mean rectal temperature was evaluated using ANOVA for repeated measurements. Mean rectal temperature was not affected by day pre-partum ( $P = 0.1558$ ). Next, we calculated the sensitivity (100 %), specificity (60 %), positive predictive value (33.3 %) and negative predictive value (100 %) of parturition occurring or not occurring on the day rectal temperature reached  $< 100$  °F. Therefore, parturition was unlikely to occur on that day if the temperature of the alpaca was  $\geq 100$  °F. It was concluded that rectal temperature is a good gauge of parturition not occurring on a given day if it exceeds 100 °F.

**Honors/Leadership:** Cargill IMPACT Scholarship; MAPS; Minorities in Agriculture, Natural Resources and Related Sciences; Rake 'N' Run

## **How to Have a Successful Restaurant: A Descriptive Study**

Phillip Hill, Dr. Jeff Hornsby, Jack Vanier Chair of Innovation and Entrepreneurship, Management,  
Entrepreneurship  
Department of Management  
College of Business

In the first year of business about 26% of restaurants fail. This fact may seem daunting but this research has investigated the causes of restaurant failure, how to avoid it, and how to run a successful restaurant. Based on the literature, a survey was conducted to verify the attributes of success and failure discussed in previous literature. The results suggest that restaurant success is heavily influenced by the managers/owners as well as startup capital, menu, etc. Twenty-six restaurants were surveyed and sixteen completed them. The data were analyzed using Excel Pivot Tables and Charts. Results are presented and discussed.

**Honors/Leadership:** Leadership Scholarship; Floor President, Goodnow Hall; Residence Hall Assistant (F12); Rake 'N' Run; Developing Scholars Talent Show

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## **Naïve rat umbilical cord matrix stem cells abrogate mammary tumor growth through markedly enhanced tumor immune responses.**

Jacquez, S., Kawabata, A., Ohta, N., Seiler, G., Pyle, M., Troyer, D. and Tamura, M.  
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College of Veterinary Medicine

Although we have demonstrated that un-engineered naïve human and rat umbilical cord matrix stem cells (UCMSC) attenuate growth of several type of tumors (Ayuzawa et al., *Cancer Lett.*2009; Ganta et al., *Cancer Res*, 2009; Doi et al., *Cytotherapy* 2010), the mechanism by which UCMSC attenuate tumor growth has not been studied rigorously. The objective of this study was to determine possible mechanisms by which UCMSC attenuate tumor growth. Intratumoral injection of rat UCMSC (rUCMSC) markedly attenuated growth of orthotopic Mat B III mammary tumor grafts in female F344 rats. This tumor growth attenuation was accompanied by significant lymphocyte infiltration of tumors. Immunohistochemical analysis revealed that CD3+, but not CD20+, cells were the main component of the infiltrating lymphocytes, suggesting that the majority of infiltrating lymphocytes in the rUCMSC treated tumors were T cells. Analysis of lymphocyte subtypes clarified that rUCMSC treatment increased the infiltration of CD4+ and CD 8+ lymphocytes and NK cells throughout tumor tissue. CD68+ cells were scarcely observed, and only in the tumors of the PBS control group. These results suggest that attenuation of mammary tumor growth by naïve rUCMSC is associated with increased lymphocyte infiltration in the tumor tissues, implying that naïve rUCMSC may control tumor growth by enhancing host tumor immune responses. This demonstrates that naïve UCMSC hold potential as powerful anti-cancer therapeutic cells for breast cancer treatment.

This work was supported by the KSU Terry C. Johnson Center for Basic Cancer Research, KSU College of Veterinary Medicine Dean's Fund, NIH RR017686, RR1556, R21CA135599, and a Kansas Bioscience Authority research grant.

