19th Annual
Capitol Graduate Research Summit
March 29, 2022

Featuring Graduate Student Research from:

Emporia State University
Fort Hays State University
Kansas State University
Pittsburg State University
University of Kansas
University of Kansas Medical Center
Wichita State University

Presenters and Poster Titles

Emporia State University

Noeline A. Boardman	SOIL EXTRACTION METHODOLOGY AND DETERMINING SOIL MICROBIOME SEASONALITY WITH NEXT-GENERATION SEQUENCING
Willa Frazer	PERSONAL GOAL IMAGERY: STRENGTHS-BASED VISUAL DEPICTION TO PROMOTE SELF-EFFICACY AND GROWTH INITIATIVE
Clayton Matthews	THE INTERACTIONS OF PhoU1 AND PhoU2 HOMOLOGS IN STAPHYLOCOCCUS AUREUS
Md. Masud Rana	REVISITING BANK MARKET CONCENTRATION: DON'T FORGET ABOUT CREDIT UNIONS
Elizabeth Schmidt	CREATION OF SELF PORTRAITS ON SELF-ESTEEM OF COLLEGE STUDENTS

Tamera Geyer	FIDELITY OF IMPLEMENTATION: A REINTEGRATION PLAN
Alison Helget	A SINFUL DISEASE: THE CATHOLIC CHURCH AND THE AIDS CRISIS IN AMERICA
Mitchell Lukens	WARM-BLOODED MOSASAURS? HOW A KANSAS FOSSIL MAY REVEAL ANCIENT PHYSIOLOGIES
Rylee Massey	MENTAL HEALTH SERVICES FOR UNDERSERVED AREAS AND GROUPS: WORKPLACE MOTIVATIONS AND RECOMMENDATIONS OF MENTAL HEALTH PROFESSIONALS IN KANSAS

Mohanish Andurkar	INVESTIGATING THE EFFECTS OF NUCLEAR RADIATION ON ADDITIVELY MANUFACTURED PARTS
Shelby Astle	TO TALK OR NOT TO TALK: AN ANALYSIS OF PARENTS' INTENTIONS TO TALK WITH CHILDREN ABOUT DIFFERENT SEXUAL TOPICS USING THE THEORY OF PLANNED BEHAVIOR
Edward Bird	UTILIZING COMPARATIVE TRANSCRIPTIONS TO UNDERSTAND THE EFFECTS OF VESICULAR STOMATITIS VIRUS INFECTION ON NEURO-SENSORY FUNCTION IN CULICOIDES MIDGES
Cris Kauer Brazil	CAN VIRTUAL REALITY BE USED TO TEST OLDER ADULTS ON DAILY ACTIVITIES PERFORMANCE?
Brandi Feehan	AGE-ASSOCIATED MICROBIAL STABILITY AND VOLATILITY SHAPE THE GUT MICROBIOME IN A HEALTHY PIG MODEL
Anne Lovett	ACUTE ANAPLASMOSIS REDUCES BREEDING SOUNDNESS IN EXPERIMENTALLY INFECTED BEEF BULLS
Carlos B. Pires	KANSAS SOIL HEALTH PARTNERSHIP
Emily Randig	APPLICATION OF FLUORESCENCE SPECTROSCOPIC CHARACTERIZATION OF AN ALGAL BLOOM EVENT IN THE MILFORD GATHERING POND
Archana Sekar	DEVELOPMENT OF DURABLE ANODE ELECTROCATALYSTS FOR DIRECT METHANOL FUEL CELLS
Jack Sytsma	DOMINANT PRAIRIE GRASS CROSS-TRANSPLANTED ACROSS THE MIDWEST RAINFALL GRADIENT: RESPONSE TO DROUGHT

Emma M. Buckardt	LANDSCAPE COMPOSITION AFFECT ANURAN OCCUPANCY PATTERNS ON MINED LANDS
Jaquelyn Bouchie	EXPLORING THE EFFECTS OF CORPORATE SOCIAL RESPONSIBILITY (CSR) IN MEDICAL TOURISM PROVIDER WEBSITES
Thai Butcher	ONE-STEP SYNTHESIS OF SOYBEAN POLYOLS: TECHNOLOGY ADVANCEMENT AND COMMERCIALIZATION
Eniola Arogunyo	DEVELOPMENT OF MAGNETO-PLASMONIC NANOSENSORS FOR THE DETECTION OF E. COLI O157:H7
Magdalene A. Asare	ECO-FRIENDLY AND HIGHLY FLAME-RETARDANT POLYURETHANE FOAMS USING SUNFLOWER OIL

University of Kansas

Jenna Frick	LONG-TERM HIGH-FAT/HIGH-SUGAR DIET WORSENS EARLY LIFE STRESS-INDUCED OBESITY
Jacob Hodge	TAILORING STEM CELL THERAPIES TO ENHANCE REGENERATIVE WOUND HEALING
Jess Kiblen	PROPEL PROJECT: PROMOTING SELF-DETERMINATION AND SOCIAL ENGAGEMENT FOR STUDENTS WITH AUTISM
Kyung Mi Min	DEVELOPING EFFECTIVE SELF REGULATION SKILLS IN EARLY CHILDHOOD
Julia Russell	SLEEP, HEALTH, AND BURNOUT IN CAREER FIREFIGHTERS
Rohit Singh	A NOVEL TECHNOLOGY TO TREAT BLOOD-VESSEL RELATED DISEASE THROUGH SPACE AND TIME SYNCHRONIZED ULTRASOUND AND LASER
Siddharth Subham	ASSEMBLING *AVENGERS* "CAR T CELLS" TO ELIMINATE BREAST CANCER
Micah Unruh	SOIL AGGREGATES, ORGANIC MATTER, AND MICROBES: IMPROVING UNDERSTANDING OF PROCESSES THAT SUPPORT SOIL FERTILITY AND FUNCTION

Samantha Cintron	UNDERSTANDING OBESITY-RELATED HIGH OUTPUT HEART FAILURE AND POLICY IMPLICATIONS FOR GENOMICS RESEARCH
Max Fairlamb	THE DNA REPAIR RELAY RACE
Amy Herman	A SINGLE DIET MESSAGE VERSUS TRADITIONAL HEALTHY EATING DURING PREGNANCY
Lauren Johnson	SHOULD BREAST CANCER PATIENTS HAVE PREOPERATIVE BIOPSY OF BORDERLINE ABNORMAL AXILLARY LYMPH NODES?
Elizabeth Thoenen	STRESS GRANULE INHIBITION IS A NOVEL VULNERABILITY OF MUTANT p53

Hafia Alqahtani	THE RELATIONSHIP BETWEEN PREFERENCE AND PERFORMANCE AND PERFORMANCE USING THREE PASSIVE EXOSKELETONS DURING SIMULATED AIRCRAFT MANUFACTURING TASKS
Amrutha Dasyam	NEURAL NETWORK ASSISTED TRAJECTORY PLANNING FOR SPACE MISSIONS
Wyel Halimeh	DEPENDENCE OF PROLINE ISOMERIZATION ON THE KINETICS OF FOLDING OF ANTHRAX LETHAL FACTOR
Smitha Haridasan	COMPUTER VISION TECHNIQUES FOR FIRE DIRECTION AND LOCALIZATION
Vijay Matheswaran	SMALL SCALE ENERGY DEVICES USING VORTEX INDUCED VIBRATION
Mathur Saket	DESIGN AND SYNTHESIS OF BISMUTH SULFIDE AND EXPLORING ITS APPLICATION AS A PHOTO-ELECTRODEMATERIAL IN THIRD GENERATION SOLAR CELLS

SOIL EXTRACTION METHODOLOGY AND DETERMINING SOIL MICROBIOME SEASONALITY WITH NEXT-GENERATION SEQUENCING

Noeline A. Boardman and Scott S. Crupper
Department of Biological Sciences

Bacterial DNA can be isolated from soil as a forensic tool in criminal investigations. Unfortunately, the wide variety of molecules found in soil can be problematic and lead to low DNA yields. This project's goals were to evaluate different DNA isolation kits for their utility in obtaining quality DNA from soil suitable for Next-Generation Sequencing and to evaluate the impact of season on the soil microbiome. Extractions were performed using four commercially available kits: two specifically for soil, and two for other media (insects/tissue and bacteria/fungi). The kits were utilized to analyze either soil or the buffer portion of buffer-saturated soil. DNA was evaluated using the polymerase chain reaction (PCR) to amplify the bacterial 16S rRNA gene. Analysis by agarose gel electrophoresis demonstrated no amplified products from extractions when only soil was used. However, the insect/tissue kit and one soil specific kit yielded a PCR product from buffer-saturated soil. To assess the effect of seasonal soil collections, soil samples from spring, summer, fall, and winter were assessed by Next-Generation Sequencing and bioinformatics. Statistical analysis was performed to compare data obtained from different seasons. We found that while using a DNA extraction kit meant for soil would seem the obvious method to extract DNA from soil, our data indicates that kits developed specifically for soil DNA isolation may not necessarily be the best choice for that procedure. Our analysis also found no significant differences in the ratios of microbial Phyla or Classes in soil obtained from all four seasons.

