Developing Scholars Program

"Through innovative and thought-provoking research, a Developing Scholar raises the bar for intellectual discovery and discussion and helps promote educational opportunities for all. "

-Clemente Jaquez-Herrera
DSP Alum
Designer, RTKL Associates

9th Annual Research Poster Symposium

K-State Union Ballroom
Sunday, April 19th, 2009
2:00 pm - 4:00 pm

TABLE OF CONTENTS

Rosemary Almeida....1
Kristina Bigelow....1
Karmen Harris....2
Stefani McCluney....2
David Willis....2
Nidia Ortega....3
Elizabeth Trevino....3
Ariel Anib....3
Jasmine Sharp....4
Derrik Wiggins....4
Emma Del Real....4
L. Jeanette Aldana....5
Eduardo Alvardo....5
Jenny Menjivar....5
Kathy Nguyen....6
Alejandro Estrada....6
Sheila Ellis....6
Anthony Garcia....7
Barbara Braga....7
Morgan Franklin....7
Ryan Brooks....8
Kristel Williams....8
Michael Hodge....8
Ashley Wood....9
Sandra Salas....9
Matthew James....9
Rita Perez....10
Edmond Rivera....10
Rose Djiofack....10
Edgar Martinez....11
Rymonda Davis....11
Francisco Velazquez....11
Matthew Ho....12
Catrina Elmore....12
Mychal Davis....13
Jeremy Williams....13
Jorge Mendoza....13
Leonel Hernandez....14
Katelyn Kowal....14
Jessica Rodriguez....14
Miguel Aldrete....15
Evgeniy Shishkin....15
Eli Anderson....15
Jaime Tobon....16
Jesus Garcia....16
Jocelyn Anderson....17
Paul Migwi....17
Victor Salazar....17
Robert Moreno....18
Jose Valles....18
Christopher Sanders....18
Tamica Lige....19
Miriam Martinez-Osorio....19
Dina Sanchez....19
Liliana Garcia....20
Curtis McClain III....20
Vanessa Reyes....20

Note:
We wish to acknowledge the efforts of the many unnamed research team members who also contribute to the knowledge and mentoring of our undergraduate scholars.

Rosemary Almeida
Senior, Kinesiology

Thomas Barstow
Professor, Kinesiology

Influence of Pedal Rate and Conditioning on Muscle Deoxy-Hemoglobin+Myoglobin Responses during Incremental Exercise

Research conducted by Boone and colleagues compared deoxygenated hemoglobin+myoglobin (Deoxy-Hb) levels in trained cyclists and physically active individuals during a ramp exercise test. The results indicated that the trained cyclists had a slower rate of generating Deoxy-Hb. This rightward shift in the sigmoid pattern indicates that cyclists are able to maintain better matching of oxygen delivery as blood flow (QO2) to muscle metabolic rate (VO2) in order to avoid the increase of Deoxy-Hb compared to the physically active individuals. This could be because cyclists have an increase oxidative capacity or because they have more slow-twitch fibers than the other individuals. In another study conducted by Ferreira and colleagues, they also analyzed Deoxy-Hb levels in healthy individuals; however, they also looked at the individual's ability to integrate blood flow and oxygen uptake at different pedal frequencies. An increase in muscle contraction frequency could possibly cause a limitation in blood flow and therefore a greater or faster Deoxy-Hb response. The results from this study indicated that there is a higher VO2 in subjects when they were asked to pedal at 100 rpm compared to a slow pedal frequency of 60 rpm. Due to this previous research, questions arise whether fitter individuals are more efficient or if it is the muscle fiber type that the individual has that makes the difference. Therefore, the purpose of this study is to determine the change of efficiency in individuals with different fiber types when there is a change in pedal frequency. The subjects in this study will be asked to complete two VO2 maximal exercise tests at two different pedal frequencies (60 and 100 rpm) while having their Deoxy-Hb measured with near infrared spectroscopy (NIRS). It is hypothesized that individuals with more slow-twitch fibers will be more efficient and therefore will also have a slower rate of increase in Deoxy-Hb.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; Rake N' Run; HALO

Kristina Bigelow
Freshman, Biology/Pre-Medicine

Annelise Nguyen
Assistant Professor, Diagnostic Medicine Pathobiology

Regulation of Gap Junctions in Colon Cancer Cells

My research deals specifically with cell-cell communication in colon cancer cells. Previously the effect of primaquine compounds (PQs) has been found to cause an increase of gap junction activity in breast cancer cells. We also have shown that colon cancer cells have a defect in gap junctional intercellular communication. In other words, the level of gap junction activity in colon cancer cells is lower than normal. My study focuses on the restoration of gap junction activity in colon cancer cells. The methodology to address my study is the transepithelial electrical resistance (TEER) assay and scrape load/dye transfer (SL/DT) assay using colon cancer cells. TEER is commonly used to measure the tight junctions of cells and SL/DT is a well-established method to measure gap junction activity. PQs were dissolved in DMSO solvent and thus DMSO was used as the control in all experiments. Cells were grown in 12-clear transwell plates with appropriate media. The results of PQ-treated colon cells show no significant change in resistance compared to control without treatment. This suggests that PQ has no effect on tight junction activity of colon cancer cells. Subsequent to this study, we examined the effect of PQ on gap junction activity and the results are inconclusive at this time. In addition to these measurements, we are currently establishing an overexpression of gap junction protein in colon cancer cells. Previous studies have shown that the level of gap junction protein, connexin 43, is low in SW620 and SW480 human colon cancer cells. Thus, connexin 43 will be reintroduced to SW620 and SW480 cells by transfection. To ensure the re-expression of Cx43, western blot analysis will be performed. The functionality of gap junction activity by re-expression of Cx43 will be performed by using SL/DT assay. The result of Cx43 transfection will cause an increase in expression of Cx43 and lead to a restoration of gap junction activity. The endpoint of this study will provide the important role of gap junction in cancer formation in which restoration of gap junction activity can be targeted for drug development.

Honors/Activities: Target on Excellence presenter; Hill's Pet Nutrition Scholar; Travel: Mexico; Rake N' Run; Fair Trade Marketplace

Karmen Harris
Freshman, Industrial Engineering

Christine M. Aikens
Assistant Professor, Chemistry

Metal Organic Frameworks for Use in Separations

Metal Organic Frameworks (MOF's) have been tested to understand their partial charges and their electrostatic interaction to apply them to separating gases such as CO2 and methane. MOF-177 and PCN-13 were used in the research findings and were split up and tested separately. Density functional theory was used to determine the partial charges of the MOF structure. Several basis sets and several functionals were tested along with different partial charge calculation methods. MacMolPlot was used to view the structures to be tested, and GAMESS (The General Atomic and Molecular Electronic Structure System) was employed to run all calculations. The partial charge calculations using the Mulliken and Lowdin methods proved to be very inconsistent and therefore will not be used in further studies. Electrostatic potential calculations were highly consistent and will be useful in further testing.

Honors/Activities: Academic Honors (1); Multicultural Engineering Program; Student Opportunities and Awards Committee; Women in Engineering and Science Program; Women Mentoring Women; Kansas State University Marching Band

Stefani McCluney
Junior, Psychology

Briana Goff
Associate Professor, Family Studies & Human Services

Operation F.A.S.T. (Family Adaptation and Sustainability Training)

Operation: Family Adaptation and Sustainability Training (Operation: FAST) is a program designed to assist military families during times of high stress that is unique to their situation. During deployments, military families must also cope with issues confronting all families (e.g., child care, home maintenance, role conflicts, health problems, job stress, and adolescent risk-taking). Consequently, most military families struggle with layers of stress.

The goal of Operation: FAST is to establish and sustain a dynamic system of resilience development with KS National Guard (KNG) families. Through a facilitated process KS National Guard families will learn from each other the knowledge, attitudes and practices necessary to sustain their well-being and be more resilient in meeting the demands of military deployment.

In this project, current research and literature were reviewed and compiled into a program manual. The focus areas specifically targeted current knowledge related to the following key topics with "family resilience" as the key focus in the review: Family Financial Resilience, Coping with Grief and Loss, Healthy/Functional Partner Relationships, Effective Conflict Resolution, Improving Family Communication, Positive Child and Youth Development, Trauma Adjustment, Compassion Fatigue, and Resources.

Honors/Activities: Bridges to the Future; Multicultural Student Recruitment; Rake N' Run; Mittens for Many; Food for the Community

David Willis
Senior, Industrial Engineering

Todd Easton
Associate Professor, Industrial Engineering

Modeling the Movements of an Infection through a Rural Environment

The objective of this multi-year project is to develop a computer simulation that models the spread of infectious diseases in rural Kansas, enabling a user to analyze and optimize mitigation policies. To date, the spread of epidemics in rural areas has not been researched due to an assumption that a small number of widely dispersed people are unlikely to initiate a global epidemic. This assumption is flawed because rural people travel extensively, which implies that an epidemic may spread across vast distances in a small amount of time. Thus, a small outbreak in a rural area has a high probability of developing into a worldwide pandemic (see 1918 Spanish Flu that started near KSU). This year the research developed computer simulation software with graphical interface that shows how a disease would spread through Clay Center, Kansas. Future research intends to focus on how a specific disease spreads through a large rural area. Once this project is completed, governmental agencies will have the ability to use this tool to test mitigation procedures, which will determine effective methods to plan, manage and control the spread of an epidemic.

Honors/Activities: Outstanding Freshman & Sophomore Award for Industrial Engineering; Internships: Honeywell Federal Manufacturing & Technologies, Institute of Industrial Engineering

Nidia Ortega
Junior, Life Sciences/Pre-Medicine

Rollie Clem
Associate Professor, Biology

Role of IAP2 as Related to Immunity in Aedes Aegypti

Apoptosis is a type of programmed cell death in which a series of events leads to the destruction of a defective cell. In Drosophila melanogaster, the protein Inhibitor of Apoptosis 2 (IAP2) plays a role in innate immunity by interfering with the apoptosis cascade. To determine whether IAP2 also functions in immunity in the yellow fever mosquito Aedes aegypti, the expression of IAP2 will be alternately silenced and induced in Aedes aegypti cells and in adult mosquitoes. In addition, recombinant IAP2 protein will be expressed and purified in order to test its interaction with other proteins in the apoptosis pathway.