**Honors/Leadership:** Golden Key International Honor Society; 2011 John C. Haymaker Cancer Research Award, 2012 Regina M. Hudiburg Cancer Research Award; Internships: 2012 Seaboard Foods; Professional Publication: "Intratracheal administration of a nanoparticle-based therapy with the angiotensin II type 2 receptor gene attenuates lung cancer growth" in *Cancer Research*; Bilingual: English/Spanish

## Measurement of calcium carbonate pre-partum mammary gland secretions to determine fetal readiness for birth in alpacas

S. Skinner<sup>1</sup>, C. Fulton<sup>1</sup>, S. Holliday<sup>1</sup>, D. Anderson<sup>2</sup>, M. Jones<sup>2</sup>, M.S. Ferrer<sup>2</sup>

<sup>1</sup>Developing Scholars Program

<sup>2</sup>Department of Clinical Sciences  
College of Veterinary Medicine

Normal gestation length in alpacas is highly variable (335 to 365 d) when timed from the day of mating. There are no reliable data to predict the actual date of parturition or fetal readiness for birth in alpacas. It can therefore be difficult to know when an alpaca will need assistance in giving birth, and if the fetus is developed enough to survive once birthed. The hypothesis was that alpacas that deliver compromised crias have a significant lower concentration of calcium in mammary gland secretions on the day prior to parturition compared with alpacas that deliver normal crias. Six pregnant female huacaya alpacas were used in this study. Between 325 and 330 days post mating, the alpaca's udder was observed for signs of secretion, and up to 1 ml of secretions were collected daily until parturition by manual extraction. The secretions were analyzed with a stall-side calcium carbonate kit (FoalWatch K-1700, CHEMetrics, Calverton, VA, USA), using a 1:12 dilution ratio. Plasma IgG concentration was measured in crias to determine the effect of collecting colostrum on passive transfer of immunoglobulins. Calcium carbonate concentration 24 h prepartum was compared between alpacas that delivered mature (n = 3) and compromised crias (n = 3) using a T-test. In alpacas that delivered normal crias, milk calcium concentration ( $316.7 \pm 33.3$  ppm) was higher in the 24 h prior to parturition than in alpacas that delivered crias that died within 72 h ( $89.7 \pm 30.8$  ppm) (Mean  $\pm$  SE) (P = 0.0075). This suggests that it is possible to determine if an alpaca will deliver a healthy cria based on the calcium concentration in the mammary gland secretions prior to parturition. Concentration of calcium carbonate in pre-partum mammary gland secretions seems an accurate indicator of fetal maturation and readiness for birth in alpacas.

**Honors/Leadership:** Edgerly-Franklin Urban Leadership Scholar; Phi Kappa Phi; Cargill Scholar, Fyfe Scholarship; A.W. Michael and William Michael Scholarship; American Society of Animal Science Scholastic Achievement Award; Honors Program; Pre-Vet Club; MANNRS; Boyd Hall Governing Board ; McNair Scholar; Rugby Captain; Bilingual: English/Spanish

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## Sugar Sweetened Beverage Intake of Young Adult College Students

Vanessa Ellis, Tandalayo Kidd  
Department of Human Nutrition  
College of Human Ecology

**Background:** MyPlate, developed by United States Department of Agriculture (USDA), encourages a balanced meal that includes dairy as the beverage of choice; however, in our society this does not appear to be the beverage of choice. Sugar-sweetened beverages are consumed by more than 50% of the American population, and the consumption of sugar-sweetened beverages has been linked to the obesity epidemic in the United States.

**Objective:** To assess young adult college students sweetened beverage consumption in relationship to body mass index (BMI).

**Methodology:** Young adult college students (n=156), 18-24 years, non-health majors, were recruited to participate in a web-based weight management intervention. Selected baseline data is presented. Independent Samples t-Tests determined differences (P<0.05) between gender.

**Results:** No significant difference in BMI for males ( $24.89+3.79$ ) than females ( $23.70+3.75$ ). Males consumed sugar-sweetened soft drinks more often than females (p=.029) and sugar-sweetened energy drinks more often than females (p=.022). No significant difference between gender for sugar-sweetened fruit drinks or specialty coffee drinks.

**Conclusion:** College males may choose sugar-sweetened soft drinks and energy drinks more often than college females, potentially increasing their risk for weight gain related to excess calories consumed from sugar-sweetened beverages.