PERSONAL GOAL IMAGERY: STRENGTHS-BASED VISUAL DEPICTION TO PROMOTE SELF-EFFICACY AND GROWTH INITIATIVE

Willa Frazer
Department of Counselor Education

Positive mental health interventions can support agency, resilience in response to challenges, and well-being through increased hope for personal change. Appraisal, self-observation, and mental behavioral rehearsal relate self-efficacy and goal setting or achievement. Art therapy may contribute to these processes by promoting control, choice, externalization of abstract internal concepts, and a sense of accomplishment through supported challenge. This study bridges literature on coaching, visualization, cognition and behavior, and positive art therapy to understand if and how art processes can contribute belief in capability, salience of strengths, and approachability of goals. This quasi-experimental (no control group, pre/posttest) mixed-methods pilot study explored whether a strengths-based goal depiction activity would increase feelings of self-efficacy and orientation towards personal growth. Participants used their choice of researcher-provided art materials to depict strengths and a goal during an individual art therapy session conducted through video conferencing. The quantitative effects of the intervention were measured using online forms of the General Self-Efficacy Scale and the Personal Growth Initiative Scale-II for 7 female-identifying participants. The results indicate a significant increase in general self-efficacy and personal growth initiative after the intervention. Correlations between initial scores and score changes indicate possible mediating factors to explore in future research. Qualitative comparisons of demographic information, participants' verbal reports, characteristics of strengths and goals, and artwork styles revealed content and imagery themes without identifiable relationships to score changes. The diversity of artistic and verbal responses suggests choice and expressive flexibility as possible mechanisms supporting the effects of the intervention.

THE INTERACTIONS OF PhoU1 and PhoU2 HOMOLOGS IN STAPHYLOCOCCUS AUREUS

Clayton Matthews and Stewart Gardner
Department of Biological Sciences

Methicillin-resistant Staphylococcus aureus (MRSA) is an aggressive, opportunistic bacterium and challenging to treat due to the rise in antibiotic resistance. The pathogenesis of S. aureus is closely related to virulence factors and persister (transiently antibiotic-tolerant bacterial cells) formation. PhoU homologs are critical in defining the regulation of persister cell formation and phosphate (Pi) metabolism in invasive bacteria. Specifically, two PhoU protein homologs in S. aureus, PhoU1 and PhoU2, are instrumental in regulating the PstSCAB phosphate transport complex and key to the formation of persisters. How these homologs interact within S. aureus phosphate regulation remains unclear. Previous research in Escherichia coli shows that PhoU regulates PstSCAB and PhoB-PhoR. This comprehensive research focused on the two proteins interaction using a Bacterial Adenylate Cyclase Two-Hybrid (BACTH) system. In addition, the level of interactions between proteins was determined using quantitative Betagalactosidase and qualitative colorimetric assays. Protein structures were predicted using Phyre2 and Cluspro protein modeling software. These observations indicate PhoU1 self-dimerizes. Additionally, PhoU2 and PhoR also self-dimerize. The analyses revealed there is some, although weak, interaction between PhoU1 and PhoU2. PhoU1 interacts with PstB; however, there is no interaction with PhoU2 and PitA. Furthermore, research findings also indicate the structure of PhoU1 and PhoU2 dimers and possible PhoU1-PhoU2 heterodimer protein structure models. This study provides a coherent understanding of PhoU1 and PhoU2 interaction with other proteins and points to potential models of how PhoU1 and PhoU2 are involved in phosphate signaling and virulence gene regulation

REVISITING BANK MARKET CONCENTRATION: DON'T FORGET ABOUT CREDIT UNIONS

Md. Masud Rana and Marc Anthony Fusaro
School of Business

When measuring market share in the U.S. banking industry, standard practice uses the Summary of Deposit data, available from the FDIC, to measure the output of each firm in each location (and thus each market). But this standard ignores a significant set of firms offering depository services, credit unions. Thus, standard metrics cause markets to appear more concentrated—to have less competition—than an accurate measure would. This omission is due to data unavailability at the branch or market level for credit unions. In this article, we use statistical modeling to allocate institution wide deposits (output) to branches and recalculate market shares. Market share mismeasurement is a significant problem for both policy (e.g., evaluating antitrust cases) and economic research (e.g., controlling for competition influences).

CREATION OF SELF PORTRAITS ON SELF-ESTEEM OF COLLEGE STUDENTS

Elizabeth Schmidt

Department of Counselor Education

The Creation of Self Portraits on Self-Esteem of College Students investigates the effects which creating a self-portrait have on the self-reported self-esteem of college students. This study fills an important gap in the literature regarding self-esteem, college students, and self-portraits as a form of art therapy intervention. College students are in a transitional point in their lives which contributes to their increased risk for reporting low self-esteem, which is correlated to a sense of rejection, mental health problems, suicidal ideation, poor job performance, disturbed interpersonal relationships, substance abuse, and domestic violence. Inversely high self-esteem is correlated to resilience, assertiveness, a positive view on life, overall engagement of a healthy lifestyle, and maximization of their potentials. This research examines the impact of creating a self-portrait on their self-reported self-esteem. It was hypothesized that college students will demonstrate a boost in self-esteem after creating a self-portrait as measured by the Rosenberg Self-Esteem Scale (RSES). Participants (N=13) completed the RSES prior to attending an in-person session, attend a single one-hour long art making session, and completed the RSES immediately following the creative process. This quantitative quasi-experimental pre-test post-test design featured a paired t-test. Although there was not a statistically significant boost in participants self-esteem, a majority (N=7) of participants scores on the RSES did increase after creating a self-portrait. College students can greatly benefit from increased self-esteem and art therapy can be an excellent way to boost their self-esteem leading to positive life impacts.

FIDELITY OF IMPLEMENTATION: A REINTEGRATION PLAN

Tamera Geyer
Department of Education

The present study investigated the need for a reintegration plan written into students' individual education plan (IEP), that is required by the State of Kansas for students who are placed in the alternative school setting. Currently, the law does not require a plan of reintegration that would ensure that stakeholders are accountable for implementing a plan with fidelity. Students who are placed into the alternative school setting often fail to reintegrate back to the general education setting successfully. Findings from satisfaction perception surveys, literature review, and systematic reviews of the State and Federal guidelines show the need for the development of an action plan for reintegration. Approval by the Kansas State Board of Education will necessitate an update to the IEP process handbook, training for IEP specialists and professional development for special education educators. Furthermore, all current placements in the alternative settings will require an amendment for their reintegration plans.

A SINFUL DISEASE: THE CATHOLIC CHURCH AND THE AIDS CRISIS IN AMERICA

Alison Helget
Department of History

From the first contraction of AIDS in America, the country deemed it the “gay disease.” While it continues to impact the LGBTQ+ community at increased levels, the disease does not target any specific gender, race, ethnicity, sexual orientation, etc. The stigma associated with AIDS stopped a lot of people from getting tested or telling their loved ones that they were HIV-positive, especially those who associated with groups that did not support non-heterosexual lifestyles. This includes the Catholic Church which abides by a fundamentalist interpretation of scripture. Since the papacy has a long history of sequestering rumors that strike not only at the celibacy but the sexuality of the priesthood, allegations about the crisis seeping into the American clergy threatened an international controversy when the College of Cardinals were hoping that the election of empathetic John Paul II would settle earlier issues. Initially, the Church in Rome chose to remain silent on the matter, causing the United States Bishops to join efforts with the Office of the Surgeon General to implement safe-sex curriculums in schools. Amidst the sacrilegious storm, compassionate priests across the country who were either HIV-negative or silently HIV-positive started projects and programs to raise awareness or offer counseling to infected individuals. Now, the current leader, Pope Francis, is attempting to amend a respectful relationship with the LGBTQ+ community that was severely strained due to the Church’s reaction, or lack thereof, to the 1980s AIDS crisis in America.

WARM-BLOODED MOSASAURS? HOW A KANSAS FOSSIL MAY REVEAL ANCIENT PHYSIOLOGIES

Mitchell Lukens
Department of Geosciences

The question of mosasaur physiology is important because of the ancient marine reptiles' dominance of the late Cretaceous oceans. An elevated body temperature would have enabled these animals to be active in many different aquatic environments. Stable isotope analysis of oxygen isotope ratios (expressed as δ18O values) preserved within fossil tissues can reveal temperature and physiological variances within skeletons but not differentiate between body temperature and water temperature. A rare specimen of a mosasaur with stomach contents presented an opportunity to resolve this problem. Excavated from the Niobrara Chalk of Logan County, Kansas, "Belle," a Platecarpus sp., contains the remains of its last meal: belemnites. Belemnites, squid-like animals, had body temperatures equivalent to the ocean water they lived in, preserving the water temperature in their calcite-based rostrums. The entombing chalk, composed of coccolith tests, also recorded the surface water temperature. Preliminary results of calculated temperatures provide evidence that "Belle's" body temperature is elevated relative to both the belemnites and the coccoliths, suggesting an endothermic physiology. Examining intra-bone and inter-bone variation of oxygen isotope ratios across the skeleton indicates that the body temperature fluctuated throughout the body, implying this mosasaur was heterothermic. The belemnites' temperature entails they lived in colder waters, deeper in the water column or further north in the sea, perhaps indicating where "Belle" ate them before its death. The coccoliths confirm previous water temperature research for the Western Interior Seaway in Kansas during the late Cretaceous.

MENTAL HEALTH SERVICES FOR UNDERSERVED AREAS AND GROUPS: WORKPLACE MOTIVATIONS AND RECOMMENDATIONS OF MENTAL HEALTH PROFESSIONALS IN KANSAS

Rylee Massey
Department of Psychology

Approximately 1 in 5 adults in the United States suffer from a mental illness, thus motivating mental health professionals and psychological researchers alike to assess the need for mental health services. Although there has been a recent nation-wide focus on providing mental health services to underserved areas and groups, there remains a disparity in who has access to effective care, especially in the state of Kansas. To better understand mental health service accessibility, we sampled from mental health professionals in Kansas to examine workplace motivations and recommendations they have to promote mental health resources to underserved areas and groups. Overall, 611 individuals with a diverse-range of training and licensures participated. Results indicate that specific workplace motivations predict the willingness to work in underserved areas and with underserved groups. These motivations included factors such as: compassion ("I am committed to providing care for those who are underserved"), financial incentives ("My priorities include to receive allowances, tax breaks, and/or student loan payouts"), location preferences ("I am excited by the idea of living in a rural area"), personal interests ("A big priority includes working with people who need mental health services because I have personally struggled with my own mental health"), and career options ("In choosing any job, my biggest priorities include the career opportunities the job offers"). These findings may assist researchers and other stakeholders in Kansas to better understand workplace motivations and how to attract and retain mental health professionals to work in underserved areas and/or for underserved groups.