Honors/Activities: Bridges to the Future; Phi Kappa Phi Honor Society; Golden Key Honor Society; Multicultural Student Honor Society; Bilingual: English/Spanish; Red Cross Club; Licensed Practical Nurse

Elizabeth Trevino
Sophomore, Microbiology/Pre-Optometry

Mark Louis Weiss
Professor, Anatomy & Physiology

Colony-Forming Unit-fibroblast (CFU-F) Assay for Determining Stem Cells in Wharton's Jelly-derived Cell Cultures

Colony-forming unit-fibroblasts (CFU-F) assay is thought to indicate the number of mesenchymal stem cells in a bone marrow aspirate (the non-hematopoietic cells in a bone marrow aspirate). Since the number of CFU-F in a bone marrow aspirate decreases with age and the decrease in CFU-F correlates with poorer clinical response to MSC treatment, we sought to compare CFU-F in MSCs derived from different sources and from different treatments. First, we will evaluate MSC in the Wharton's jelly in the umbilical cord and compare it to bone marrow MSCs collected from animals of different ages. Previous work has shown that the Wharton's jelly MSCs contain a larger number of CFU-Fs, compared to bone marrow MSCs, and that CFU-F decreases with age. Next, we will evaluate the effect of lower oxygen expansion of MSCs on CFU-F. Previous work indicates that 5% oxygen increases the growth rate and maintains stem cells in the undifferentiated state. We will determine whether 5% oxygen increases the CFU-F in MSC cultures. We will use the CFU-F assay to determine if we can manipulate the number of stem cells in culture and improve their therapeutic value.

Honors/Activities: Bridges to the Future; Golden Key Honor Society; Hill's Pet Nutrition Scholar; Kansas State University Research Forum presenter; American GI Forum National Youth Chair; National Council of La Raza presenter; Rake N' Run

Ariel Anib
Sophomore, Criminology/Pre-Law

Roy Barnett
Instructor, Sociology, Anthropology, and Social Work

Analysis of Death Row Inmates and the Social and Political Process of Capital Punishment in Texas

This study examines the characteristics of death row inmates in Texas and the factors involved in each inmate's capital offense case. We have created a database of 430 Texas death row inmates, which includes such factors as: education, prior occupation, relation of victim, prior offense, age/race of victim, age/race of offender, aggravating factors, and the county in Texas where the offense occurred. This project also includes case studies of specific capital prosecutions in Texas, with the goal of uncovering the various social, political, and legal processes involved in prosecuting capital cases in Texas.
In the current research, we find that death row inmates have a number of factors in common: poverty, less education, from certain counties in Texas, and are likely to have a white victim. These factors may indicate that certain murder suspects are more likely to be tried as capital offenders and if convicted, they are more likely to be sentenced to death. The preliminary case studies of death row prosecutions in Texas indicate the possibility that the judicial system of Texas is based on a conservative, punitive philosophy. In Texas, they elect judges and prosecutors that are conservative in their political philosophies and therefore make decisions and rulings that push the political agenda of being "tough on crime."

Honors/Activities: Community Service Chair of Goodnow Hall; SGA Intern; Government Relations Committee; Student Senate; Rake N' Run

Jasmine Sharp
Sophomore, Fisheries, Wildlife, & Conservation Biology | Brett Sandercock
Associate Professor, Biology

Use of Stable Isotopes to Identify Diet and Habitat Use by Greater Prairie-Chickens

The Greater Prairie-Chicken (Tympanuchus cupido), is a grassland bird that is declining in population numbers in the native prairies of Kansas. The objective is to determine diet and habitat use of this bird species. In this investigation, stable isotopes of carbon and nitrogen are needed to compare the signatures of bird feathers and tissues to the different types of vegetation and insects that prairie chickens feed upon in native grasslands.

First, a trial was conducted to make measurements of different wing feathers of prairie chickens. The goal was to determine the variability within the wing so that only a subset of feathers needed to be analysed. The feathers were cleaned, dried and cut. Then it was ground into powder for analyses. Small samples of powdered feathers were weighed between 1.5 to 9 mg, and analysed in a Stable Isotope Mass Spectrometry Laboratory (SIMSL). Next the isotopic signatures in the prepared samples of food items were examined and compared with the differences of the carbon and nitrogen in the feathers. Stable isotopes are an efficient method for determining the dietary choices and habitat use of resident populations of prairie chickens. Information on diet and habitat use will be useful for conservation of rangelands required to sustain populations of the Greater Prairie-Chicken.

Preliminary results from the first set of feather analyses indicated there are no differences among feathers from the same wing, and all wing feathers have similar signatures. These findings will greatly simplify future sampling under field conditions. Moreover, these results indicate that there is spatial variation in the isotopic signatures of prairie chicken feathers. Three populations in the Flint Hills of eastern Kansas differed in stable isotopes of nitrogen but not carbon. Differences in nitrogen could be related to site differences in trophic level or use of agricultural fertilizers. Results for food items are still pending.

Honors/Activities: Bilingual: English/French; Bread Basket; Rake n' Run; Wonder Workshop

Derrik Wiggins
Freshman, Open Options/Japanese | Candice Hironaka
Associate Director, School of Leadership Studies

The Effect of Nippon Culture on Suicide among Japanese Youth

The purpose of the research is to identify some causative cultural factors that contribute to suicide in Japan. Suicide has skyrocketed in Japan over the past 40 years making it the one of the most prevalent leading causes of death in Japan. These suicide rates are in stark contrast to its economic and social position in the world. The synergistic effect of adult suicide has now been documented among Japanese youth. Suicide is the second highest cause of death for persons 15- 24. The current findings revealed that suicide in Japan is affected by: age, gender, economics, bullying, sexual orientation, sexual experiences, drug or alcohol use, and self-esteem issues. This investigation explores some of these factors in greater detail in an effort to find the "cultural links" to the rise in youth suicide.

Honors/Activities: Edgerley-Franklin Urban Leadership Scholar; Bilingual: English/Japanese; Food for Thought

Emma Del Real
Senior, Biology | Lorena Passarelli
Associate Professor, Biology

Role of Post-Translational Modifications of a Viral Fibroblast Growth Factor on Virulence

Baculoviruses are enveloped viruses, containing a large, circular and double-stranded DNA genome. Most baculovirus genomes encode a viral fibroblast growth factor (vfgf) that is homologous to the fibroblast growth factor (fgf) found in both invertebrate and vertebrate organisms. Fibroblast growth factors exhibit a wide range of functions that include working as mitogens and motogens involved in neural cell differentiation, osteogenesis, angiogenesis, and limb formation. The vfgf of the Bombyx mori nucleopolyhedrovirus (BmNPV) is N-glycosylated and readily secreted. On the other hand, the vfgf of the Autographa californica MNPV (AcMNPV) is not N-glycosylated. We will construct recombinant viruses where the N-glycosylation sites of the BmNPV fgf are altered and N-glycosylation sites are introduced into the AcMNPV fgf and compare their infectivity. This will allow us to establish a relationship between N-glycosylation of vfgfs and viral infectivity.

Honors/Activities: Bridges to the Future; Terry C. Johnson Cancer Research Award; Travel: Mexico; Rake N' Run; United Multicultural Women

L. Jeanette Aldana
Junior, Biology

Jeremy Marshall
Assistant Professor, Entomology

Reproductive Senescence and Loss of Fitness in a Cricket

The effects of old age are numerous and are collectively termed *senescence*. One area that has received considerable interest in recent years has been reproductive senescence which can be manifested as poor copulation ability, poor fertilization success, or reduced fertility – just to name a few. Such reproductive senescence can dramatically influence the lifetime fitness of an organism, especially if that organism mates or produces offspring throughout its lifespan. Here, we studied the effects of male and female age on copulation duration, the link between copulation duration and successful ejaculate transfer, and numbers of eggs laid by females in the cricket, Allonemobius socius. This work showed that (1) both older males and older females have significantly shorter copulation durations than their younger counterparts, (2) that copulations resulting in successful ejaculate transfer were significantly longer in duration, and (3) that longer copulation durations, and presumably greater amounts of ejaculate transfer, result in a significantly higher number of eggs being laid by females. These results suggest reproductive senescence is occurring in these crickets and that such senescence has a significant effect on fitness.

Honors/Activities: Bridges to the Future; Multicultural Student Honor Society, Hill's Pet Nutrition Scholar; HALO, United Multicultural Women

Eduardo Alvarado
Freshman, Philosophy/Pre-Law

Donald Saucier
Assistant Professor, Psychology

Priming Prosocial and Antisocial Attitudes and Behaviors

Behavior can be manipulated by priming, by which a stimulus (e.g., witnessing violent behavior) activates certain traits in the participants' subconscious and makes them more likely to behave in accordance with that stimulus (e.g., behave more violently) without deliberate intention. Our study assessed the ability of musical lyrics to prime participants' prosocial or antisocial attitudes and behavior. Participants completed the lyrics of commonly-known songs as primes (religious Christmas, secular Christmas, patriotic, or neutral). Participants then completed measures that assessed prosocial and antisocial behaviors and attitudes (e.g., empathy, aggression, prejudice). We expect that the primes will affect behavior (e.g., Patriotic primes will prompt more negative attitudes towards Arabs; Christmas primes will prompt more helping). These results will contribute to the literature on priming's effects on behavior and will allow us to see the extent to which primes affect prosocial and antisocial attitudes and behavior.