**Honors/Leadership:** Memorial Scholarship; Pilots Program; Black Student Union; Pre-Nursing Club; Rake 'N' Run; American Legion Pancake Feed; Travel: Canada

## **Cellphone and Social Support among Young Adults**

Issac Falcon Campos, Karen S. Myers-Bowman  
Department of Family Studies and Human Services  
College of Human Ecology

Today in different parts of the world cell phone use among college students is increasing. This is a phenomenon of interest because cell phone use might serve as a tool to increase one's social support. The current mixed method study investigates social support perception in relation with cell phone use. Ten Kansas State University students participated in a focus group. They were asked four open-ended questions about the ways they use their cell phone, how often they use their cell phone, and what they believe the benefits are of having one. Also the group discussed social support as it relates to mobile phone use. The results show that an individual's social support perception is related to their cell phone use, and that cell phones are more than a tool to communicate; they also serve as tools to give and receive social support.

**Honors/Leadership:** Acceptance to the Family Studies and Human Services graduate programs at Kansas State University and the University of Kansas; NIH Bridges for the Future; Golden Key International Honor Society; Phi Theta Kappa; The Greater Kansas City Hispanic Scholarship; McNair Scholar; Community Service: Through Our Children's Eyes: Healthy Task Force; Bilingual: Spanish/English

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## **Klotho and Central Regulation of Sympathetic Nerve Discharge**

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The sympathetic nervous system is critically involved in the maintenance of physiological homeostasis under basal conditions and in response to acute and chronic stressors. Sympathetic nerves innervating the heart, blood vessels and visceral organs are constantly active and the background level of sympathetic nerve discharge (SND). Sympathetic dysfunction has been observed in numerous pathophysiological states including hypertension, heart failure, sudden cardiac death, ventricular arrhythmias, diabetes and obesity. In addition, many of these changes occur with age, including alterations in resting levels of muscle and skin SND, autonomic support of arterial blood pressure and SND responses to acute stress. The study of SND is necessary for understanding relationships between chronic disease development and age-associated changes in sympathetic nerve function.

Klotho is a recently identified anti-aging gene. Genetic mutation of Klotho is associated with premature aging, presentation of numerous aging phenotypes (e.g., arteriosclerosis, ataxia, hypoglycemia, hypoactivity), and a shortened lifespan. Klotho protein is expressed in renal tubule epithelial cells and in the choroid plexus in the brain. There is also possible evidence that Klotho may function as a circulating hormone, making it a multi-functional protein. Recent studies have investigated the role of Klotho in cardiovascular regulation, suggesting that this protein may play an important part in the aspects of integrative physiology, but ultimately the question of Klotho possibly having a role in regulating centrally-generated sympathetic nerve outflow would need to be answered in order to fully understand how central SND changes occur during normal aging.

The objective of this study is to determine the role of Klotho in the regulation of SND during exposure to acute environmental stress. The proposed studies will aim to provide a novel perspective on central mechanisms controlling sympathetic regulation. The working hypothesis is that silencing of brain Klotho will significantly potentiate SND responses to cold and heat stress, thereby establishing for the first time a regulatory link between central neural Klotho and sympathetic nervous system regulation. Electrophysiological, microinjection, protein chemistry and molecular biological techniques will be used.

**Honors/Leadership:** HGB Floor President; Alternative Breaks Winter 2011; BEBE Language Academy; Rake 'N' Run; Mittens for Many; Flint Hills Breadbasket; Bilingual: Spanish/English; Travel: Puerto Rico, Dominican Republic

## **Production of Microfluidic Devices**

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Department of Chemistry  
College of Arts and Sciences

Microfluidic devices have begun to change the way cell biochemistry is studied. These devices 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. Here at Kansas State University, I, along with Dr. Christopher Culbertson and graduate student Gage Brummer, 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; Silver Medallion Scholarship, National Society of Collegiate Scholars; Rake 'N' Run; Mittens for Many

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## **Case Studies of Humanitarian Logistics: Identifying Industrial Engineering Opportunities**

Valerie Rito, Jessica Lee Heier Stamm  
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College of Engineering