INVESTIGATING THE EFFECTS OF NUCLEAR RADIATION ON ADDITIVELY MANUFACTURED PARTS

Mohanish Andurkar[1], Bart Prorok[2], Valentina O'Donnell[3], John Gahl[3], and Scott Thompson[1]

[1]Alan Levin Department of Mechanical and Nuclear Engineering; [2]Department of Materials Engineering, Auburn University; [3]University of Missouri Research Reactor (MURR)

The growing interest in developing safe modular nuclear reactors has resulted in a need for advanced materials/parts that can tolerate intense radiation while in service. Manufacturing of such advanced materials via traditional machining processes present several challenges. Recently, Additive Manufacturing (AM), or 3D printing, has shown capability of fabricating complex-shaped nuclear components. AM offers a unique opportunity to print parts on demand with a reduced need to rely on external suppliers. The aim of this research is to compare the mechanical properties of metal samples fabricated using conventional machining and AM methods before and after nuclear radiation. This research will help engineers design next-generation, radiation-resistant nuclear reactor components using AM processes. Inconel 625 (a nickel-based superalloy) was fabricated using the laser powder bed fusion (L-PBF) AM process. The samples were placed inside a nuclear reactor for 2 weeks. The mechanical properties of these samples were examined by measuring hardness before and after nuclear radiation. The hardness values of the AM samples were compared to traditional machined samples**.** Results indicate that AM specimens are less prone to radiation hardening defects relative to their wrought counterparts. As-printed AM specimens showed an increase in hardness by 1.2% hardening. The wrought samples displayed an increase in hardness by 5.25%. Results provide insight into how one can minimize radiation hardening in nuclear materials for their safe and reliable use. Results should increase confidence levels for adopting AM for building nuclear reactor components which perform the same or better than conventionally manufactured components.

TO TALK OR NOT TO TALK: AN ANALYSIS OF PARENTS' INTENTIONS TO TALK WITH CHILDREN ABOUT DIFFERENT SEXUAL TOPICS USING THE THEORY OF PLANNED BEHAVIOR

Shelby Astle, Michelle Toews, Glade Topham, Amber Vennum

Department of Applied Human Sciences

Parent-child sexual communication (PCSC) has positive outcomes for children's sexual health, but parents' intentions to educate children about sexuality are largely understudied. Based on the theory of planned behavior, this study aimed to explore what factors are associated with intentions to talk with children about different sexual topics. A sample of 561 parents of an oldest child ages 6-11 were recruited to complete a survey through Prolific.co. Results of a path analysis showed that having positive attitudes about PCSC, believing others would approve of them talking with kids about sex (subjective norms), and feeling that they had the ability to engage in PCSC (self-efficacy) were significantly associated with parents' intentions to talk to their children about at least three of the five categories of sexual topics ("the basics," "pleasure," "sex in relationships," "gender identity/sexual orientation," and the "religious meaning of sex"). Of these components, self-efficacy was most consistently and strongly associated with increased intentions to discuss all topics, followed by the attitude of believing sex education was the parents' responsibility. These findings suggest that building self-efficacy and helping parents feel responsible for educating their children about sex would be most important in attempting to increase parental intentions to engage in PCSC on a wide variety of topics. Funding for parent-targeted programming should be allocated to increase parent intentions to engage in PCSC. This programming should focus on helping parents develop self-efficacy and a sense of responsibility for educating children about multiple sexual topics.

UTILIZING COMPARATIVE TRANSCRIPTOMICS TO UNDERSTAND THE EFFECTS OF VESICULAR STOMATITIS VIRUS INFECTION ON NEURO-SENSORY FUNCTION IN CULICOIDES MIDGES

Edward Bird[1], Brandon Hall[1], Kristopher Silver[1], and Dana Nayduch[2]
[1]Department of Entomology; [2]USDA-ARS Center for Grain and Animal Health Research

Culicoides midges are important vectors of many livestock pathogens, including orbiviruses and rhabdoviruses. These viruses heavily infect the insect's eyes and other sensory organs as the infection disseminates. Previous midge infection studies with the orbivirus epizootic hemorrhagic disease virus (EHDV) have shown that many genes associated with vision, memory and other behaviors were downregulated, while a few genes associated with olfaction were upregulated. Because vision is important for midges to navigate their environment and is key for vector surveillance via light trapping, virus alteration of these traits has significant implications on host seeking and disease risk assessment. We hypothesized that the reported effects of orbivirus infection on gene expression in midges would also be observed in rhabdovirus-infected midges. In this study, we used RNAseq to determine differential expression (DE) of genes in female *Culicoides sonorensis* infected with the rhabdoviral livestock pathogen, vesicular stomatitis virus (VSV). Midges were fed either blood meals spiked with media containing VSV or virus-free media (controls) and were collected 8 days post-ingestion. RNA was extracted and sequenced from pools of midges in 5 replicates. Overall, 65 genes were significantly (FDR > 0.05) differentially expressed between virus infected and uninfected midges. Many of these genes were associated with the innate immune system, as well several genes in association with olfaction, vision and other neuro-sensory functions. This information will give us valuable insight into altered sensory perception and neurological function of midges, which can inform behavioral phenotypic studies and ultimately better management methods.

CAN VIRTUAL REALITY BE USED TO TEST OLDER ADULTS ON DAILY ACTIVITIES PERFORMANCE?

Cris Kauer Brazil and Malgorzata J. Rys
Department of Industrial and Manufacturing Systems Engineering

The number of people affected by cognitive disorders will increase in the next decades as the US population ages. Researchers need to find effective ways to test, train, and screen individuals affected by normal and abnormal aging processes. Virtual Reality (VR) technology could facilitate screenings by making tests real-life based and more accessible. The purpose of this research is to find out if VR can be used for daily activity testing and will compare real-life performance with VR performance. In this case study, a sorting task was replicated in a virtual environment to compare these two different settings in terms of task load, time, and effectiveness. Twenty college students participated in the study, and results showed a significant difference in time between conditions, with the VR condition taking significantly more time and having significantly higher variability than the real-life condition. The task was effectively completed by participants in both settings, but there were differences in time, strategy, and perceived task load when the two conditions were compared - even when considering learning effects. Participants considerably improved their VR times by the third trial with an average 24.1% improvement. Task load was reported to be higher for the VR task when compared to the real-life task. High levels of immersion and low levels of cybersickness were also reported. This research supports the important considerations when developing VR simulations for common daily tasks. Future research will evaluate differences between younger and older adults when performing VR tasks.

AGE-ASSOCIATED MICROBIAL STABILITY AND VOLATILITY SHAPE THE GUT MICROBIOME IN A HEALTHY PIG MODEL

Brandi Feehan[1], Megan Niederwerder[2], Bob Goodband[3], and Sonny T.M. Lee[1]
[1]Division of Biology; [2]Department of Diagnostic Medicine/Pathobiology; [3]Depertment of Animal Sciences and Industry

The gastrointestinal microbiome plays a critical role in swine health with implications on the sustainability and competitiveness of Kansas swine production. Microbes harbored in the gastrointestinal system are crucial for metabolizing dietary nutrients into utilizable sources for the host while also limiting pathogen invasion leading to disease. This study demonstrated how the swine gut microbiome, specifically bacteria and fungi, develop over a pig's life. Fecal samples from ten pigs were collected during three age-dependent stages: preweaning (0-3 weeks of age), nursery (3-11 weeks), and finishing (11-22 weeks). We performed bacterial 16S rRNA amplicon sequencing to determine diversity and identify taxonomy of distinct bacteria between growth stages, and qPCR for a swine fungus of interest (*Kazachstania slooffiae*). Our results indicated that the preweaning microbiome was relatively more different among the pig hosts as compared to the nursery and finishing aged swine. *Kazachstania slooffiae* abundance was highest immediately following weaning but decreased to a plateau during the middle of the nursery stage. Both the plateau of *Kazachstania slooffiae* abundance and bacterial convergence occurred in the middle of the nursery stage which indicated an interplay between bacterial and fungal establishment within the gut. Our study provided the foundation for future research to evaluate how bacteria and fungi interact with the swine host for diet metabolism, and maintenance of a healthy gut environment. This knowledge can be utilized to improve swine growth and pork production, such as through altered diets and therapeutics, for Kansas agriculture.