Honors/Activities: Academic Honors (1); Multilingual: English/Spanish/Italian; Rake N' Run

Jenny Menjivar
Junior, Microbiology

Denis Medeiros
Professor, Human Nutrition

Bridges to the Future Program

Bridges to the Future is a program sponsored by the National Institutes of Health and is aimed at under-represented diverse students who wish to pursue careers in the Biomedical Sciences. The Kansas State University (KSU) program targets five community colleges: Dodge City Community College, Donnelly College, Kansas City, Kansas Community College, Garden City Community College, and Seward County Community College. When accepted to the program, students will receive a tuition scholarship at their community colleges. Soon after community college, students can "bridge over" to KSU. Part of the bridging activities include attending an open house at KSU, an orientation into the biomedical sciences and life at KSU during a one-week intersession course, and prior to the junior year, conducting an 8-week research internship with a KSU faculty mentor. Those community college students who become K-Staters have an early start in their career by working next to a mentor in their field of interest, as well as continuing their mentoring experiences through the Developing Scholars Program.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; Baby Daughter, Marissa!

Kathy Nguyen
Junior, Public Health/Nutrition

Mark Haub, Koushik Ahdhikari
Professor, Human Nutrition
Assistant Professor, Human Nutrition

Is there a Link between Bitterness Sensitivity and Type 2 Diabetes in Humans?

Our study will focus on two SNPs (Single nucleotide polymorphism) present in TAS2R38 (A49) and PPARγ (P12A) genes. Recent studies have shown that the SNP at 49th position of TAS2R38 gene might be enough to determine bitterness sensitivity to thioureas compounds. If praline is encoded then the individual might be a taster or supertaster. On the other hand, if alanine is encoded then the individual might be a nontaster. Researchers have found that PPARγ gene plays a role in human diseases which include type 2 diabetes (T2D). There is some evidence that shows that there might be a link between P12A SNP in PPARγ gene and T2D. Therefore, the objective of this study will be genotype normal, pre-diabetic and diabetic human subjects for the two above-mentioned polymorphisms, and determine if there is a link between bitterness sensitivity and risk of T2D. The major limitation of this study will be the sample size (n-60), but our goal is to set up the protocols involved in the genotyping, and gather some preliminary data to observe some trends if they are present.

Keywords: TAS2R38 gene, PPARγ gene, bitter sensitivity, type 2 diabetes, and single nucleotide polymorphism.

Honors/Activities: Phi Kappa Phi Honor Society; Golden Key Honor Society; Multicultural Honor Society; Bridges to the Future; Bilingual: English/Vietnamese; Multicultural United Women; Rake N' Run; Wonder Workshop

Alejandro Estrada
Junior, Kinesiology

Stephen Chapes
Professor, Biology

To Test Ehrlichia Chaffeensis in Genetically Altered Flies

E. chaffeensis is an obligate intracellular bacteria, which will only grow in live cells. Individuals are infected with E. chaffeensis when bitten by lone star ticks, which carry the bacteria. The disease caused by infection with E. chaffeensis is called human monocytic ehrlichiosis. Infected individuals may experience headaches, muscle aches, fever, chills, and/or nausea. If not treated with care, it may cause neurological side effects or death. Several drosophila genes were identified in a recent gene array screen that were up regulated after infection of S2 cells with E. Chaffeensis. We screened several adult drosophila fly lines carrying mutations in these genes to test the hypothesis that they were involved in host defense. In this study, E. chaffeensis was cultivated in DH82, canine macrophages. After E. chaffeensis was isolated from the DH82 cells, it was injected into the mutant flies and survival was monitored for 120 hours post infection. By testing the various types of genetically altered D. melanogaster, we can gain an understanding of the genes which contribute to host defense to E. chaffeensis infections. Since the Drosophila innate immune system has many vertebrate homologs, the information we learn in flies is readily useable in animal systems and relevant to human medicine.

Honors/Activities: Bridges to the Future; Hill's Pet Nutrition Scholar; Bilingual: English/Spanish; Rake N' Run; Mittens for Many

Sheila Ellis
Senior, Journalism & Mass Communications

Samuel Mwangi
Assistant Professor, Journalism & Mass Communications

Online Practices of Kansas Newspapers

The concept of transition has been embraced by a number of media theorists and researchers that are interested in exploring and articulating the dynamics, metaphors and aesthetics of socio-technical change with respect to technologically mediated communication. Using a constructed set of best practices in online journalism and technology acceptance models, this research looks at online trends and practices of metropolitan, micropolitan and rural Kansas newspapers and identifies significant issues and challenges facing newspapers in a digital age.

Honors/Activities: Associated Press Internship; National Landmark Scholars Internship; Outstanding Minority Journalists of the Year; National Association of Black Journalists Scholar; K-State Hero Award, Topeka Capitol-Journal Freelance reporter; Roanoke Times Intern; Founder and President of Diverse Mass Communicators; President of the Kansas State University Association of Black Journalists; First African-American Editor-in-Chief at the Kansas State *Collegian*; Dean of Student Life Outstanding Graduating Senior Award

Anthony Garcia
Senior, Kinesiology

Melissa Bopp
Assistant Professor, Kinesiology

Relationship of Chronic Disease with Physical Activity and Nutrition

Background: There are racial-ethnic health disparities present all across the United States. Health problems such as cardiovascular disease (CVD) and obesity are on the rise due to dietary factors and a lack of physical activity, especially in the Hispanic population. Rates of physical activity and good nutrition are lower in Hispanics compared with other ethnic groups. The certain factors that lead to these health problems are unclear in Southwest Kansas Hispanics.
Objectives: The purpose of this study was to examine the amount of physical activity (PA) and proper nutrition (PN) Hispanics in Southwest Kansas are engaging in, in order to assess some of the current risk factors facing Hispanics.
Methods: This was a cross-sectional volunteer sample. Participants were self-identified Hispanics in Dodge City, Garden City, and Liberal, KS. Respondents answered questions regarding sociodemographics, physical activity, nutrition, access to health services, and current health status. Basic frequencies and means were used to describe the sample. T-Tests were used to compare differences in PA and nutrition between age and gender groups.
Results: The data is currently being collected: results are not yet available.
Conclusions: Our findings will be helpful in developing tailored health promotion programs for Hispanics in Southwest Kansas.

Honors/Activities: Academic Honors (1); Bridges to the Future; Golden Key Honor Society; Multicultural Student Honor Society; Kinesiology Student Association

Barbara Braga
Freshman, Chemical Engineering

Stefan Bossmann
Professor, Chemistry

Mycobacterium Smegmatis

For my project, I work alongside with graduate students in the research of the growth of the Tuberculosis bacteria in certain chemical environments. I test how Mycobacterium Smegmatis, a sister bacteria to Tuberculosis, grows in certain concentrations of solutions. The overall goal of the team I work with is to make cell blockers, which will eventually assist in the making of medicines and cures for Tuberculosis. This project is a multi-year project since there is so much detail involved to make a safe cell blocker; therefore I will not have concrete details and results for the overall project. I also will be able to continue working on this project, since there are so many chemicals that can help create the cell blockers. For my results, I do hands-on experiments with the bacteria. My project involves the manufacturing of vitamin and potato dextrose gel plates and different concentrations of certain chemical solutions, as well as plating the bacteria and incubating it for growth. After the bacteria has grown, I take a count of the bacteria and make a graph which will determine whether I should change the concentrations of the solutions. So far, after one semester working in this project I have discovered, alongside with my research mentor, that certain concentrations of Ruthenium(II)-tris-phenanthroline Chloride will inhibit the growth of Mycobacterium smegmatis, which is an essential information for the making of cell blockers. In the long run I will be part of a team that has helped with an issue occurring in our world. Just as we need time to learn, it takes time for discoveries to be made.

Honors/Activities: Alpha Chi Sigma; Professional Chemistry Fraternity; Multilingual: English/German/Portuguese; Travel: Brazil; Rake N' Run

Morgan Franklin
Sophomore, Business Administration/ Pre-Law

Donita Whitney-Bammerlin
Instructor, Management

A Legal Look at Collegiate Athletics: Whose Responsibility Is it?

This project attempts to answer the question of whether or not the legal responsibilities of a coach at the NCAA level include the sportsmanship of his/ her team. There is little to no research concerning this topic. This makes finding the answer to this question both exceptionally challenging and rewarding. We propose a three-phase project. In phase one, we conducted research. Phase two concerns creating a questionnaire for Division I coaches and analyzing the responses. The third phase is devoted to constructing a useful handbook regarding ethical sportsmanship responsibilities for use by Division I coaches.

Honors/Activities: 2009 Vector Marketing Management Candidate; KSU Board of Publications; DSP Graphic Designer; Travel: Africa, Spain

Ryan Brooks
Junior, Finance

Eric Higgins, Hamilton Fout
Associate Professor, Finance
Assistant Professor, Economics

Fannie Mae and Freddie Mac and the Mortgage Meltdown: Can They Be Blamed?

Amidst the recent collapse of the U.S housing market and subsequent economic contraction, Fannie Mae and Freddie Mac have become objects of media scrutiny. The purpose of this project is to determine the role that these large Government Sponsored Enterprises (GSE) had in the mortgage/ housing collapse. In order to answer this question, this work collects and analyzes various economic research and data to determine the effect of Fannie Mae and Freddie Mac's decisions on the economic observables.

Honors/Activities: Academic Honors (1); National Society of Collegiate Scholars; Edward Jones Investments Internship; Student Finance Association; Students in Free Enterprise

Kristel Williams
Junior, Elementary Education

Gail Shroyer
Professor, Elementary Education

NCATE Standard 1: Do KSU Teacher Candidates Know and Demonstrate the Knowledge, Skills, and Professional Dispositions Necessary to Help All Students Learn?