The purpose of our project is to advance knowledge of the challenges and successes of humanitarian organizations and to identify industrial engineering tools to support humanitarian response systems. The research methodology we chose is the case study. From among organizations in the Midwest, we selected two based on their interesting logistics operations. The first is Convoy of Hope, a faith-based organization helping people throughout the world through international children's feeding initiatives, community outreaches, disaster response and partner resourcing. Convoy of Hope is unique because they operate their own tractor-trailer fleet. Convoy of Hope has successfully completed many routine and disaster response missions, yet they face many challenges. Currently Convoy of Hope tracks their drivers' routes and their mileage using paper. We find that it is a particular challenge for their logistics personnel to manage the routing and scheduling of deliveries to their partners for feeding initiatives. As a result, there is an opportunity to improve logistics by applying tools from operations research and industrial engineering to design routes that are fuel-efficient, account for food safety requirements, and that meet the needs of feeding partners.

The second organization we studied, Numana, is a humanitarian organization whose mission is to empower people to save the starving by raising awareness, providing actionable solutions and encouraging advocacy. One of the organization's main activities is the assembly, storage, and distribution of pre-packaged meals. This offers the opportunity to study handling, storage, and transportation processes for raw and finished products. Our study of Numana is ongoing. We anticipate that our research will lead to insight into the challenges that Numana faces, opportunities for improvement, and similarities and differences between our two case studies. The anticipated contribution of our research is the discovery of opportunities for future partnership between industrial engineers and humanitarian organizations to improve logistics.

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

## Defining species boundaries in grassland soil nematodes

Abraham Denner<sup>1</sup>, Brian Darby<sup>2</sup>, and Michael Herman<sup>1</sup>

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Division of Biology

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We have cultured several isolates of nematodes from Konza prairie soils and have employed a PCR assay to determine whether they represent new or previously known species. Our results suggest that around 96% of the isolates are of known species, but the remaining 4% are either undescribed or not previously known to be on Konza. For two of these species in the genus *Mesorhabditis* (called MR1 and MR2) the definition of a species is unclear because we observed male-to-female ratios that suggested MR1 and MR2 are pseudogamic; meaning that females require mating with males to initiate embryogenesis, but sperm disintegrate in the cytoplasm and the embryo develops parthenogenetically without any male genetic contribution. Others have also reported pseudogametic *Mesorhabditis* species. Our current project seeks to understand species boundaries by testing whether these represent separate species and whether they are indeed pseudogamous. Mating compatibility between MR1 and MR2 was tested by cross mating experiments. We did not observe any progeny from any of the females indicating that they are separate species. We have implemented nuclear staining techniques within the developing zygotes of both MR1 and MR2 to determine whether they are pseudogamous. Finding one pronucleus in the oocyte of a mated female would indicate that the sperm of the male does not contribute any genetic matter and that the species is pseudogamous. We are currently analyzing the life cycle and life history characteristics of MR1 and MR2 to determine the optimal time to stain the embryos and to better understand the basic biology of these species. This work helps us better understand this unusual mode of reproduction, how widespread this phenomenon is and what the ecological and evolutionary implications of pseudogamy are for soil nematodes.

**Honors/Leadership:** Institute of Ecological Genomics Undergraduate Research and Mentoring Scholarship; Baeten Farm Scholarship; Fairchild Scholarship; Ecological Genomics Symposium 2011; DSP and Fraternity service projects, Haiti relief

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## Personality and Perceptions of Racial Discrimination Perpetrators within the Context of Political Messages

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College of Arts and Sciences

Racial discrimination in the political arena is common, with minority fear-based political rhetoric being an effective way to influence voting patterns (van Dijk, 2000). However, understanding personality dispositions that makes one more likely to accept the racist attitudes of political candidates in the media have not been extensively identified. It is currently known that perpetrators of racial discrimination are associated with lower levels of agreeableness (Akrami & Ekehammar, 2006), higher levels of social dominance orientation (Sidanius & Pratto, 1999), and lower levels of empathy (Sue, 2010). However, little else has been done to examine the relationship between levels of prejudice and other personality variables. As such, the present study will examine racial discrimination perpetrators' levels of gratitude, ability to forgive, along with exploring the relationship with resiliency and past trauma. Ease of forgiveness and gratitude have been shown to be associated with higher levels of empathy (Macaskill, Maltby, Day, 2002; McCullough, Emmons, and Tsang, 2002). Therefore, it is hypothesized that individuals scoring higher on the racism scales will be less empathic, grateful, and forgiving. Additionally, this study will explore the perceptions of the personality of political candidates and the effect their racially charged rhetoric has on voting patterns.