ACUTE ANAPLASMOSIS REDUCES BREEDING SOUNDNESS IN EXPERIMENTALLY INFECTED BEEF BULLS

Anne Lovett[1], Emily Reppert[1], John Jaeger[2], Qing Kang[3], Macy Flowers[4], Naemi Bickmeier[4], Tippawan Anantatat[4], and Kathryn Reif[4]
[1]Department of Clinical Sciences; [2]Department of Animal Sciences and Industry;[3] Department of Statistics; [4]Department of Diagnostic Medicine and Pathobiology

The causative agent of bovine anaplasmosis, *Anaplasma marginale*, costs the U.S. cattle industry an estimated $300 million annually. Anemia and fever during clinical anaplasmosis may reduce bull breeding soundness. The study objective was to evaluate breeding soundness outcomes and clinical changes in beef bulls during clinical anaplasmosis and after recovery. Six healthy, *Anaplasma*-negative, mature, Angus bulls of satisfactory breeding status were included. Blood from an infected donor cow was used to challenge three bulls, the other three remaining unchallenged controls. Fever, anemia (via packed cell volume, PCV), pallor, and icterus were monitored weekly in all bulls. Infection progression was evaluated via quantitative PCR and percent parasitized erythrocytes (PPE). Seroconversion was monitored by cELISA. Oxytetracycline was given to bulls with PCVs <15% or temperatures >105°F. Weekly breeding soundness examinations were performed on all bulls for 16 weeks. Breeding soundness parameters included sperm morphology and motility, external and internal genitalia, and physical exam. All *A. marginale*-challenged bulls were PCR-positive, seropositive, and clinical by 3-, 17-, and 24-days post-challenge, respectively. Clinical signs included weight loss, pallor, icterus and fever (≥104.3°F). Anemia in all challenged bulls reached PCV nadirs ≤18% and peak PPEs ≥50%. Breeding soundness reductions were observed days after clinical onset and continued weeks beyond resolution of clinical anaplasmosis. Bulls in the control group remained negative for *A. marginale* by PCR and cELISA, and maintained consistent breeding soundness outcomes. Findings from this study suggest acute anaplasmosis is a driver of reduced breeding soundness in beef bulls.

KANSAS SOIL HEALTH PARTNERSHIP

Carlos B. Pires, Dorivar Ruiz Diaz, Ignacio Ciampitti, and Charles W. Rice
Department of Agronomy

Soil health is proven to have wide-ranging benefits and is of increasing interest to farmers and agricultural stakeholders. Although no-till adoption has been growing, there is still relatively low adoption of cover crops. As soil health practices become more common, data on on-farm soil health metrics changes are needed to target middle and late adopters. The objective of this study is to measure and communicate the environmental benefits of cover crops. The Kansas Soil Health Partnership is a five-year project and currently involves four farms across the State of Kansas: (1) Solomon, (2) Bucyrus, (3) Beloit, and (4) Glen Elder. For this abstract, we will focus on results from site 1. Site 1 is located at the Knopf Farms and is in year three of five. The experimental design was four randomized and replicated strips (RCBD) of the farmer standard practice (no cover crop) and the improved practice (cover crop). Soil samples were taken on a GPS coordinated grid at 0-5 and 0-15 cm soil depth at the first (2019 - benchmark) and third (2021) year of the study. The soil health indicators measured were: β-glucosidase activity (βG), microbial biomass (MB), and arbuscular mycorrhizal fungi (AMF). We observed that cover crops increased all soil health indicators at 0-15 cm when comparing 2019 and 2021. The increments in βG, MB, and AMF were even higher at 0-5 cm. Cover crops have demonstrated a great potential for improving soil health across Kansas.

APPLICATION OF FLUORESCENCE SPECTROSCOPIC CHARACTERIZATION OF AN ALGAL BLOOM EVENT IN THE MILFORD GATHERING POND

Emily Randig and Prathap Parameswaran
Department of Civil Engineering

An increase in the frequency and geographic distribution of algal and cyanobacterial blooms has been observed over the last two decades, threatening marine and freshwater ecosystems. In situ fluorometers have been proposed for their potential to provide early warning of bloom development through the analysis of fluorescence signatures of the water. Despite the potential of the technology, there has been no in-depth analysis studying the fluorescence and 3-D excitation emission matrixes (EEMs) of an algal bloom in a waterbody experiencing an algal bloom with intensive monitoring. The Milford Gathering Pond in Geary County, KS experiences annual algal blooms that cause public access closures and affects the Kansas Department of Wildlife and Parks fish hatchery. An algal bloom at the pond was intensively monitored from April 2021 to November 2021. Various water quality parameters such as pH, turbidity, orthophosphate, total nitrogen, and total carbon were tracked and the 3D fluorescent EEM spectroscopy was analyzed. Preliminary findings have shown EEM intensity changes in the T1 and C1 fluorophores, which represent the Protein-like and Humic-like components respectively. Although subtle, early changes in the EEMs correspond with the onset of the bloom and the EEMs continued to change with the progression and increase in severity of the bloom. The findings show promise for a proactive and realistic algal monitoring tool which can be used by regulators and scientists alike for greater societal and environmental well-being.

DEVELOPMENT OF DURABLE ANODE ELECTROCATALYSTS FOR DIRECT METHANOL FUEL CELLS

Archana Sekar[1], Nathaniel Metzger[2], Xianglin Li[2], and Jun Li[1]
[1]Department of Chemistry; [2]Department of Mechanical Engineering, University of Kansas

The increasing energy demand has attracted investigation of alternate energy fuels such as methanol. Methanol when produced from feedstocks is a renewable, carbon neutral fuel. Liquid methanol, as an anode fuel in Direct Methanol Fuel Cells (DMFC) possesses high energy density (6.08 kWh/kg). DMFCs can be deployed in transportation, portable electronics, and as stationary power supply systems. We report a study on the development of efficient, durable PtRu anode electrocatalyst on unique core-shell support architecture for high performance DMFCs. This core-shell support comprises of defective amorphous TiO_2 shell (~10 nm thick) conformally coated on oxygen functionalized nitrogen doped carbon nanotubes (ONCNT). Our electrocatalyst synthesis approach involves the utilization of low-cost microwave heating and post-synthesis thermal annealing in H_2 environment. The as-prepared nanostructured electrocatalyst, denoted as PtRu/TiO_2/ONCNT-400, was characterized using electrochemical voltametric techniques to determine the methanol oxidation activity and long-term stability. Our results revealed that the PtRu/TiO_2/ONCNT-400 demonstrates improved methanol oxidation reaction (MOR) with a mass activity of about 523.5 mA/mg_{Pt}, enhanced CO oxidation reaction kinetics and excellent stability for 500 cycles when compared to the state-of-the-art commercial PtRu/C anode catalyst. **CONCLUSION:** The ultra-thin amorphous TiO_2 shell provides a strong catalyst metal support interaction to offer excellent stability. It also provides surplus hydroxyl species to efficiently oxidize the reaction intermediates such as CO thereby reducing catalyst poisoning and enhancing the mass activity. Various high surface area carbon supports are currently being explored and the thickness of TiO_2 is being optimized to further improve the performance.

DOMINANT PRAIRIE GRASS CROSS-TRANSPLANTED ACROSS THE MIDWEST RAINFALL GRADIENT: RESPONSE TO DROUGHT

Jack Sytsma[1], Kori Howe[1], Matthew Galliart[2], Eli Hartung[1], Loretta Johnson[1]
[1]Division of Biology; [2] Department of Biological Sciences, Fort Hays State University

Big bluestem (*Andropogon gerardii*) is a dominant, native, tall grass that is for critical cattle forage, conservation, and restoration. This grass has a wide geographic distribution across the Great Plains rainfall gradient (500-1200 mm rain/yr). Distinct wet and dry ecotypes, each adapted to its local regional climate, have been recognized. The objectives were to observe growth of big bluestem ecotypes that were cross-transplanted into wet and dry climates. We predicted that each ecotype would perform best in their home site, but perform poorly when foreign sites. Reciprocal gardens (cross-transplants) were established in 2010 and growth was monitored over time until 2021 in four garden sites (Colby, Hays and Manhattan, KS to Carbondale IL). To specifically examine the effects of drought, rainfall was reduced by 50% using rainout shelters in three sites. Cover was measured to estimate growth. By 2021, the wet ecotype had 54% less cover than the dry ecotype in Colby but had 43% more cover in Illinois. In contrast, the dry ecotype cover is lower in Illinois but higher western Kansas. These results confirm that wet and dry ecotypes perform best in their home environments. Interestingly, the mesic ecotype had intermediate cover (~40%) in all four sites. Experimental rainfall reduction resulted in increased cover in the dry ecotype in Illinois. These results indicate the prominent role of ecotypes across the natural and experimental rainfall conditions. Thus, restoration should consider the use of climate-adapted ecotypes in anticipation of future droughts.

LANDSCAPE COMPOSITION AFFECTS ANURAN OCCUPANCY PATTERNS ON MINED LANDS

Emma M. Buckardt, Christine C. Rega-Brodsky, and Andrew George
Department of Biology

The loss and fragmentation of habitat has altered amphibian populations across North America. Southeast Kansas's landscape has been dramatically impacted by urbanization, agriculture, and a rich history of coal mining, which has left few native habitats intact. Amphibian populations are varied in these human altered habitats and their distribution could be influenced by landscape composition. Our study aims to assess the connection between anuran distributions and landscape composition in sites that have been heavily disturbed by strip-mining. We conducted call surveys six times from March 16 to June 12, 2021 at 65 sites throughout Crawford and Cherokee Cos. in southeast Kansas. Nine anuran species were recorded calling throughout the survey area, with naïve occupancy varying from 18% to 100%. Two Species in Need of Conservation were heard: Spring Peepers (Pseudacris crucifer) and Crawfish Frog (Lithobates areolatus). Results varied by species, but preliminary models suggest that multiple species are positively associated with forest cover and negatively associated with built environments, and that naturally revegetated mined lands are promoting anuran occupancy in the area. Future analyses will be conducted to support conservation efforts in the area.