In March 2009, the National Council for Accreditation of Teacher Education (NCATE) visited the Kansas State University College of Education. The purpose of their visit was to see if the College of Education met the necessary standards that would show evidence that K-State is properly preparing their teacher candidates for the classroom. The six accreditation standards that NCATE looked for are as follows: 1) Candidate Knowledge, Skills, and Professional Dispositions 2) An Assessment System and Unit Evaluation 3) Field Experiences and Clinical Practice 4) Diversity 5) Faculty Qualifications, Performance, and Development, and 6) Unit Governance and Resources. During their visit, the accreditation team visited area schools in Manhattan, Kansas and interviewed the Education majors on site. They also reviewed hundreds of charts and tables in an exhibition room to see if the data matched up with the rubrics used to assess all six accreditation standards. With the College of Education working collectively as a team, different faculty and staff were responsible for preparing only one of the six standards. Dr. Shroyer and I were in charge of Standard 1. While we are still awaiting the results from the NCATE Board of Examiners, this study focuses, more specifically, on the process that we endured in order to be ready for our septennial evaluation.

Honors/Activities: President's Honor Roll (4); Silver Key; Kappa Delta Pi Honorary Society; McNair Scholar; Kids Across America Counselor; Target on Excellence presenter; Bilingual: English/Spanish; Student Governing Association; Education Senator; SGA Allocations Committee

Michael Hodge
Junior, Public Relations

Grace Hwang
Assistant Professor, School of Leadership Studies

School of Leadership Studies – Proposed Marketing Plan

In order to come up with a proposed marketing plan to use for future leadership students, potential donors and other supporters, I had to first research the other leadership schools and programs in the United States, and find out what distinguishes our School of Leadership from our competitors. I found out that there are currently only two stand-alone Schools of Leadership in the United States: the Jepson School of Leadership at the University of Richmond, Virginia, and the Claremont-McKenna School of Leadership in California. I put together a comparative notebook with the different mission statements, goals and purposes of each School of Leadership. I also gathered information about different leadership programs across the country that are not yet "Schools of Leadership," but very competitive programs. Based on this information, I have determined that one of the most unique and marketable aspects of the K-State School of Leadership is the new building, which will be completed in the Spring of 2010. It will be the first sustainable LEED- certified "green" building on campus. I will show a poster of the new building; develop a power point presentation for leadership faculty, students, and staff to use to "sell" the school to future students, donors and supporters, and imbed into that presentation, a video of this new ten million dollar building that will house our innovative leadership classes and programs, and further facilitate leadership training with our currently 1,300 leadership minors at K-State.

Honors/Activities: Civic Leadership Studies Office Coordinator; Rake N' Run; Highway Cleanup; Thanksgiving Basket Distribution

Ashley Wood
Sophomore, Anthropology & Spanish

Kristan Corwin
Associate Professor, Physics

The Usage of Analog Circuits in Ultrafast Laser Technology

Stabilized lasers have been important in advancing optical frequency metrology. The improvement of frequency measurements and standards has useful applications in the telecommunications industry. I will be creating analog circuits that will be used in the process of running and measuring outputs of ultrafast lasers. I researched publications of past uses of laser stabilization, optical frequency comb technology, optical frequency measurements, and the time-domain applications of this technology. Through my research I have found that with the advances in laser technology, measurement of high frequencies is now possible. This measurement capability brings new applications to a broad range of technologies, including telecommunications. While lasers and optical fibers are needed in this type of research, analog electronic circuits are also needed for stabilizing these optical frequency combs. I have been learning about the applications and measurement of resistors, capacitors, inductors, and operational amplifiers using a "breadboard," a device that allows for easy construction of temporary electronic circuits. After learning about these, I assembled, analyzed, and measured circuits with different combinations of these components. Future experiments will include building circuits that can be of practical use.

Honors/Activities: Phi Eta Sigma Honor Society; National Society of Collegiate Scholars; Yosaki Dance Club; Bilingual: English/Spanish; Travel: Japan; Ethnographic Field School in Guatemala

Sandra Salas
Senior, Biology

Helmut Hirt
Assistant Professor, Biology

Characterization of the ΔdltX mutant of Enterococcus faecalis

Enterococcus faecalis has emerged as an important opportunistic nosocomial pathogen in recent decades, highlighted by the increase of vancomycin resistant enterococci (VRE) isolates in hospitals around the world. Lipoteichoic acid (LTA) is an essential amphiphilic polymer of many gram-positive bacteria, including enterococci. Decoration of the polymer by D-alanine reduces the overall negative charge of the bacterial cell and makes it less susceptible to cationic peptides, an important component of the innate immune response. D-alanylation of LTA is performed by the gene products of the dlt-operon, dltA-D. Recently, a small open reading frame, dltX, was identified upstream of the dltA gene. An in-frame deletion mutant was constructed. Our study characterizes the phenotype of this deletion mutant in respect to its susceptibility to antibiotics and the ability of the cells to serve as recipient for an E. faecalis specific conjugative plasmid. In addition, gene expression of the dlt-operon in the dltX mutant is investigated.

Honors/Activities: Bridges to the Future; Hill's Pet Nutrition Scholar; HALO; Bilingual: English/Spanish; Community Service: St. Joseph's Retirement Village

Matthew James
Junior, Industrial Engineering

Todd Easton
Associate Professor, Industrial Engineering

Modeling the Movements of an Infection through a Rural Environment

The objective of this multi-year project is to develop a computer simulation that models the spread of infectious diseases in rural Kansas, enabling a user to analyze and optimize mitigation policies. To date, the spread of epidemics in rural areas has not been researched due to an assumption that a small number of widely dispersed people are unlikely to initiate a global epidemic. This assumption is flawed because rural people travel extensively, which implies that an epidemic may spread across vast distances in a small amount of time. Thus, a small outbreak in a rural area has a high probability of developing into a worldwide pandemic (see 1918 Spanish Flu that started near KSU). This year the research developed computer simulation software with graphical interface that shows how a disease would spread through Clay Center, Kansas. Future research intends to focus on how a specific disease spreads through a large rural area. Once this project is completed, governmental agencies will have the ability to use this tool to test mitigation procedures, which will determine effective methods to plan, manage and control the spread of an epidemic.

Honors/Activities: Academic Honors (2); University Honor's Program; Golden Key Honor Society; Multicultural Student Honor Society; Outstanding Freshman in Industrial Engineering; Internship: EnVisage Consulting; Institute of Industrial Engineers; Student Senate

Rita Perez
Senior, Public Health Nutrition

Tonatiuh Melgarejo
Associate Professor, Human Nutrition

Comparative Bioinformatic Studies on an Iron-Regulating Host Defense Peptide in Three Carnivore Species

A primary form of defense against disease is comprised of host defense peptides (HDP's), also known as antimicrobial peptides. These peptides are found in virtually all species and form part of the innate immune system. Different HDPs protect organisms against bacteria, viruses, fungi and some target abnormal or cancerous cells. Moreover, the group of HDPs covers other biological functions such as immuno-modulation, chemotaxis and regulation of iron metabolism. Hepcidin, an iron-regulating molecule, has previously been identified in different mammalian species, including the domestic dog (Canis familiaris). Furthermore, our laboratory has more recently identified hepcidin in the house cat (Felis catus), and work is currently being conducted on hepcidin in a related species - Hyaena hyaena. The purpose of this study was to compare the amino acid sequence homology and biological function of the hepcidin peptide from these three carnivore species. The first part of this study involved molecular cloning and partial characterization of striped hyena hepcidin. Using degenerate primers from feline hepcidin, mRNA expression was analyzed in liver samples obtained from striped hyenas living in captivity. A cDNA of 405 nucleotides was obtained rendering a predicted amino acid sequence of 85 amino acids. Comparative amino acid sequence studies of the striped hyena hepcidin demonstrated 85% and 90% homology with the canine and feline hepcidin, respectively. Ongoing comparative studies in the laboratory are currently focused on elucidating upon the biological function of hepcidin in different carnivore species.

Honors/Activities: Academic Honors (3); Kappa Omicron Nu Honors Society; Golden Key Honor Society; Multicultural Student Honor Society; The National Scholars Honor Society – Magna Cum Laude Nominee; Phi Kappa Phi Nominee; Terry C. Johnson Cancer Research Scholarship; Bridges to the Future; McNair Scholar; Family Nutrition Program Internship; ADA Food and Nutrition Conference and Exposition; Bilingual: English/Spanish

Edmond Rivera
Freshman, Human Ecology/Pre-Medicine

Michael Kanost
Distinguished Professor, Biochemistry

Study of Hemolymph Protease in Insects

A protease is an enzyme responsible for cutting peptide bonds, which are found in proteins and hold proteins together. Proteases in insect hemolymph are known to be involved in insect immune responses. We suspect that hemolymph protease HP13 from the tobacco hornworm, Manduca sexta, may also be involved in immune response, but nothing is yet known about its function. We are trying to develop the most effective method for the synthesis and purification of hemolymph protease 13 in order to study its biochemical activity. We first used the polymerase chain reaction to produce a DNA encoding HP13 and then designed a plasmid with insertion of this HP13 cDNA, which we will use to transform E. coli cells to create millions of copies of this recombinant DNA molecule. This DNA will then be purified and inserted into cultured insect cells (Drosophila S2 cells), which will secrete the desired protein. We will then purify the HP13 protein and investigate its proteolytic activity. We are also using immunoblot experiments to analyze the HP13 in the hemolymph of Manduca sexta.

Honors/Activities: Edgerley-Franklin Urban Leadership Scholarship; Bilingual: English/Spanish; Human Ecology Telefund; Rake N' Run; HALO

Rose Djiofack
Junior, Secondary Education/Modern Languages

Laura Kanost
Visiting Assistant Professor, Modern Languages

Translating Cilantro y Perejil

My research project consists of translating, under the supervision of Dr. Laura Kanost, a film screenplay called Cilantro y perejil (English title: Recipes to Stay Together). The movie was written in 1995 by Cecilia Pérez Grovas and Carolina Rivera and directed by Rafael Montero. This work is part of a larger project on Mexican women filmmakers intended to show how successful Mexican women have been in the history of cinema. Another goal of the project is to make the original and the translated screenplays available for an international audience of students and scholars to read, given none of them have ever been published before.