**Honors/Leadership:** NIH Bridges to the Future; Memorial Scholarship; Golden Key International Honor Society; Psi Chi; Phi Theta Kappa; International Service Teams, Brazil; Psychology Department Undergraduate Research Convocation; Society for Personality and Social Psychology Poster; James R. Coffman Award of Excellence; Bilingual: Spanish/ English

**Wine Marketing Preferences of College Students**  
Laura Gonzales, Elizabeth B. Barrett  
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College of Human Ecology

The purpose of this research was to investigate the wine consumption habits of college students attending Kansas State University. A survey was developed in order to obtain my results. The survey asked general questions such as; wine preferences, persons who influenced the respondent to drink wine, and where they obtain information about wine. Another purpose of this study was to determine ways to advertise wine to college students. Results found the average age of the students surveyed to be 21. The majority of the participants preferred sweet wines, would pay \$11 to \$15 for a bottle of wine, and they choose a bottle of wine based on the front label. Most participants began drinking wine at home with their parents or siblings and first drank white sweet wines. Those surveyed mostly obtained knowledge about wine from the internet, liquor stores, and classes they have taken. Wine companies could lower the price of their wine and design creative front labels to attract college students. Companies could also advertise their wine to students by having their ads displayed on the internet with informative wine websites. Advertisements could also be more appealing to a college aged audience.

**Honors/Leadership:** National Society of Collegiate Scholars; Proud to be a Wildcat Scholarship; Alumni Association Scholarship; Hispanic Scholarship Fund Scholarship; Living the Dream Inc.; Martin Luther King Memorial Scholarship; LULAC; Business and Hospitality Career Fair Committee and Student Representative for the College of Human Ecology

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**Genetic Analysis of Bacterial Sucrose Transport and Utilization in the Rice Disease**

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College of Agriculture

Sucrose is often hypothesized to be an important nutrient for plant-associated bacteria, including in plant pathogens. However, the requirement for sucrose in the ability of *X. oryzae* pv. *oryzae* (Xoo), the causal agent of bacteria blight of rice is unknown. Recent reports indicate that Xoo induces the host plant cells to express a sucrose transporter. We hypothesize that expression of the transporter in host cells leads to the leakage of sucrose into the extra-cellular spaces and xylem and stimulation of growth of the bacteria. 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 lessened. We focused on four Xoo genes that are involved with sucrose transportation and utilization based on sequence similarity to known bacterial uptake genes. A site-specific 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 *Escherichia coli* (*E. coli*) but cannot replicate in Xoo. The vector contains a gene for resistance to the antibiotic kanamycin (Knr), which allows for recombination of the plasmid into the targeted gene upon transient introduction of the plasmid into Xoo, thus creating mutant copies of the target genes. We used PCR for verification that the proper recombination events were present in the antibiotic resistant isolates Xoo.

The effect of the mutations in sucrose transporter and utilization on the ability of Xoo to incite disease in rice will be 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; Golden Key International Honor Society; Rake 'N' Run; Mittens for Many; Travel: Mexico; Bilingual: Spanish/English