EXPLORING THE EFFECTS OF CORPORATE SOCIAL RESPONSIBILITY (CSR) IN MEDICAL TOURISM PROVIDER WEBSITES

Jaquelyn Bouchie and Alicia Mason
Department of Communication

Organizational corporate social responsibility (CSR) communication involves the use of strategic communication messages to convey multiple facets of corporate CSR actions including the ethical, legal, economic and philanthropic activities of organizations to their internal and external stakeholders. CSR is a surprisingly understudied aspect of the global medical tourism industry. Medical tourism providers (MTPs) have harnessed the benefits of the Internet to market and promote medical services to potential medical consumers. This study uses a quantitative content analysis of digital CSR information promoted by medical tourism providers (MTPs) via organizational websites to understand the congruence, prominence, and types of CSR engagements commonly used by global MTPs. Results revealed no significant differences based on World Health Organization (WHO) region $F(4,53)=.88$, $p=.48$, nor the U.N.'s Economic Index $F(2, 54)=.16$, $p=.84$. Regardless of the region or economic status of the country, MTPs averaged 3-6 CSR engagements. Although significant differences between these groups were not found, what is clear is MTPs who are engaging in CSR activities, often do so more than once, and use a variety of CSR strategies to do so. The two most prominent CSR strategies were cause promotion (n=99, 39.7%), and community volunteering (n=53, 21.2%). Through analysis it was determined that MTPs were serving as credible health information providers during the COVID-19 pandemic, revealing the role that individual health providers, locally and internationally, play in helping publics remain informed throughout multiple stages of adverse global pandemics.

ONE-STEP SYNTHESIS OF SOYBEAN POLYOLS: TECHNOLOGY ADVANCEMENT AND COMMERCIALIZATION

Thai Butcher and Santimukul Santra
Department of Chemistry, Pittsburg State University

Bio-based soybean polyols are the hydroxylated derivative of soybean oil (SBO). In general, the synthesis of soybean polyols involves 2-3 organic reaction steps, including the epoxidation reaction of the soybean oil double bonds and then hydroxylation of the epoxidated vegetable oil. These procedures involve the use of expensive chemicals and catalysts, time taking and laborious. Taken together, the available conventional methods are not commercially cheap and it is affecting the overall soybean business in the competitive global market. Herein, we introduce a new, one-step, green chemistry method for the synthesis of soybean polyols directly from the soybean oil. We developed click-ene chemistry, where the 'azide' group of a hydroxylated azide compound reacts directly with aliphatic 'double bonds' of the soybean oil or other vegetable oils. In addition, this new process is highly economic, since 1) one-step synthesis, 2) more than 90% yield of soybean polyols, 3) less time consuming, 4) no expensive catalyst, chemicals or solvents needed, 5) no purification. Using this one-step, cost-effective process, the synthesized soybean polyols will be commercially cheap and can be extensively used in the competitive global market of polyurethane foams, binders, coatings, adhesives, sealants, elastomers (CASE) and other vegetable oil-based products. The main focus of this project is to produce soybean polyols, in one-step, using heat, UV or microwave radiation and the results will be discussed in this presentation.

DEVELOPMENT OF MAGNETO-PLASMONIC NANOSENSORS FOR THE DETECTION OF E. COLI O157:H7

Eniola Arogunyo and Santimukul Santra
Department of Chemistry

Recurrent outbreaks of the food-borne pathogens particularly E. coli O157:H7 continues to impact human health and agricultural economy tremendously. The required cell-count for this pathogenic strain of E. coli is relatively low (10-100 viable cells) and hence it is vital to detect at low CFU counts. Popular methods such as PCR, ELISA, LAMP, SERS and electrochemical detection have its own limitations. To overcome these challenges, magneto-plasmonic nanosensor (MPnS) is developed for achieving superior analytical performance with parallel multi-readout capabilities. Iron oxide nanoparticles (IONPs) and gold nanoparticles (GNPs) are combined in one-pot to formulate composite MPnS with multimodal detection capabilities. MPnS-based bioassays and detections follow spin-spin magnetic relaxation (T2 MR) mechanism and results can be sensitively collected using a bench-top magnetic relaxometer. Importantly, MR method is independent of light, and the detection assay performance is expected to be easy in suspensions and turbid heterogeneous food samples. This feature makes it very attractive as a detection tool in complex food matrices with minimal to no sample preparation and interference. In addition, surface plasmon resonance (SPR) and colorimetric detection modalities of MPnS further allows improved sensitivity and amplified visual detection in field settings. Results obtained from the rapid and ultrasensitive detection of E. coli O157:H7 using MPnS will be summarized in this presentation.

ECO-FRIENDLY AND HIGHLY FLAME-RETARDANT POLYURETHANE FOAMS USING SUNFLOWER OIL

Magdalene A. Asare and Ram K. Gupta
Department of Chemistry

Polymers are of inevitable use to the world these days due to their tunable characteristics that have widened their range of application. They can be used for some common household materials, in industries, medical devices, and sporting equipment among others. Polyurethane, one of the highly produced polymers, has tremendous properties that render it useful for several products. In general, it is synthesized through the addition reaction of a polyol and isocyanate. Until recently, polyols, which play a vital role in the properties of polyurethane, were petroleum-based. However, due to the fast depletion of these non-renewable sources and the earnest need to protect the environment, researchers are more intrigued about using green and cost-efficient alternatives. In addition, scientists are looking out for materials that are less toxic, renewable, biodegradable, and can be easily synthesized in the replacement of petrochemical sources. Bio-based polyols from biomass such as vegetable oils, lignin, and others have proven to be applicable in the synthesis of polyurethane with comparable or improved properties to commercially available ones. In the current work, our lab investigated the practical use of sunflower oil in the production of polyurethane-based composites. Sunflower oil was first converted into a polyol using an epoxidation reaction followed by ring-opening with methanol. The bio-based polyol was then used in the synthesis of the polyurethane composite in an easy one-step reaction with isocyanate. In an additional attempt to improve the mechanical properties of the green polyurethane composite, graphene, an extraordinary allotrope of carbon was added. The dispersion of the graphene, as well as the effects of the eco-friendly polyol, was investigated. In addition, TGA, DSC, TGA, flexural test, and elasticity among many others were used to test the effects of graphene on the mechanical properties of the materials. It was observed that the elastic modulus increased to over 450 MPa, the flexibility, and hardness of the material improved with increasing concentrations of the graphene. The TGA results also showed high thermal stability of the synthesized polyurethane materials in the presence of graphene. This experiment established a very fast and facile method for the production of bio-based polyurethane composites that had improved mechanical properties with the addition of graphene.

LONG-TERM HIGH-FAT/HIGH-SUGAR DIET WORSENS EARLY LIFE STRESS-INDUCED OBESITY

Jenna Frick[1], Brittni Jones[1], Olivia Eller-Smith[1], Rebecca Foright[1], Aaron Brake[1], Xiaofang Yang[1], Michelle Winter[2], Matt Morris[3], John Thyfault[3], and Julie Christianson[1]

[1]Department of Anatomy and Cell Biology; [2]Kansas Intellectual and Developmental Disabilities Research Center; [3]Department of Molecular and Integrative Physiology

Exposure to stress early in life has been associated with adult-onset co-morbidities such as chronic pain, obesity, and metabolic disorders. We have established a mouse model of early life stress using neonatal maternal separation (NMS) that results in urogenital hypersensitivity and increased body weight compared to naïve (non-separated) mice. In this study we tested the hypothesis that consumption of a high fat/high sucrose (HFS) diet will worsen NMS-related outcomes. To examine this, pair-housed male and female naïve and NMS mice received either control or HFS diet beginning at 4-weeks of age. Weight gain, food intake, body composition, and pain-like behavior were monitored throughout the study. NMS mice on a HFS diet were found to have increased body weight and percent body fat compared to naïve mice on a HFS diet and to NMS mice on a control diet. Additionally, both NMS and the HFS diet resulted in significantly lower hind paw mechanical withdrawal thresholds indicative of hypersensitivity. After 20 weeks on their assigned diets, mice were given a glucose tolerance test. Both NMS and HFS diet consumption were found to result in impaired glucose homeostasis. Upon histological examination of the liver, HFS diet fed NMS mice were observed to have increased steatosis and hepatocyte ballooning. Our results suggest that HFS diet exacerbates the outcomes of NMS in both males and females, resulting in widespread sensitivity, weight gain, glucose intolerance, and steatosis. Future work will explore possible underlying mechanisms for the increased weight gain and sensitivity associated with stress and diet.

TAILORING STEM CELL THERAPIES TO ENHANCE REGENERATIVE WOUND HEALING

Jacob Hodge[1,3], Jenny Robinson[1,2], and Adam Mellott[3]

[1]Bioengineering Graduate Program, University of Kansas; [2]Department of Chemical & Petroleum Engineering, University of Kansas; [3]Department of Plastic Surgery, University of Kansas Medical Center

Incomplete wound closure results in chronic, non-healing wounds, which currently affects over 8.5 million people in the US every year, costing the healthcare system over $30 billion annually. With the aging population and rise in diabetes, the prevalence of chronic wounds is expected to rise. In diabetes, 15% of patients develop non-healing ulcers, with a greater than 50% recurrence rate. A recent retrospective analysis showed that Medicare cost alone for wound care was estimated to reach ~$97 billion, with diabetic wounds being the leading cause of non-traumatic lower-limb amputations. There remains a critical need for a therapy that can address this lack of wound closure and prevent the progression to complex chronic wounds that burden patients and our healthcare system. Adult Mesenchymal Stem Cells (MSCs) contain intrinsic regenerative properties and have been shown to enhance wound healing activity in diabetic wounds. MSCs can regenerate tissue by sensing and adapting to environmental changes within tissue, followed by secretion of regenerative factors that promote tissue regeneration. However, current research is limited due to the unnatural 2D expansion of MSCs on plastic, which results in loss of regenerative capabilities. My research demonstrates the ability to tailor regenerative factors released by MSCs in a 3D system that replicates the environment the cells see within native tissue. Within this system, MSCs are exposed to stimuli that enhance their regenerative capacity. Ultimately, this research could lead to the development of novel tailorable therapeutics that lessen the economic burden of chronic wounds on the Kansas healthcare system.