My goal as a translator is for the English-language reader to have the same feeling as a reader of the original Spanish text. In every sentence, I strive to maintain the structures, degree of formality, style, and cultural associations of the original.

Honors/Activities: BESITOS; Target on Excellence presenter; UFM Instructor; Multilingual: English/Spanish/French; Fair Trade Marketplace

Edgar Martinez
Senior, Mechanical Engineering

Warren White
Associate Professor, Mechanical & Nuclear Engineering

Non-Linear Controls of Underactuated Mechanical Systems

Information, as well as the understanding of nonlinear control of underactuated mechanical systems shared with the engineering community, is the basis of this research sponsored by the National Science Foundation and supported by the Developing Scholars Program. Examples of underactuated systems are rocket guidance together with satellite and underwater vehicle orientation control systems. Part of the dissemination of the research results is the internet. The task at hand is to create a website that will draw the attention of others in the same field of study. The website will include an explanation of the research, methods, figures, published papers, simulations, and videos. Proper organization of the web page so that the viewer knows exactly what he/she is looking at together with the ability to distinguish between different problem types and easy navigation of the site is essential for successful communication. This is important because non-linear control of underactuated systems is theoretically more complex than linear systems, but with proper understanding the nonlinear techniques offer greater performance capabilities. In addition to the website, the design and construction of underactuated mechanical system test articles allow the demonstration of the controllers on physical devices. Such devices illustrate the challenging issues associated with controlling these mechanical systems as well as showing that the developed techniques do in fact work. Another useful aspect of the experimental devices is the fact that they are very interesting. Information about underactuated system control on the internet is scarce; therefore, having a website along with physical devices will bring groups of researchers together to allow the sharing of information and the bringing forth of collaborative solutions to the problems.

Honors/Activities: Internship: Bio-Security Research Institute; Multicultural Engineering Program; National Action Council for Minorities in Engineering Scholar; Bridges to the Future; Bilingual: English/Spanish; Acts of Kindness; Rake N' Run

Rymonda Davis
Freshman, Journalism & Mass Communications

Morgan J. Morgan
Assistant Professor, History

The Grandmother Project

My research was conducted in order to learn about familial relationships among African American women in the 1930s compared to those same relationships now, including their roles in their families, as well as their abilities to overcome tough situations regarding their personal lives. This research was started in order to compare the roles of African American women then and now, as well as possibly identifying the roots of important characteristics that are present in African American women today. My research was primarily through the use of interviews of older African American women in the Manhattan community. However, online journal articles about African American family structure were also used to double check information that was discovered in the interviews.

Throughout researching the lives of women, a primary discovery was that there are many distinct differences between the familial structures of African Americans then, as compared to now. Then, women in the family were expected to take care of the family and were often a symbol of strength. However, children were expected to stay in their place, and often didn't know what was going on in the family. This is very different from African American families today because there tends to be a pattern of openness among everyone, including the children.

Although the role of African American women in the family has evolved over time, they still remain to be symbols of strength and hope for the family and provide support and comfort to other members of the family.

Honors/Activities: Edgerley-Franklin Urban Leadership Scholar; Diverse Mass Communicators; Chapman Center Fellow

Francisco Velazquez
Senior, Life Science

Mary Cain
Associate Professor, Psychology

The Ability of d-cycloserine to Attenuate Operant Responding in High and Low Responder Rats

The current study examines the effects of DCS (d-cycloserine) on extinction and reinstatement of sucrose-maintained operant responding in HR and LR rats. DCS has been shown to facilitate learning and memory. The previous research shows that 15mg/kg DCS significantly attenuates reinstatement, and that DCS differentially affects reinstatement in HR and LR rats. Rats will be trained to lever press for a 20% sucrose solution on an FR-5 schedule. Once a stable response is achieved, rats will undergo extinction sessions. During extinction, rats will be administered a lower and/or higher dose administration of DCS than previous research to determine the most effective dose.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; HALO; Rake N' Run

Matthew Ho
Sophomore, Architecture, Planning & Design

Michael McGlynn
Assistant Professor, Architecture, Planning & Design

Carbon Neutrality in Studio Design

The concept of carbon neutrality as used in contemporary architecture focuses on designing buildings in such a manner as to prevent or significantly reduce greenhouse gas (GHG) emissions and/or to use no fossil fuel GHG emitting energy during construction or operation of the building. One form of the technology examined in this project was the computer simulation program known as BEopt (Building Energy Optimizer) developed by The National Renewable Energy Laboratory (NREL). BEopt is a tool used by researchers faced with the challenge of comparing the costs, energy savings, and interactions between different combinations of energy-saving options.

This project focuses on how techniques, such as carbon neutrality design, can be taught and implemented in current architecture curriculum. The ultimate goal of this project was to examine how BEopt can be used to accurately design carbon neutral energy buildings. At present BEopt is a program in limited use in academic based programs. We argued that BEopt can and should be used as a heuristic device increasing student's awareness about reducing fossil fuels in their designs. The ultimate goal of the project then is to increase awareness of design tools that help produce buildings that produce little to no GHG emissions.

Keywords: Architectural Curriculum, Studio Design, Carbon Neutrality, Zero Energy, BEopt

Honors/Activities: Edgerley-Franklin Urban Leadership Scholarship; Multilingual: English/Spanish/Vietnamese; Cats 4 Cans

Catrina Elmore
Sophomore, Business Administration

Margaret Burton
Instructor, English

Eleven Years after Brown v. Board 1954: WHEN SHALL WE INTEGRATE?

After the Brown v. Board of Education decision was made by the Supreme Court, many schools did not integrate immediately; the court had granted local school districts the latitude to integrate "with all deliberate speed." Brown v. Board of Education mandated the integration in the public school system of children identified at the time as "Negro" and "Caucasian"; stating the hope that children could accept one another as equals and friends, the court also paved the way for African-Americans to share in equal civil rights as adults. We should examine what took place after the Supreme Court's decision on Brown v. Board of Education, in order to learn the conditions of education for African-Americans at that time period and the gains in the public sphere that African Americans have made since then. My research sought to determine the reactions of the Riley County community and school board from the years 1954 to 1965. Examining Riley County newspapers, the record of the Riley County Historical Society, and the minutes from the school board of the Manhattan-Ogden United School District 383, I searched for evidence of resistance to integration, and the length of time required for this community to integrate schools. I found that no daily issue of the Manhattan Mercury, published from 1954-1965, carries an article directly referring to the Brown decision; nor do the USD 383 School Board Minutes from the years 1954-1965 mention the case. The absence of direct mention of Brown in these documents suggests that Riley County School Board and newspaper editors may have considered contemporary standards of integration satisfactory, or they may have felt that any existing problems should be suppressed in accounts made to the public. Furthermore, Brown v. Board of Education may not have achieved much press in Riley County, regardless of the magnitude of the case, because the Supreme Court never set a timeline for integration, leaving the Riley County area with the choice to overlook the decision. Further research into personal student records, local police reports, and oral histories might supply a more conclusive picture of the attitudes of the period.

Honors/Activities: Academic Honors (1); National Society of Collegiate Scholars; Undergraduate Peer Instructor

Mychal Davis
Junior, Animal Science & Industry

Sanjeev Narayanan
Assistant Professor, Diagnostic Medicine Pathobiology

Real Time Quantitative-PCR Assays Developed for Finding Human Engineered Plasmids in the Environment.

Plasmids are naturally-occurring, self-replicating, mobile genetic elements that are capable of horizontal transfer of antimicrobial resistance and virulence genes among bacteria in mixed bacterial cultures. These naturally occurring plasmids have been modified to be more efficient in genetic engineering laboratories over the past 30 to 40 years for its use in molecular cloning experiments. Since DNA is stable at a wide range of temperatures, pressure, and exposure to various chemicals; engineered plasmids that may escape from the lab may have major implications on the development of resistance to antimicrobials or gain of virulence factors. We extracted DNA from cattle manure samples, soil samples, water, and crow droppings using the Fast DNA Spin for Soil Kit and purified the DNA with the Geneclean Turbo kit. We developed real time PCR assays capable of detecting regions of these plasmids in complex sample. Of the 150 cattle manure samples, three were positive for the plasmid-origin of replication. DNA sequencing revealed that the PCR product had 96.4% homology to the plasmid used in the lab. We are currently in the process of further characterizing this plasmid.

Honors/Activities: Multicultural Student Honor Society; Hill's Pet Nutrition Scholar; Minorities in Agriculture Natural Resources and Related Sciences; Ag Council Representative; Target on Excellence presenter; Cargill Diversity Scholarship; ABC-affiliate interview

Jeremy Williams
Freshman, Economics

Brian Niehoff
Professor, Management

Examining the Impact of Student-University Fit on Intentions to Stay at the University

Person-organization fit is a measure of an individual's perceived fit within an organization; that is to say, how an employee's values and characteristics align within the corresponding values, characteristics, and norms of the whole organization. The concept is a useful model of retention and turnover within an organization, turnover and retention depending to a large extent on the degree of fit an individual perceives (Schneider, 1987). Because employees often view their workplace as an extension of themselves, concessions will be made to redress and minimize differences between the individual and the workplace. This concept has been supported by a wealth of research, yet a limited number of studies have examined this concept in relation to the university setting. Using a twenty-two question survey administered to first-year students, this study examines the student-university fit and the degree of its effect on retention. Furthermore, this study is intended to simply better understand aspects of retention at the university level. By comparing a sampling of minority students to a sampling of the majority, the study will examine if minority students perceive less of a fit in the university and whether the degree of perceived-fit proves as a greater indicator of intentions to remain at the university.