## **Evaluation of Muscle Recruitment During Simulated Planetary Extravehicular Activities**

LF Chavez, CJ Ade, S Wilcox, RM Broxterman, TJ Barstow

Department of Kinesiology  
College of Arts and Sciences

Planetary extravehicular activities (EVAs) are the tasks expected from astronauts in outer space. Each EVA can last from several minutes to several hours and can also entail intense physical activity. Since few humans have been to outer space, the data on the physical demands on astronauts is limited. Developing new training techniques as well as countermeasures for the physical requirements in the field is one of the main research foci for NASA. Electromyography (EMG) is a widely used diagnostic procedure in which electrodes are attached to a muscle or muscle group of interest with the purpose of assessing the muscle's and motor neuron's health and recruitment. This type of information can lead to new training programs that maximize performance specific for physical tasks in outer space. Purpose: To identify, during a simulated planetary EVA, which muscle or muscles would demonstrate the most valid and reproducible data for future experimental models involving dynamic exercise. Methods: Men and women completed the planetary navigation field test (PNFT) at 3 different paces, ranging from very slow (walk) to fast (sprint). The field test included 6 stations, including a flight of stairs, rock-climbing, stationary object lifting, and agility tasks. EMG electrodes were attached to the vastus lateralis, rectus femoris, vastus medialis, gluteus medius and maximus, biceps femoris and gastrocnemius. Results: Raw EMG signals were rectified and the root mean square (RMS) was calculated using the manufacturer software package (EMG work, Delsys Inc). Ongoing data collection will effectively show what muscles and muscle groups will provide the most distinguishable and clear data for further EMG testing.

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

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## **Assessment of Fetal Readiness for Birth in Alpacas Based on Blood Progesterone Concentration**

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Department of Clinical Sciences  
College of Veterinary Medicine

Many species of domestic and farm animals have many known indicators of proximity of parturition. However, this is not the case for alpacas. There have been various papers written on the subject of levels of progesterone in alpacas prior to parturition, but there are no solid values available for alpaca owners to use as a guide in estimating time of parturition. We are studying the levels of progesterone in the blood in pregnant female alpacas. The hypothesis was that progesterone concentration decreases within 48 h pre-partum. Blood was collected daily starting at 325 to 330 d of gestation until parturition from four alpacas. We collected whole blood, between the hours of 8 and 10 am from the jugular vein of the alpacas. We centrifuged the samples to obtain at least 1 cc of plasma. The plasma samples were frozen until the end of the collection time. Once parturition occurred, plasma samples were thawed and analyzed with the Target Equine Progesterone Kit (BioMetallics, Princeton, NJ, USA). The kit gave us a range of progesterone levels from the lowest, C1, to the highest, C4. Using a Chi Square Test, it was determined that the frequency distribution of progesterone scores was not affected by day pre-partum ( $P=0.7986$ ). The sensitivity of alpacas giving birth within 24 h of obtaining a value of C1 was 50%, specificity was 83.88%, positive predictive value was 0%, and negative predictive value was 76.92%. Based on the preliminary data, the progesterone test seemed to be a better indicator of parturition not happening within 24 h if a value higher than C1 is obtained than of parturition happening with a value of C1.

**Honors/Leadership:** Animal Shelter volunteer, Recycling Community Service; Social Chair in Students for Environmental Action

## The Future of Algae

William L. Duren, David Steward  
Department of Civil Engineering  
College of Engineering

A competition for food versus fuel is arising due to the emergence of biofuels being made from food crops. A possible alternative to using food crops is the use of algae because it can thrive in many different regions and climates, and algae has an ability to produce high volumes of oil per acre per year. My research identified many different methods of growing algae and different constraints that apply to its growth. Data was then retrieved from several different sources related to climate, population density, water availability and land usage. Research is progressing and the next step will be to apply the constraints to the data using ArcGIS. We expect the data analysis to identify that the most likely area will be the Midwest plains region, because of the constraints on algae production from sustainable water availability. These results are important because they may help identify future scenarios for crop and energy production.

**Honors/Leadership:** Academic Honors; GE Aviation Co-Op / Morrow Engineering; Cargill IMPACT Scholarship; MAPS; Memorial Scholarship; Foundation Scholarship; Rake 'N' Run; Powercat Motorsport

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## What Makes a Successful Logo?

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College of Business Administration

What elements are necessary to make the “face” of a product? That is the main question I am tackling in this research project. People see thousands of advertisements with brand marks every day yet only recognize or remember very few of them. Those few brand marks have managed to glue themselves into the memories of those people because they possessed the qualities that would make them recognizable. I chose this topic to learn what makes a logo memorable, because they are a key variable in helping to determine the future success of a company or business.