PROPEL PROJECT: PROMOTING SELF-DETERMINATION AND SOCIAL ENGAGEMENT FOR STUDENTS WITH AUTISM

Karrie Shogren[1], Sheida Raley[1], Brian Boyd[2], Kara Hume[3], and **Jessie Kiblen**[1]
[1]Kansas University Center on Developmental Disabilities; [2]Juniper Gardens Children's Project; [3]University of North Carolina at Chapel Hill

There are a growing number of students with autism entering secondary school, being served in general education classrooms, and in need of educational supports to enhance school and postschool outcomes. However, there is a dearth of evidence on comprehensive school-based interventions, particularly for students with autism served in general education classrooms. These students' academic and social needs may be overlooked. I will share findings from a multi-year project focused on goal setting and attainment through working with the Self-Determination Learning Model of Instruction (SDLMI) and how to utilize peer supports in inclusive general education settings. With support from trained teachers, students with autism in this first year of the project set and work toward goals in the core content subjects (e.g., English Language Arts, Social Studies) that will generalize to other topics and situations both in and beyond school settings. This project extends previous research on the SDLMI and PS by explicitly examining the impact of interventions on teacher and student outcomes in inclusive general education and special education settings. The overall purpose of the project is to evaluate the efficacy of interventions to promote self-determination and the use of peer supports in inclusive secondary core content classes to increase teacher knowledge and skills and enhanced student academic and transition outcomes. Identifying interventions that are effective for teachers and students has the potential to lead to enhanced outcomes for students, teachers, and schools within Kansas and the United States.

DEVELOPING EFFECTIVE SELF REGULATION SKILLS IN EARLY CHILDHOOD

Kyung Mi Min
Department of Educational Psychology

Self-regulation (SR) has long been studied as a significant predictor of children's social-emotional development and cognitive development. Lack of maturation of SR skills has been associated with adverse behaviors, readiness, and academic success outcomes. Therefore, children who have difficulties in social interaction and emotional control show a lack of regulation of behaviors and early cognitive skills. This study aimed to review the research related to SR in early childhood. The research question used to guide this literature review: What are SR strategies that have been effective in children's social emotional development and cognitive development? Preliminary findings indicate that the modeling of private speech, the use of objects to improve attention visually, and teaching mindfulness-based interventions are positively related to children's cognitive abilities such as mental flexibility, inhibitory control, and working memory. Implications from this research are that educators should pay a greater focus on SR strategies at the early childhood level.

SLEEP, HEALTH, AND BURNOUT IN CAREER FIREFIGHTERS

Julia Russell and Nancy Hamilton
Department of Psychology

Firefighters are at increased risk of sleep disorders, most commonly insomnia and Obstructive Sleep Apnea (OSA). Sleep disorders are costly at the individual level in terms of mental and physical health, as well as increased workplace errors. Sleep disorders are also costly to organizations because of absenteeism and employee turnover. While previous research has found relationships between sleep, mental health, and occupational burnout, it is not clear how these associations evolve over time in career firefighters. Therefore, the goal of this study was to understand how insomnia and Obstructive Sleep Apnea (OSA) symptoms affected health and burnout in career firefighters. 117 participants filled out a survey assessing sleep disorder symptoms, as well as measures of perceived physical and mental health. Nine months later, participants completed a follow-up survey that also included a measure of burnout. Nearly one third of participants were at risk for clinical insomnia, while nearly half were at high risk for OSA. Having more severe insomnia symptoms was associated with worse perceived mental and physical health, both at baseline and at the follow-up survey. Furthermore, insomnia was a significant predictor of burnout at the follow-up survey. These data demonstrated that insomnia symptoms were associated with worse perceived health and burnout over time. Effective treatments are available both for insomnia and OSA symptoms, and this study suggests that providing support for sleep disorder screening and treatment, as needed, could improve overall health and prevent burnout in members of the fire service across the state of Kansas.

A NOVEL TECHNOLOGY TO TREAT BLOOD-VESSEL RELATED DISEASE THROUGH SPACE AND TIME SYNCHRONIZED ULTRASOUND AND LASER

Rohit Singh and Xinmai Yang
Institute for Bioengineering Research and Department of Mechanical Engineering

We have recently developed two novel technologies, namely photo-mediated ultrasound therapy (PUT) and ultrasound-assisted endovascular laser thrombolysis (USELT), which utilize space-time synchronization of ultrasound and laser to induce bio-effects inside blood vessels. PUT can be used to treat medical conditions involving neo-vascularization such as diabetic retinopathy and macular degeneration, while USELT can be used to treat venous thromboembolism. Venous thromboembolism is the formation of blood clots in veins, which can be fatal if the blood clot breaks loose and travels through the blood stream to the lungs. Existing treatment techniques such as anti-coagulants and thrombolytic therapy are expensive with treatment costs ranging from $ 15,000-20,0000 and are often not very effective, resulting in a fatality rate of more than 11 percent (around 900 die each year in Kansas alone). We are developing USELT with the aim to provide effective treatment for venous thromboembolism, such that the overall fatality rate can be reduced, and lives can be saved. Diabetic retinopathy and macular degeneration are major causes of blindness in the United States, as well as in Kansas. Approximately 37,000 people suffer from diabetic retinopathy and 26,000 people from macular degeneration in Kansas. The existing treatment of frequent intravitreal injections of anti-VEGF is a huge burden on patients and physicians and does not have long-term efficacy. More than 50 percent of patients become partially or fully blind after 5 years. We are developing PUT with an aim to provide a non-invasive, cost-effective treatment option with long-term efficacy to prevent blindness from macular degeneration and diabetic retinopathy.

ASSEMBLING *AVENGERS* "CAR T CELLS" TO ELIMINATE BREAST CANCER

Siddharth Subham[1], John Jeppson[2], Jie Zhao[2], Bryan Schatmeyer[2], Rashna Madan[2], Nelli Lakis[2], Andrew Godwin[2], Roy Jensen[2], Shane Stecklein[2], Joseph McGuirk[2], Ronald Chen[2] and David Akhavan[2]

[1]*Bioengineering Program, University of Kansas;* [2]*University of Kansas Medical Center*

Breast cancer is the most diagnosed cancer among females in the United States, as well as in Kansas. It is predicted that nearly 400 women in Kansas will succumb to it this year. Triple Negative Breast Cancer (TNBC) is an aggressive subtype of breast cancer accounting for 15-20% of all cases and having a critical survival rate of only 12% in patients diagnosed with metastatic TNBC. Current treatment methods include surgery and chemotherapy along with the recently developed checkpoint inhibitors and targeted therapy. However, there hasn't been a significant increase in survival of the patients. The current study designs a new immunotherapy with reduced toxicity and increased efficacy for TNBC patients. CAR-T cell therapy comprises of engineering the body's own immune cells, the T cells, i.e., *Avengers*, to better recognize cancer cells and eliminate them. This therapy has been successful in treating blood cancer and the first patient to receive this therapy just completed 10 years of cancer free survival. We engineer CAR-T cells to search dual proteins (EGFR and B7H3) on cancer cells and eliminate them. We believe that training them to search for both proteins instead of just one will enhance their performance. We have seen significant killing of tumor cells by our single and dual CAR-T cells in the lab. We have cured mice of tumors by our EGFR CAR-T cells and now we are focusing on testing the dual CAR-T cells in mice. This therapy will benefit Kansas women diagnosed with TNBC with a long cancer free lifetime.

SOIL AGGREGATES, ORGANIC MATTER, AND MICROBES: IMPROVING UNDERSTANDING OF PROCESSES THAT SUPPORT SOIL FERTILITY AND FUNCTION

Micah Unruh and Sharon Billings

Department of Ecology and Evolutionary Biology

Plants draw carbon dioxide out of the air and transform it into leaves, stems, roots, and other organic material. Much of this matter eventually mixes into the soil, where microbes convert most of it back into carbon dioxide. However, some of the plant material may linger in the soil for decades to millennia to form *soil organic matter,* or SOM. SOM provides vegetation with essential nutrients, increases the soil's ability to retain water, and undergirds many other important soil functions. When soil is cultivated for agriculture, the amount of SOM contained within it tends to decrease, and many scientists expect this depletion to accelerate in coming decades. Crops planted in soils with low SOM tend to have lower yields and require greater amounts of costly fertilizers. Thus, developing land management practices that slow or reverse SOM loss is critical. To achieve this goal, we must understand the processes that control whether plant matter ultimately becomes SOM or if its carbon is transformed back into carbon dioxide. Most SOM is found inside of *soil aggregates*. These small clusters of mineral particles and other materials are the focus of our research, which explores 1) how the distribution of microbes, organic matter, and water within soil aggregates stabilizes SOM; 2) how the characteristics of a soil aggregate influence what microbial species associate with it; and 3) how the species makeup of microbial communities affects SOM accumulation. We hope our work will inform low-cost solutions to declining SOM stocks, benefiting Kansas farmers.