Honors/Activities: Target on Excellence presenter; Bilingual: English/Spanish; K-State Pennies for Peace

Jorge Mendoza
Senior, Biology

Brett Sandercock
Associate Professor, Biology

Parental Care of the Migratory Upland Sandpiper at Konza Prairie

Upland Sandpipers (Bartramia longicauda) are a species of conservation concern but little is known about their breeding behavior. Mating systems among shorebirds vary greatly by species, ranging from strictly monogamous to promiscuous species. This field study focuses on determining parental roles in incubation and brood rearing in Upland Sandpipers. In order to examine this question, sandpipers were trapped at night at Konza Prairie. Blood samples and various physical measurements were collected. Before release, a radio transmitter was attached to their backs and unique combinations of colored bands were put on their legs. Using radio telemetry technology, the birds were tracked to locate their nests. Mates were captured at nests, measured and a blood sample was collected from the mate. Regular monitoring of nests and estimation of the hatching date was important in order to band and collect a blood sample from the newly hatched chicks. We used molecular technology to sex birds from blood samples collected in past breeding seasons. Our goal was to determine what type of mating system Upland Sandpipers use and sex ratios of young. A better understanding of breeding behavior will aid in conservation of this species, as our study is the first investigation of sex roles and parental investment in this species.

Honors/Activities: Golden Key Honor Society; Terry C. Johnson Cancer Research Award; K-State REU summer internship; Harvard internship in Evolutionary Biology; Society for the Study of Evolution and the Society of Systematic Biologists International Conference, University of Idaho; Bridges to the Future; Bilingual: English/Spanish; Rake N' Run

Leonel Hernandez
Senior, Construction Science & Management

Blythe Marlow
Instructor, Architectural Engineering & Construction Science

CNS 544 Topics in Construction Science/ Introduction to Revit(R)

"Purpose-built for building information modeling (BIM), Revit® Architecture building design software works the way you think, enabling you to design freely and deliver efficiently." – Overview Autodesk website 2009.
We further developed a new course in Construction Science and Management with Revit® Architecture and Building Information Modeling (BIM) as a professional elective. The course, CNS 544 – Problems in Construction Science/ Introduction to Revit®, was researched and developed to improve student background knowledge of BIM using the Autodesk Revit® software platform. I studied the course's relevance to the construction industry, the college curriculum course creation process, and highlighted personal experiences while familiarizing myself with Revit® Architecture as it relates to the design and construction industry as a whole. Finally, connections were drawn between the classroom learning and the professional applications of the software, to support the assertion that student knowledge of Revit® may actually succeed in achieving the above quote, "design the way you think, enabling you to design freely and deliver efficiently."

Honors/Activities: President's Honor Roll (1); National Scholars Honor Society; Target on Excellence presenter; Internship: Hensel Phelps Construction; Operation Nehemiah, New Orleans; Greensburg Cleanup; Extreme Makeover Home Edition – Chapman; Bridges to the Future; Bilingual: English/Spanish

Katelyn Kowal
Freshman, Engineering

Christopher Sorensen
Distinguished Professor, Physics

Binary Liquids: A Dissolved Transition Metal Salt Mixed with Alcohols

The project I am working on is an experiment dealing with binary liquids. Binary liquids are two liquids that will not mix, like oil and water. The two liquids that I am studying are an aqueous solution of manganese sulfate and various alcohols such as methanol or ethanol. The procedure is to take two milliliters of the saturated manganese sulfate solution and mix it with about two milliliters of a certain alcohol. We then use a method called the shake test to see how well these two liquids mix or don't mix. If the two still do not mix, resulting in one liquid simply setting on top of the other, I take a fifty percent dilution of the saturated solution and try the test again. I find that in most of the experiments I am doing, most alcohols do not mix with this manganese sulfate, except for methanol which mixed right away. Another result I found is that there is some mixing, but you can still see a definite line between the two liquids even though it may not be right in the middle. Sometimes the line moves higher or lower in the test tube, resulting with the transition metal salt to become particles again and set at the bottom of the test tube. The next part to this experiment will be dealing with temperature and seeing if that has any effect on the mixing, and also using different transition metal salts, continuing to use the shake test.

Honors/Activities: Memorial Scholarship; Freshman Wildcat Grant; Bilingual: English/Spanish

Jessica Rodriguez
Sophomore, Food Science & Industry
Pre-Veterinary Medicine

Butch KuKanich
Assistant Professor, Anatomy & Physiology

Assessment of Oral Codeine in Dogs

Codeine is a narcotic analgesic used to reduce pain and is also known to cause drowsiness. Currently, oral dosages of codeine are being given to dogs as a pain reliever, but it is unknown how much effect an oral dosage actually has. We are testing the effectiveness of this medication by using various techniques of blood samples and pain threshold devices. In this experiment, a codeine and acetaminophen mixture is used as an analgesic on healthy dogs. After the drug is given orally, we obtained blood samples from the dogs using a jugular catheter which was inserted prior to the dosage and conducted pain threshold tests using a von Frey device in predetermined increments over a 12 hour period. In order to measure the amount of drug in the blood, we first separated the plasma, then added a known amount of internal standard, extracted the drug from plasma, and measured drug concentration with the mass spectrometer. The amount of drug in the plasma is measured by comparing the mass spectrometer response to a standard curve. The von Frey is a way to measure changes in the dogs' pain thresholds in response to the medication.

Honors/Activities: Academic Honor Roll (1); College of Agriculture Honors; Hill's Pet Nutrition Scholar; Early Admission to College of Veterinary Medicine; Student Alumni Board; Travel: Chile/England/Mexico/Bahamas/Panama/Germany; Bilingual: English/Spanish; K-State Proud

Miguel Aldrete
Junior, Biochemistry

Jianhan Chen
Assistant Professor, Biochemistry

A Computational Assay of the Cholera Toxin a1 and a2 Subunits in Enzymatic Activation

The experiment is a computational assay of the pathogenic toxin secreted by the bacterium Vibrio cholera known as cholera toxin (CT) which causes acute diarrhea that can lead to severe dehydration and death if untreated. Although the general pathway of the enterotoxin is largely understood, the explicit activation mechanism of the A1 subunit is currently unknown. The study focuses on the allosteric phenomenon of how a structural change in a certain region of the protein can cause a structural change in another region of the same protein while the two are separated by a relatively large distance. Three specific components will be investigated in the A1 subunit: the activation loop (residues 25 to 40), the active-site loop (residues 47 to 56), and the active site itself (residues Arg7, Ser61, Glu110, and Glu112). Strong evidence supports a model in which a change in the activation loop causes it to lose secondary structure and become disordered. The event is believed to cause a shift in the active-site loop resulting in exposure of the active site. Using the force fields employed in the molecular dynamics (MD) program CHARMm, two simulations are allowed to run for a specified time interval, one of a solvated A1 polypeptide that has been separated from the A2 subunit and one of a solvated A1 polypeptide that has yet to be nicked and reduced from its A2 component. We wish to gain insight in the role that the A2 subunits play in stabilizing the activation loop's ordered coil conformation before it binds to ARF6-GTP that caused the loop to take on a more disordered, and consequently more flexible state that triggers the series of events that uncover the concealed active site. This information could be employed in drug-design research by possibly revealing potential sites for inhibitor interaction, thus preventing the toxin's activation altogether.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; Rake N' Run

Evgeniy Shishkin
Junior, Chemical Engineering

Takashi Ito
Assistant Professor, Chemistry

Self-Assembled Monolayer Formation on AlGaN Semiconductor Substrates

We are studying the formation of self-assembled monolayers (SAMs) on group-III nitride semiconductors such as GaN, AlN and their alloy (AlxGa1-xN; $0 < x < 1$). These semiconductors are widely used in short-wavelength optoelectronic, high-power electronics, and chemical and biological sensors based on their unique electrical properties. Their excellent thermal and mechanical stability will make it possible to develop devices that can be operated under high temperature, power and flux/energy radiation. Extensive research on the SAMs will allow us to utilize the semiconductors as the basic building block for next-generation, portable chemical sensors. We are currently studying the SAM formation of a series of primary substituted hydrocarbons having different terminal groups on AlGaN. In the previous study, a compound with a terminal –PO(OH)2 group, octadecylphosphonic acid (ODPA), can form well-packed SAMs on GaN upon immersion into its toluene solution, in contrast to other compounds with terminal –OH, -SH, -NH2 and –COOH groups. Here, we are examining AlxGa1-xN ($x = 0.2, 0.25$) instead of GaN to investigate the effects of the semiconductor composition on the SAM formation of these compounds. SAM formation is assessed by measuring water contact angle of substrate surface upon immersion in a toluene solution of one of the compounds. Well-packed SAMs provide surface covered with hydrocarbon and thus will not be wetted by water, which is recognized as larger contact angle. So far, we have established a cleaning method for AlGaN (cleaning in 6M HCl, in water and with UV/ozone to remove organic adsorbates) to obtain consistent results. We have also found that ODPA can form well-packed SAMs on AlGaN, as with GaN. We are also studying the rate of the monolayer formation on these substrates.

Honors/Activities: Target on Excellence presenter; Bilingual: English/Russian

Eli Anderson
Freshman, Journalism & Mass Communications

Louise Benjamin
Associate Professor, Journalism & Mass Communications

Radio vs. America

This project explores newspaper journalism covering the "War of the Worlds" radio broadcast performed by Orson Welles on Halloween, 1938. The radio program was a dramatic interpretation of H.G. Well's 1898 science fiction novel which describes an invasion of earth by Martians. Due to the realistic nature of the program, the broadcast caused public panic in New York and surrounding Eastern regions. This project will discuss the perception and reaction the nation had to the broadcast.