Successful logos and brand marks such as Pepsi and Nike possess the elements needed to help make a business recognizable, which in return brings more customers. I studied a variety of brand marks and correlated them to marketing strategies and consumer behavior. Specifically, the study will investigate how users elicit a response to color and shape, and how some brand marks project a response to different age groups. This research will also include a small survey, based on a convenience sample of K-State students and faculty/staff. The expected outcome of the research will determine the degree to which age affects the degree of “connection” made by the individual to the logo. User-friendliness, color, a sense of simplicity and a theme are relevant in the creation of logos. One must know how to create an image that not only reflects the objective of the company, but is approachable by their target age group, as well as containing simple features that would make it easier to recognize to the public, regardless if it has words incorporated into it or not. Color projects emotion; if a brand mark has generally dark and dull colors, then it would make the company appear to be darker and more adult-oriented, compared to bright colors, which can be approached by younger age groups as well. Essentially, the main goal of a logo is to grab the attention of a company’s consumers and create a connection that will draw them to their product. Brand marks and logos, in short, are the faces of a company. Without a well-crafted image that reflects all the positive goals and successes of that company, it in return will be unable to achieve maximum sales of its products.

**Honors/Leadership:** Kansas State Silver Medallion Scholarship; Kansas State Memorial Scholarship; KSU College of Engineering Scholarship; Irish Foundation Scholarships; Cargill Scholarship; MAPS Summer '10; Cargill/ Conoco Phillips Scholar; Bilingual: English/German

## The Correlation between God and Mental Health

Joshua Springfield, Farrell Webb

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College of Human Ecology

The relationship between belief in God and mental health has received inconsistent attention in the well-being and quality of life literature (Andrew & Withey, 1976; Campbell, Converse & Rodgers, 1976; Hayward & Heron, 1999; Laditka, Corwin, Laditka, et al., 2009). It is commonly believed that as one grows older there is a decline in mental health, and that this is necessarily accompanied by less well-being (Rowe & Kahn, 1997; Rowe & Kahn 1998; Scheier, Carver & Bridges, 1994). Recent studies (Chong, Ng, Woo & Kwan, 2006; Hsu, 2007, Phelan, LaCroix, & Larson, 2004, Laditka, Corwin, Laditka, et al, 2009) questioned the conventional wisdom about aging, particularly with regard to belief in God and spirituality. The current investigation examines the relationship between mental health, self-esteem, and belief in God among older Americans. We use the theory of gerotranscendence (Tornstam, 1994) which is a psychosocial theory of aging that argues that human development is a life-long process that continues into old age and that, when optimized, ends in a new perspective. Data were extracted from the Religion, Aging and Health Survey, Wave I and II (Krause, 2006) a national probability sample of older Americans aged 65 and older non-institutionalized, English-speaking persons. A recursive structural equation model was developed that had three latent constructs: Mental Health at Time 1; Self Esteem; and the outcome measure Mental Health at Time 2. The final model revealed that approximately 49.2% ( $R^2 = .492$ ) of the variance in mental health could be explained by the model. The relationship between Mental Health at Time 1 and Mental Health at Time 2 was strong and positive [ $\beta = .743$  ( $p < .001$ )]. The model had acceptable scores [ $.2 = 95.868$  ( $df 14$ ,  $p < .000$ ) CFI = .886; RMSEA = 0.62]. In general, the findings of this study support the theory of gerotranscendence.

**Honors/Leadership:** NIH Bridges to the Future; Rake 'N' Run; Volunteer at Humane Society; Bilingual: English, Spanish; Microbiology Club

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### Architectural Practice: *defining success in a service-oriented profession*

Alex Martinez, Wendy Ornelas

College of Architecture, Planning and Design

Success is defined as, (sek ses'), n, 1. the favorable or prosperous termination of attempts or endeavors. 2. the attainment of wealth position, honors, or the like. 3. a successful performance or achievements. (1). Research for this project will be done to assess the qualities and characteristics of what it means to be successful in a creative and service-oriented profession. Points of research are: known outside of the profession, entrepreneurial skills, creative outlook, ethical design, financial income and personal life.