UNDERSTANDING OBESITY-RELATED HIGH OUTPUT HEART FAILURE AND POLICY IMPLICATIONS FOR GENOMICS RESEARCH

Samantha Cintron[1], Qiuhua Shen[1], Diane Mahoney[1], Mihaela Sardiu[2], John Hiebert[1], and Janet Pierce[1]

[1]School of Nursing; [2]Department of Biostatistics & Data Science

High output heart failure (HOHF) is a cardiac condition that occurs when the cardiac output is higher than normal due to increased peripheral demand. HOHF occurs secondary to an underlying condition that requires high output due to an increase in oxygen consumption or decreased systemic vascular resistance. Obesity is a major cause of HOHF yet there is limited research on obesity-related HOHF. Thus, pathophysiologic mechanisms of this syndrome are not fully understood. The objectives of this integrative review were to describe the current state of the research regarding obesity-related HOHF and to recommend direction for future research. Using PubMed, CINAHL, and EMBASE electronic databases, we searched for literature specifically related to HOHF. A narrative synthesis of definitions and symptoms, obesity as an underlying condition, pathophysiology, and treatments of obesity-related HOHF was completed. Limited research was found on obesity-related HOHF. A total of six articles were included in the integrative review with one retrospective study and five literature reviews. No official diagnostic criteria for obesity-related HOHF was reported. Possible pathophysiologic mechanisms include increased pressure in the upper airways, adipokine dysregulation, increased metabolic activity, and insulin resistance. Additional research is needed on the pathophysiologic mechanisms of obesity-related HOHF to begin investigations on therapeutic interventions to improve patient health outcomes. Using omic approaches such as genomics to prevent, diagnose, and treat under-researched diseases like obesity-related HOHF is essential. However, the technology and cost will require both policy and funding support.

THE DNA REPAIR RELAY RACE

Max Fairlamb[1], Fletcher Bain[2], Maria Spies[2], M. Todd Washington[2], and Bret Freudenthal[1]

[1]Department of Biochemistry and Molecular Biology, University of Kansas Medical Center;[2]Department of Biochemistry, University of Iowa Carver College of Medicine

Our DNA is under constant siege from damage inducing sources such as UV radiation and reactive metabolic byproducts. If left unchecked, DNA damage from such sources can quickly lead to cell death, genomic mutations, and cancer. To maintain genomic stability, cells utilize a DNA repair pathway called Base Excision Repair (BER). During repair, the damaged nucleotide is excised and replaced through a sequential, step-by-step process performed by a series of DNA repair enzymes. At each step, the damaged DNA transitions through a fragile intermediate state which could easily form a toxic double stranded break before the repair process is complete. How cells prevent these fragile DNA intermediates from breaking during processing remains unknown. Previous work has suggested that the DNA may be "handed-off" between sequential BER enzymes, like runners passing a baton, to minimize its exposure between steps of the BER cycle. However, this coordinated hand-off mechanism remains speculative, resulting in a considerable gap in knowledge surrounding how cancer-inducing DNA damage is repaired by the human body. To address this, we have established a single-molecule Total Internal Reflection Fluorescence (smTIRF) microscope to directly monitor the colocalization of BER enzymes during DNA repair. Preliminary data reveals unprecedented information about the step-to-step coordination by looking at the types of co-complexes formed, the order of their assembly and disassembly, and their dwell times. As a result of this analysis, we hope to expand the current understanding of how the human body repairs DNA damage and thus prevents possible cancer forming mutations.

A SINGLE DIET MESSAGE VERSUS TRADITIONAL HEALTHY EATING DURING PREGNANCY

Amy Herman, Lauren K Hand, Debra K Sullivan, Holly R Hull
Department of Dietetics and Nutrition

Over 50% of women gain too much weight during pregnancy, leading to negative health outcomes. Traditional diet interventions have multiple messages, and the main point may be getting lost. This is especially relevant during pregnancy, where there is already a high mental and physical demand. We ran two separate pilot studies: a traditional diet (T; n=21) where pregnant women were counseled on healthy eating topics, and one focused solely on increasing fiber intake (F; n=12). Each study had a control group (C; combined n=15). Body weight and 24-hour dietary recalls were collected at baseline and end study. Diet was analyzed using Nutrient Data System for Research (NDS-R). Paired t-tests and ANOVA were performed. Both interventions were successful at helping women reduce gestational weight gain compared to the control (T: 12.67kg, F: 13.34kg, C: 17.76kg; ;p=0.03). Only the fiber group increased their overall diet quality ($p<0.05$) as assessed by the Alternative Healthy Eating Index for Pregnancy (AHEI-P). Diet aspects targeted for healthy eating were analyzed such as calories, fat, protein, carbohydrates, fruits, vegetables, whole grains, sugar sweetened beverages, sodium, added sugars, fiber, and saturated fat. At end study, the fiber group ate more fruits, whole grains, and fiber compared to the traditional group ($p<0.05$). Sugar sweetened beverage intake approached significance (F v T, p=0.08). No other differences were seen. A single message of increasing fiber intake was effective at reducing gestational weight gain and increasing diet quality. This may be an effective and simple strategy for diet improvement.

SHOULD BREAST CANCER PATIENTS HAVE PREOPERATIVE BIOPSY OF BORDERLINE ABNORMAL AXILLARY LYMPH NODES?

Lauren Johnson[1], Ashley Huppe[2], Jamie L. Wagner[3], Amanda L. Amin[3], Christa R. Balanoff[3], and Kelsey E. Larson[3]
[1]School of Medicine; [2]Department of Radiology, Division of Breast Imaging; [3]Department of Surgery, Division of Breast Surgical Oncology

Involvement of axillary lymph nodes (ALN) impacts surgical management in breast cancer patients. When normal or abnormal ALN are visualized on ultrasound (US), guidelines for clinical management are established. When borderline abnormal ALN are identified on US, management is unclear. We aimed to evaluate if pre-operative biopsy (BX) for borderline ALN is clinically helpful or disruptive for patients. A single center retrospective chart review of breast cancer patients with invasive ductal carcinoma or ductal carcinoma in situ and borderline ALN from 2014-2019 was performed. Clinicopathologic data were compared for those who did and did not have BX using chi-squared analysis. Patients with BX (n=34) and no BX (n=31) were matched with respect to tumor characteristics and rate of positive ALN at the time of surgery (p=0.26). Patients receiving BX underwent mastectomy more often (p=0.03) and had more ALN removed during surgery (p=0.005). BX was clinically disruptive in 58.8% of patients, all having BX for ALN without tumor involvement, indicating an unnecessary procedure. BX was clinically helpful in 32.4% of patients; 14.7% proceeded directly to axillary lymph node dissection, eliminating the need for a biopsy during surgery, and 17.6% had positive ALN localized after neoadjuvant chemotherapy. BX was neither helpful nor disruptive in 8.8% of patients. BX for borderline ALN is more likely clinically disruptive and did not impact the rate of tumor positive ALN removed during surgery. Breast cancer patients with borderline ALN should undergo BX only if it will directly change clinical management.

STRESS GRANULE INHIBITION IS A NOVEL VULNERABILITY OF MUTANT p53

Elizabeth Thoenen[1], Sugako Oka[2], Atul Ranjan[3], Alejandro Parrales[3], Dan Dixon[4], and Tomoo Iwakuma[3]

[1]Department of Molecular and Integrative Physiology, University of Kansas Medical Center; [2]Department of Medical Biophysics and Radiation Biology, Kyushu University; [3]Hematology and Oncology, Children's Mercy Hospital, Kansas City, MO; [4]Department of Molecular Biosciences, University of Kansas

Cancer growth is generally dictated by the level and activity of tumor suppressors and oncogenes. Tumor suppressors repress tumor formation and growth and are at low levels cancer cells. Conversely, oncogenes support tumor growth and other malignant properties of cancer and are at high levels or overactive in cancer cells. The tumor suppressor protein p53 normally arrests cell cycle progression or induces cell death in abnormal cells, but in over half of all human tumors, p53 is mutated. Mutant p53 protein loses tumor suppressive abilities and, uniquely, gains cancer-promoting activity such as enhancing tumor growth and spread. Because directly targeting oncogenes has been technically challenging, we wanted to identify and target molecular changes specifically altered by mutant p53 protein in cancer cells. We found that cancer cells expressing mutant p53 were unexpectedly sensitive specifically to agents that induce endoplasmic reticulum (ER) stress, including common chemotherapy drugs, Sorafenib and Vincristine. We hypothesized that mutant p53 inhibits the formation of pro-survival cellular structures, called stress granules (SGs), that enable cancer cells to survive under ER stress. Indeed, mutant p53 protein inhibited SG formation following ER stress in multiple types of cancer cells with different p53 mutations. We furthermore demonstrated that mutant p53-expressing tumors in mice were significantly more sensitive to Sorafenib, with reduced tumor volume and SG formation in tumors, as compared with tumors with mutant p53 depletion. Thus, ER stress-inducing chemotherapy drugs may be repurposed to specifically target human tumors expressing mutant p53.