The "War of the Worlds" broadcast has had long-lasting effects on society, especially on the media. In the years after the broadcasts, movies and plays were created in honor of the broadcast. In addition, over 12,000 newspaper articles have been written discussing the broadcast. These and other results of the impact of the "War of the Worlds" radio broadcast will be revealed and discussed in this project.

Honors/Activities: Edgerley-Franklin Urban Leadership Scholarship; Kansas Association of Broadcasters Entertainment Program Award; Wildcat 91.9 DJ and Talk Show Host

Jaime Tobon
Junior, Biology/Pre-Dentistry

Stefan Bossmann
Professor, Chemistry

MDHI Synthesis and photolysis as a point of control over the MspA Porin Channel of Mycobacterium Smegmatis

Mycobacterium tuberculosis (MTB) is an extremely deadly pathogen. It has caused many deaths world-wide and is considered very dangerous because of its high level of infectiousness. Research in the development of vaccines against this disease is highly important. Our group is working with MDHI Pyridine molecules and looking into the applicability of this compound as a vector for the transport of drugs into the MTB membrane.

MDHI shows a reaction to ultraviolet light. This reaction allows this photochromic molecule to "open" for a brief period of time after being exposed to a light source. If the molecule can be placed within the membrane of the MTB bacterium and then "opened," it would essentially provide a channel into the bacterium through which it will be susceptible to treatments. When the molecule is opened it immediately begins to return to its normal state. Thus, it is important to find a means of keeping the molecule activated.

Testing was done to find a desirable frequency and temperature, which would prolong the "opening effect" or activation of the molecule. We started by applying external temperature to the samples in order to control the environment. Testing was conducted under various temperatures ranging from 10°C to 40°C. Next, we applied the use of a spectrophotometer in order to measure the absorbance of the molecule. The ultimate goal is to see which combination of temperature (T) and irradiation frequency (ν) will provide us with an ideal length of time to use the MDHI molecule.

In conclusion, further testing is being conducted to find optimal conditions for the application of this molecule. We are also conducting several experiments with different molecules which share similar properties with MDHI.

Honors/Activities: President's Honor Roll (1); Target on Excellence presenter; Pre-Dental Club; Travel: Brazil, Honduras, Germany, France, Austria; Multilingual: English/Spanish/Portuguese/German; Rake N' Run; Flint Hills Bread Basket; Mittens for Many

Jesus Garcia
Sophomore, Human Nutrition/Pre-Medicine

Brett Wong
Assistant Professor, Kinesiology

Contribution of Sensory Nerves to Cutaneous Active Vasodilation in Humans

Mechanisms underlying the reflex increase in skin blood flow during whole body heat stress in humans are poorly understood. It is believed this increase in skin blood flow, termed cutaneous active vasodilation (AVD), is under the control of sympathetic cholinergic nerves. Although recent evidence indicates cutaneous sensory nerves may be involved in this response, this idea has not yet been investigated. We tested the hypothesis that cutaneous sensory nerves contribute to the increase in skin blood flow during whole body heat stress in humans. The topical anesthetic cream, EMLA, was used to acutely block cutaneous sensory nerves. Subjects were instrumented with 4 microdialysis fibers on the ventral surface of the forearm. Sites were randomly assigned to receive: saline (control), 10 mM L-NAME to inhibit NO synthase (NOS), EMLA cream on top of the area of skin with the fiber, or L-NAME + EMLA cream. EMLA was applied to ~5 cm3 area of skin under an occlusive dressing for a total of 180 min (two, 90 min application periods). Acute sensory nerve block was verified by lack of sensation to a pin prick and light scratching of the skin. Subjects were equipped with laser-Doppler flow probes to measure skin blood flow. Whole body heat stress was induced by pumping 50°C water through water perfused suits that covered the entire body of the subjects except the head, hands, feet, and experimental forearm. In response to whole body heat stress, skin blood flow increased to ~60% CVCmax in control sites. The response in EMLA sites was not significantly different from control sites. The response in L-NAME was significantly reduced (~40% CVCmax) in L-NAME sites. Interestingly, AVD was nearly abolished in sites treated with L-NAME + EMLA (~10% CVCmax). These data suggest the contribution of sensory nerves to AVD requires the presence of functional NO.

Honors/Activities: Target on Excellence presenter; Multicultural Student Honor Society; McNair Scholar; Mortar Board Honor Society; Multicultural Ambassador; Multilingual: English/Spanish/French

Jocelyn Anderson
Sophomore, Chemistry

Deryl Troyer
Professor, Anatomy & Physiology

Advances in Chemotherapy

Cancer cells are resistant to chemotherapeutic treatment. A key reason for this is that they up regulate transporters in the multidrug resistance family so that they can 'pump out' the otherwise toxic drugs. B16 mouse melanoma cells are resistant to doxorubicin treatment. We hypothesized that verapamil, a channel blocker, could be given with the doxorubicin to sensitize the melanoma cells to this treatment. Various concentrations of verapamil alone, doxorubicin alone, or verapamil combined with doxorubicin were tested. Cell viability was analyzed using the MTT assay. We found that verapamil at low concentrations enhanced the ability of doxorubicin to reduce melanoma growth. We are currently testing other multidrug resistance inhibitors for their ability to increase the effectiveness of drugs such as doxorubicin.

Honors/Activities: Bilingual: English/Spanish; Rake N' Run

Paul Migwi
Junior, Chemical Engineering

Keith Hohn
Associate Professor, Chemical Engineering

Single Molecule Spectroscopy of Sol-Gel Synthesized Si-Al Powders

The goal for this project is to develop methods for characterizing acid-base properties of catalysts made through sol-gel synthesis using single molecule spectroscopy. Silica-alumina materials were synthesized with different amounts of silica, namely 30%, 50% and 70% silica, in an effort to make materials with widely varying acid-base properties. The samples were then studied using single-molecule spectroscopy, where C.SNARF-1 was used as the fluorescent probe. Differences between the samples were noted with increasing fluorescence near 580nm for protonated C.SNARF-1 and at 640nm for deprotonated C.SNARF-1 as silica concentration increased, indicative of increasing Brønsted acidity. However, more analysis is needed to substantiate this trend. We think that this can be a tool to study a wide variety of heterogeneous catalysts, and this study will prove the potential of this technique.

Honors/Activities: American Institute of Chemical Engineers; National Society of Collegiate Scholars; National Action Council for Minorities in Engineering; Trilingual: English/Swahili/Kikuyu

Victor Salazar
Senior, Mechanical Engineering

Warren White
Associate Professor, Mechanical & Nuclear Engineering

Non-Linear Controls of Underactuated Mechanical Systems

Information, as well as the understanding of nonlinear control of underactuated mechanical systems shared with the engineering community, is the basis of this research sponsored by the National Science Foundation and supported by the Developing Scholars Program. Examples of underactuated systems are rocket guidance together with satellite and underwater vehicle orientation control systems. Part of the dissemination of the research results is the internet. The task at hand is to create a website that will draw the attention of others in the same field of study. The website will include an explanation of the research, methods, figures, published papers, simulations, and videos. Proper organization of the web page so that the viewer knows exactly what he/she is looking at together with the ability to distinguish between different problem types and easy navigation of the site is essential for successful communication. This is important because non-linear control of underactuated systems is theoretically more complex than linear systems, but with proper understanding the nonlinear techniques offer greater performance capabilities. In addition to the website, the design and construction of underactuated mechanical system test articles allow the demonstration of the controllers on physical devices. Such devices illustrate the challenging issues associated with controlling these mechanical systems as well as showing that the developed techniques do in fact work. Another useful aspect of the experimental devices is the fact that they are very interesting. Information about underactuated system control on the internet is scarce; therefore, having a website along with physical devices will bring groups of researchers together to allow the sharing of information and the bringing forth of collaborative solutions to problems.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; Rake N' Run

Robert Moreno
Sophomore, Financial Planning

Yun-Oh Whang
Assistant Professor, Marketing

Sports Fanfare and Common Identity: The Differences between Caucasians and African Americans

This project focuses on the major cultural and sociological differences between Caucasian and African American fans at a major Midwestern state university's sporting events. This project is designed to identify the driving force between the two races' behavior, focusing on various esteems that represent common group identity. It helps us understand the differences in the fanfare of sporting events between the two major ethnic groups on the university campus. Information is gathered first by inquiring what work has already been done pertaining to this topic. Next, a series of interviews were conducted with students who are intense and moderately intense fans to measure their common identity perception and support for the university's football program. Interviews were given to fifteen subjects. Seven are Caucasian and eight are African American. The content of the interviews is transcribed and categorized to identify various types of common identity including public esteem, identity esteem, membership esteem, and private esteem of the respondents. The levels of these four esteems are recorded to be correlated with the intensity of the respondents' support for the university's football program. Based on the correlations found, the differences between Caucasian and African American college students are analyzed and discussed.

Honors/Activities: Law Internship, Kansas City; Bilingual: English/Spanish

Jose Valles
Senior, Animal Science & Industry,
Pre-Veterinary Medicine

Daniel Thomson,Christopher Reinhardt
Associate Professor, Clinical Sciences
Assistant Professor, Animal Sciences & Industry

Web-based Modular Delivery of Training Materials to Feedyard Employees

The Beef Cattle Institute at Kansas State University, along with the collaboration of other professionals, has collected numerous sources of information to create modules that will benefit many different topics and areas in the beef industry. These modules have been produced in a multi-media format such as hard copy, audio, and video, all bilingual in English and Spanish. These modules are intended to serve to train and educate the English and Non-English speaking elements of the beef industry and other cattle affiliated businesses. These modules will be presented to a minimum of 30 individuals in six to ten different feedlots in the state of Kansas in the spring semester of 2009. While presenting, each individual will take a pre-test and after viewing the module, a post-test. Both pre- and post-tests will include the exact same questions. The tests and the modules will be provided to the individual in his/her preferred language. Both scores of the tests will be recorded and compared. The results of this study will be documented to confirm the effectiveness of these modules in increasing the individual's knowledge. As this study is completed and if positive feedback is gained, the modules will be copyrighted to be supplied for national and international usage.