Great leaders begin to foster success through passion, not money, not fame, but love of the profession. They focus on providing projects that fulfill the needs of a client, keep the firm profitable, and create business opportunities for the next generation. A heavy work load is expected, but when does a leader say enough is enough? A balancing act is demanded of one who is successful. These leaders continue to thrive in the professional world while having a personal life that is fulfilling in their eyes.

Passion is defined as (pash'en) n, 1. any powerful or compelling emotion or feeling. (2). The spirit of an architect runs deep. An undaunting strength is required to become successful and remain such. How does one define their success? When can they claim success? Alain de Bottom says in a TEDTalk, "Don't give up on your ideas of success, but make sure they're your own." (3) is a key component of success. This research will look at characteristics of successful architects and how they define success.

1. The Random House Dictionary of the English Language, Second Edition Unabridged, 1987.
2. *ibid.*
3. TED Talks, A kinder, gentler philosophy of success, Alain de Bottom, July 2009.

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

## **New Lighting Prototypes Integrating Emerging Technologies for Low Environmental Impact and User Adaptability**

Xavier Gavin, Michael Gibson

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College of Architecture, Planning, and Design

Today, a number of new technologies are poised to reshape the way in which artificial lighting is used by people and integrated into environments. Many of these technologies have become affordable and somewhat ubiquitous, such as light-emitting diodes (LEDs), electroluminescent materials (known by the trade name ‘Indiglo’), and phosphorescent materials (materials that glow using stored light energy without electricity). Yet in the case of LED technology, high-tech lighting frequently adopts the form and function of past models for artificial lighting, integrated into familiar paradigms of lamps and fixtures. The disadvantages of these existing and past lighting paradigms is that they concentrate a large amount of power in a single source, consuming a large amount of energy while also creating the ergonomic challenges of light distribution and glare prevention. Including candles, oils, gas, and electric filament lamps, these past lighting models also used controlled burning or high temperature to produce light and posed many integration issues as a result. Moreover, the Energy Information Administration measures lighting to consume about 11 percent of the electricity used in homes and 38 percent of the electricity used in businesses.

The project hypothesizes that a new paradigm of lighting, departing from the concentrated, fixed lighting methods of the current and past paradigms, can leverage LED technologies to be more efficient and more adaptable to human needs, and in doing so can greatly lower the environmental impact of lighting.

LED lighting technology differs from traditional lighting technologies because it is much smaller, operates at near room temperature, and produces light more efficiently than incandescent or even fluorescent light sources. The project underway observes that these important improvements in lighting have not changed the way lighting is integrated into our environments. Rather than appropriate LED lighting technology into existing lighting paradigms, the project hypothesizes that this technology can become the basis for radically different models for integrating lighting in our environments. Doing so is not only a better use for emerging LED technology, but also a way to reduce our impact on the larger environment by lowering energy consumption and reducing the amount of waste associated with the operation, consumption, and replacement of lighting.

The project examines not only cutting-edge lighting technology, but also new materials and fabrication processes in its proposal for a new approach to lighting. This new approach includes the use of photovoltaic technology to harvest electricity for the luminaire, as well as a kit-of-parts method of construction that allows the luminaire to be fully customizable and reconfigurable for the user. Not unlike Japanese paper lanterns, the luminaire is light weight and moves easily with the user, replacing in effect the fixed and inflexible lighting that is normally found in our modern environments. During the fall and spring, two prototypes were built using off-the-shelf electronics and simple materials to test the character and viability of this new lighting approach. Although very few commercial luminaires are available that are similarly designed, the project’s prototypes support the conclusion that light weight, self-powered, and adaptable luminaires are realistic, practical, and sustainable solutions for the environments of the future.

**Honors/Leadership:** Accepted into Interior Architecture Product Design; Kansas Honor Society; Phi Eta Sigma; West Hall Star Student; Placed Second at the Japanese Competition, Chicago; Developing Scholars Talent Show Visual Arts Winner