THE RELATIONSHIP BETWEEN PREFERENCE AND PERFORMANCE USING THREE PASSIVE EXOSKELETONS DURING SIMULATED AIRCRAFT MANUFACTURING TASKS

Haifa Alqahtani[1], Nils Hakansson[1], Michael Jorgensen[2], Adam Jaeger[3]
[1]*Department of Biomedical Engineering;* [2]*Department of Industrial, Systems, and Manufacturing Engineering;* [3]*Department of Mathematics and Statistics*

Work-related musculoskeletal disorders (WMSDs) are the top workplace risk factors that impact the health of workers. In Kansas, there were 45,253 reported injuries/illnesses during the 2020 fiscal year. The main contributors to shoulder WMSDs are lifting one's arms and handling heavy tools at or above shoulder level. Passive shoulder exoskeletons are designed to support the arms during overhead work tasks and may aid in reducing the risk of WMSDs. However, exoskeletons are only effective if workers choose to wear them. Therefore, the objectives of this study were to quantify participants' upper-extremity muscle activity reductions as participants performed simulated aircraft manufacturing tasks using three passive exoskeletons and assess correlations between the exoskeleton efficacy and user exoskeleton preferences. To fulfill these objectives, 16 experienced local aircraft manufacturers were recruited to participate in the study. A wireless electromyography (EMG) system was used to record muscle activity levels as the participants performed the simulated work tasks with the exoskeletons. The muscle activity and exoskeleton preference data were analyzed using a multinomial logistic regression model to identify the relationship between participants' muscle activity reduction and exoskeleton preference rankings. The results indicate that the exoskeleton preferences correlated with muscle activity reductions for an overhead level task, but not for a shoulder-level task. Overall, participants preferred the exoskeleton that provided the least reduction in muscle activity. This study demonstrated that a correlation between preference and exoskeleton muscle reduction is task dependent, and, therefore, task factors in addition to user preference should be considered in exoskeleton selection.

NEURAL NETWORK ASSISTED TRAJECTORY PLANNING FOR SPACE MISSIONS

Amrutha Dasyam, Pardhasai Chadalavada, and Atri Dutta
Department of Aerospace Engineering

A critical aspect of space mission analysis is spacecraft trajectory optimization, which is a challenging problem involving nonlinear dynamics, multiple phases, nonconvex objectives, and complex constraints. State-of-the-art trajectory optimization solvers are primarily meant for use by personnel on the ground; however, onboard trajectory planning capability can enhance mission flexibility and responsiveness to uncertain situations. Our research focuses on applying machine learning techniques to improve the performance of our in-house trajectory planning tool on two fronts: (1) accurate prediction of atmospheric density for Mars aerobraking maneuvers, and (2) improvement of quality of orbit-raising trajectories to Geostationary Earth Orbit (GEO). These applications are important for reducing the cost of space missions through significant reduction of fuel expenditure, which in turn allows for stacking multiple satellites in a single launch vehicle and lowering launch costs. Consequently, given new emphasis on GEO applications (GOES-T mission enhancing tornado warning lead time and GeoCarb mission monitoring vegetation stress), the benefits of mission cost reduction are important for Kansas. Additionally, recent years have witnessed an enhanced involvement of private industry (notably SpaceX, Boeing, Lockheed Martin and Blue Origin) in near-Earth and deep space missions. This also means new business opportunities for Kansas companies that already have a strong aeronautical infrastructure. In this context, our research on mission planning for spacecraft with solar-electric propulsion has provided a new platform for engaging Kansas stakeholders (multiple universities) with NASA and private industry.

DEPENDENCE OF PROLINE ISOMERIZATION ON THE KINETICS OF FOLDING OF ANTHRAX LETHAL FACTOR

Wyel Halimeh and James G. Bann
Department of Chemistry

The death that can come within a few days after exposure to the anthrax toxin from *Bacillus anthracis* is due to the presence and effects of anthrax lethal factor (LF). LF is a zinc metalloproteinase whose function depends upon the translocation of LF from the endosome of a host cell into the cytosol, where it cleaves mitogen-activated protein kinase kinases and disrupting cell signaling pathways. The translocation requires LF to unfold as it transits through the narrow channel of the pore, formed by the anthrax protective antigen (PA). Unfolding of LF has been shown to be pH-dependent, but little is known regarding the kinetics of unfolding and refolding of LF. Specifically, refolding of LF must occur fairly rapidly within the cell cytosol to prevent degradation of the protein by cellular proteases. The N-terminal PA binding domain of LF, LF_N, has a single cis-proline residue (Pro16, and we hypothesized that this cis proline must isomerize to trans during the unfolding and translocation process and that refolding would be slow, and perhaps dependent on cellular prolyl isomerases for refolding. To this end, we have performed a detailed kinetic refolding/unfolding study of LF_N from urea solutions. Our preliminary experiments indicate that LF_N refolding occurs rapidly (within 1 second), suggesting that Pro166 does not isomerize to an appreciable extent in the unfolded state, or if it does isomerize, that isomerization back to cis is a fast process. The implications of these experiments on the mechanism of anthrax toxin lethality will be discussed.

COMPUTER VISION TECHNIQUES FOR FIRE DETECTION AND LOCALIZATION

Smitha Haridasan and Ajita Rattani
DRAC: Disaster Resilience Analytics Center

From droughts, earthquakes, tornadoes, winter storms and wildfires, communities in Kansas have weathered significant damage over the past. During 2016, 2017 and 2021, record breaking wildfires burned thousands of acres in Kansas and placed significant demands on state's local fire department. In December 2021, Four County Fire had burned an area approximately close to 96,000 acres. Strong winds in Kansas made these wildfires uncontrollable burning down houses and businesses on its path. Strikes, arson, sparks from vehicles, or prescribed burns escaping control are causes for wildfires to burn down houses, barns and fences resulting in both human and animal deaths. Many wildfires remain small and are easily contained, but some grow rapidly and require significant suppression efforts and resources. While fire fighters try to control fast spreading fires, smoke travels miles causing health concerns. Windstorm and wildfires cause millions worth of damage in Kansas. As global climate gets warmer, probability and intensity of forest fires will gradually increase, therefore it is important to intelligently monitor forest fires. To meet the needs of hazard monitoring drones and helicopters, multi-spectral light weight deep learning algorithms have proven to be very effective in early detection of fire in images captured from drones with an accuracy of 97.70%.

SMALL SCALE ENERGY DEVICES USING VORTEX INDUCED VIBRATION

Vijay Matheswaran and L Scott Miller
Department of Aerospace Engineering

Small-scale off-grid energy devices are an increasingly important part of the energy mix today, as seen in small solar panels and micro wind turbines that power road signs or heat livestock water troughs. Solar panels are the most commonly used solutions. However, a device that uses Vortex Induced Vibration (VIV) as its basis can provide a low-cost alternative. Flow of air around a bluff body leads to vortex shedding in its wake. Asymmetric shedding of vortices can result in oscillatory forces on the body, and cause large amplitude oscillations (VIV). Vortex shedding frequency and oscillations amplitude is primarily dependent on body geometry and flow velocity. In this study, the design methodology for a device that extracts energy from VIV is presented. A semi-empirical model is developed to predict shedding frequency and forces due to vortex shedding for the canonical case of flow around a circular cylinder. Shedding behavior of different geometries is related to that of a cylinder through conformal mapping. In this manner, forces due to vortex shedding for various geometries and their applicability in energy devices can be quickly predicted. Validation is done through water table and wind tunnel tests. Emphasis is laid on ensuring the device is low-cost and constructed from readily available or repurposed material, and require no specialized knowledge to maintain. Such a device can find use in rural communities and regions throughout Kansas.

DESIGN AND SYNTHESIS OF BISMUTH SULFIDE AND EXPLORING ITS APPLICATION AS A PHOTO-ELECTRODEMATERIAL IN THIRD GENERATION SOLAR CELLS

Mathur Saket and Wei Wei
Department of Mechanical Engineering

Solar energy has become one of the major sources of renewable energy and is a viable economic option in areas which receive a large amount of sunlight around the year, such as the state of Kansas. However, it currently relies on ultra-pure silicon ingots to produce commercial silicon photovoltaics, which prevents the cost of electricity being produced to compete with non-renewable energy production. A viable low cost alternative for silicon based cells would be dye-sensitized solar cells (DSSC), which are easier and cheaper to manufacture as they do not require expensive and delicate raw materials to make, while they could be made semi-flexible which allows for a greater variety of applications for these cells. A DSSC consists three components, a photo-electrode, an electrolyte and a counter-electrode. When exposed to incident light, the photoelectrode releases an electron which is transported to the external load, leaving the photoelectrode in an oxidized state. The electrons are collected by the counter electrode and used to reduce the electrolyte. This charged electrolyte then reduces the positively charged photo-electrode, allowing the process to begin again. To improve the efficiency of this process, we explore the use of Bismuth Sulfide and Titanium Oxide composite as photo-electrode material by testing it in varying ratios and studying their impact on the efficiency of DSSC.

NOTES:

For more information, please contact:

Emporia State University

Jerald Spotswood, Emporia State University, Plumb Hall 313, 1 Kellogg Circle, Emporia, KS 66801, (620)341-5508, http://www.emporia.edu/grad/

Fort Hays State University

Angela E. Pool-Funai, Fort Hays State University, 306 Picken Hall, Hays, KS 67601, (785) 628-4236, http://www.fhsu.edu/gradschl/

Kansas State University

Claudia Petrescu, Kansas State University, 117 Eisenhower Hall, Manhattan, KS, (785) 532-6191. www.ksu.edu/grad

Pittsburg State University

B. B. Stots, 112 Russ Hall, 1701 South Broadway, Pittsburg, KS 66762. http://www.pittstate.edu/office/graduate/

University of Kansas

Jennifer A. Roberts, The University of Kansas, 213 Strong Hall, 1450 Jayhawk Blvd., Lawrence, KS 66045-7535, (785) 864-8040. www.graduate.ku.edu

University of Kansas Medical Center

Michael J. Werle, The University of Kansas Medical Center, MSN 1040, 3901 Rainbow Blvd, Kansas City, KS 66160, (913) 588-7491. http://www.kumc.edu/academic-affairs/graduate-studies.html

Wichita State University

Coleen Pugh, Wichita State University, 107 Jardine Hall, 1845 Fairmount, Wichita, KS 67260-0004, (316) 978-3095. www.wichita.edu/gradschool

Or visit: http://www.wichita.edu/cgrs