Honors/Activities: Bridges to the Future; James R. Coffman Award of Excellence; Hill's Pet Nutrition Scholar; Bilingual: English/Spanish; Beef Cattle Symposium; Men's Soccer Club; Rake N' Run

Christopher Sanders
Sophomore, Landscape Architecture

Stephanie Rolley
Professor, Landscape Architecture, Regional & Community Planning

Historic Mapping of Kansas State University

This digital mapping project presents a comprehensive historical mapping of Kansas State University from 1863 through the present. The purpose is to illustrate the impact of the university's presidents on development of the campus. K-State began as an agricultural school and evolved into a suburban academic community. This project traces that history.

The maps are created in ArcGIS using current campus maps and historical references to determine the layout of the campus throughout its history. Hand-drawn maps created by Lori Tolliver, MLA '96 are used as a primary reference to compose the digital maps of all campus buildings and roads. Map layers illustrate the major eras of presidential impacts.

The maps help users understand the factors that have influenced the form of the Kansas State University campus and its sense of place. Viewed in chronological sequence, one can see the evolution of the campus' physical form as well as the influence of different administrations. Users may select the date in time they wish to see and all buildings and campus roads will be displayed accurately.

Honors/Activities: Accepted into Masters of Landscape Architecture Program; KSU Competitive Shooting Squad; Rake N' Run

Tamica Lige
Sophomore, Fine Arts

Douglas Dow
Assistant Professor, Art

The Origin of Medici Art Patronage: The Old Sacristy at San Lorenzo

The Medici, a prominent banking family in Renaissance Florence, emerged at the beginning of the fifteenth century as significant patrons of the arts, commissioning works from figures such as Brunelleschi, Michelangelo, Donatello, and Botticelli. Giovanni di Bicci de'Medici began this tradition of sponsorship of the arts with the construction of the Old Sacristy at San Lorenzo.

In order to understand what motivated the art patronage of the Medici, one must examine Giovanni di Bicci's first major commission, the Old Sacristy. Under Giovanni's leadership the family bank secured a valuable papal account that led to an increase in the wealth, power, and visibility of the Medici in Florence. Giovanni financed the renovation of San Lorenzo, an ancient church that had functioned for a time as the seat of the bishop. Commissioning the Old Sacristy and funding the renovation of this historical site expressed the ambitions of the Medici.

This study will place the patronage of Giovanni di Bicci de'Medici within a tradition of sponsorship of art and architecture by other prominent Florentine families. The practice of commissioning art was an established means of signaling status in Renaissance Florence. For the Medici, Giovanni set a precedent at the Old Sacristy, an example that gathered force as it was revisited by generations of Medici heirs.

Honors/Activities: President's honor Roll (1); K-State Proud Award; Smith-Craig Art History Scholarship; Study Abroad in Italy; Multilingual: English/Spanish/Italian; Art History Society

Miriam Martinez-Osorio
Senior, Biology

Tonatiuh Melgarejo
Associate Professor, Human Nutrition

Establishment of a Primary Cell-Line of Feline Macrophages

Macrophages play an important role in the innate (non-specific) as well as in the cell-mediated (specific defense) immune response. Macrophages are phagocytic cells derived from another type of white blood cells, the monocytes. The macrophages function to take up and digest a variety of cellular debris as well as pathogens, and they furthermore interact and stimulate other types of immune cells. Because macrophages are versatile cells, which play a role in a multitude of different biological scenarios, these cell types have been studied intensely. However, studies are currently sparse on macrophages in the domestic cat (Felis catus), and no feline macrophage cell lines are commercially available. Various potentially lethal infectious diseases, such as FIV (Feline immunodeficiency virus) and FeLV (Feline leukemia), affect the domestic cat - which is a much treasured pet animal in the Western hemisphere. Novel non-invasive *in vitro* models to further study feline infectious pathogens are therefore warranted. This study is focused on the establishment of a primary cell line of macrophages derived from feline monocytes using standard laboratory techniques. The feline macrophage cell line established in our laboratory will be invaluable in future studies of different pathogen/macrophage interactions, as well as investigations into the mechanisms of macrophage antimicrobial effector functions and the contribution of macrophages to the specific immune responses of carnivore species.

Honors/Activities: Bridges to the Future; Bilingual: English/Spanish; Flint Hills Bread Basket

Dina Sanchez
Senior, Biology

Helmut Hirt
Assistant Professor, Biology

Characterization of a Mobile Genetic Element Encoding Tetracycline Resistance from an Environmental Enterococcus hirae Isolate

Enterococci have become a major concern as important nosocomial pathogens. The major concern is not necessarily a dominant virulence factor but resistance to a wide variety of antimicrobials. Little is known about the ecology of antibiotic resistance genes. We have found a significant occurrence of antibiotic resistance genes, mainly encoding resistance to tetracycline and erythromycin, in enterococci isolated from bison and skunk from Konza Prairie. Tetracycline resistance could be transferred by conjugation to an E. faecalis recipient. One of the mobile genetic elements – originally isolated from an E. hirae from skunk – was closer characterized for its transfer abilities and stability.

Honors/Activities: Bridges to the Future; Red Cross Volunteer; Bilingual: English/Spanish; Rake N' Run

Liliana Garcia
Sophomore, Human Nutrition

Michael Kanost
Distinguished Professor, Biochemistry

Proteomic Analysis of Larva Hemolymph Proteins from Anopheles Gambiae Mosquito

Anopheles gambiae mosquitoes are the vector of many diseases, including malaria. In our research we are studying the insect's immune system and how it might help the insect fight off infection by parasites. Many proteins the insect uses for immunity can be found in the hemolymph (blood) proteins. One important group of proteins are serpins (Serine Protease Inhibitor) which help control the immune system. In this research we focused in the hemolymph from the larval stage of the mosquito. We collected hemolymph from 6-7 days old (168-192 hours) larvae and used SDS Polyacrylamide Gel Electrophoresis to analyze the proteins. We compared this gel with one from adult mosquitoes and found that some of the protein bands are different. We have used an immunoblot technique to identify some of the serpins present in the hemolymph. The genome of Anopheles gambiae has been sequenced, so we should be able to identify the proteins, by matching the DNA sequence of the genes with the amino acid sequence of the proteins. Further, we will use Mass Spectrometry to identify more proteins present. Also, we will test the hemolymph for immune proteins that inhibit bacteria growth. If we can understand the insect's immune system and how it responds to infection, this will aid the effort to develop methods that help protect people from diseases such as malaria.

Honors/Activities: United Multicultural Women; Bilingual: English/Spanish; Travel: Mexico; Wonder Workshop; Rake N' Run

Curtis McClain III
Senior, Kinesiology

Thomas Barstow
Professor, Kinesiology

The Effects of Supine and -6 Degree Head-down Tilt Posture on Exercise Capacity Compared to Upright Exercise

Background: Studies have shown that microgravity (-6 degree head-down tilt) exposure decreases cardiac output and exercise performance. These changes occur due to change in blood flow and body fluid distribution. However, there is little known about the effects that occur during acute exercise in a supine or -6 degree head-down tilt position compared to an upright position. Purpose: We know that there is a trend in exercise capacity in the supine and/or -6 degree head-down tilt position compared to the upright position (reduced peak heart rate and VO2). But how significant are these differences to heart rate, stroke volume, and cardiac output? Methods: Seven healthy untrained males performed maximum oxygen uptake (VO2 MAX) tests in the upright, supine, and -6 degree head-down tilt positions. Measurements of oxygen uptake and heart rate were taken throughout the test. Cardiac output was measured periodically and referenced to the 100-watt work rate. Stroke volume was computed from heart-rate and cardiac output. Results: Significant decreases in peak oxygen uptake and heart rate were shown in the supine and -6 degree head-down tilt positions compared to the upright position(VO2peak 2.01±0.46, 2.01±0.51 compared to 2.32±0.61 L/min respectively; peak heart rate 161±14 compared to 172±11 bpm). In the -6 degree head-down tilt position stroke volume at 100 watts was significantly higher compared to the upright position (76.6±4.7 compared to 71.2±4.5, ml). Conclusion: Results suggest an immediate decrease in exercise capacity upon exposure to a microgravity environment, before any cardiovascular deconditioning. This would suggest astronauts should perform exercise tests in the -6 degree position prior to space flight to evaluate exercise performance and establish a baseline response.

Honors/Activities: Bridges to the Future; Life Fitness Center Practicum; Kinesiology Student Association

Vanessa Reyes
Senior, Biology/Pre-Medicine

Tonia Von Ohlen
Assistant Professor, Biology

Egfr Pathway Regulation on Subcellular Localization of Ind

The central nervous system in Drosophila is divided into three domains which form three columns of neuroblasts. These three domains are dependent on three transcription factors: Ventral nervous system defective (Ind), and Muscle segment homeobox (Msh). The Epidermal growth factor receptor (Egfr) pathway regulates the activity of the protein MapKinase. In turn, MapK regulates Ind activity by phosphorylation. Drosophila S2 cells were used to detect expression of Ind by manipulating MapK activity levels. This was achieved by transfecting S2 cells with a plasmid expressing Ind. MapK levels were adjusted by the addition of lipopolysaccharide (LPS). Transfected cells were treated with an anti-MapK primary antibody followed by a fluorescent secondary antibody for microscopic viewing. The results indicated that an increase in MapK activity increases localization of protein in the nucleus. This allows Ind to actively repress target genes.

Honors/Activities: Golden Key Honor Society; National Scholars Honor Society; Multicultural Student Honor Society; Terry C. Johnson Cancer Research Award; Hill's Pet Nutrition Scholar; Scholars in Rural Health Program; Bridges to the Future; Travel: England/Scotland; Bilingual: English/Spanish