12th Annual
Capitol Graduate Research Summit

February 12, 2015

Featuring Graduate Student Research from:

Fort Hays State University
Kansas State University

Pittsburg State University
The University of Kansas
The University of Kansas Medical Center
Wichita State University

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Kansas State University

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Dustin C. Smith ADDING GAME-LIKE ELEMENTS TO AN ARMORED VEHICLE RECOGNITION TRAINING

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Keri Becker	CLASSROOM-BASED INSTRUCTION OF NARRATIVES USING SKILL
Patrice Betz	EFFECTS OF ENVIRONMENTAL AND HUMAN DISTURBANCE FACTORS ON THE RANGE CONTRACTION OF NORTH AMERICAN BIRD AND MAMMAL SPECIES
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Presenters and Poster Titles

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Nelson Elbers	GREEN SYNTHESIS OF α-PHELLANDRENE AND β-CARYOPHYLLENE BIO-BASED POLYOLS AND THEIR APPLICATION FOR POLYURETHANE
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Jyothi Kallu	PSMA-RECEPTOR TARGETING MAGNETIC NANOPROBES: NOVEL NANOTHERANOSTICS FOR THE TREATMENT OF PROSTATE CARCINOMAS
Samantha Meneely	CHANGES IN ESTROGEN RECEPTOR ALPHA (ERα) PHOSPHORYLATION IN HUMAN T CELLS
Bharani Vadde	GENERATION OF ELECTRICITY FROM PHOSPHORESCENT INSECTS

EVALUATING THE USE OF LONG-TERM CONDITIONING OR EXTRUSION TO EXTRACT NUTRIENTS FROM LOW ENERGY FEEDSTUFFS IN FINISHER PIGS

Grace Bokelman[1], *Cassie Jones[1], Charls Stark[1], Jason Woodworth[2], Mike Tokach[2], Joel DeRouchey[2], and Kyle Coble[2]*

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A total of 270 finisher pigs starting at 115 lbs. were utilized in a 79-d experiment to determine the effects of long-term conditioned feed or extruded feed on pig growth performance. Four treatments with different manufacturing were evaluated; 1) control, mash 2) pelleted 45s conditioning time 3) pelleted 95s conditioning time 4) extrusion. Diets were low energy, high by-product and nutritionally similar. There were 6-8 pigs per pen and 9 replications per treatment. Feed intake and pig weights were recorded regularly. Data were analyzed using the GLIMMIX procedure of SAS. There was an overall effect of feed efficiency among pellet vs. control and control vs. thermal processing (P <.0001) while pellet vs. extruded had a tendency (P = 0.09). Both pelleted diets were similar while the extruded diet had the most efficient gain to feed (G:F) ratio. The control mash diet had the least overall efficiency stemming from low average daily gain (ADG) and was driven by higher average daily feed intake (ADFI) as compared to the other treatments. Pigs fed the extruded diet consistently had lower ADFI, although having similar feed efficacy values as the other two pelleted treatments (0.37 vs 0.36). This research suggests feed efficiency isn't affected by 45s vs 90s conditioning time, while extrusion outperformed pelleted and mash diets in G:F. Further research is needed assess the profitability and advantages producers could have with extruded swine diets compared to pelleted diets.

EFFECTIVENESS OF VARIOUS CHEMICAL MITIGATION STRATEGIES ON POST-PROCESSING CONTAMINATION OF PEDV IN FEED AND FEED COMPONENTS

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Porcine Epidemic Diarrhea virus (PEDv) has become an economically and socially devastating issue facing the United States swine industry. It is directly responsible for the death of over 8 million pigs. While PEDv is not a new virus on the global scale, it was not present in the United States until 2013. The virus is transmitted by fecal-oral contamination, but epidemiological and controlled research evidence has confirmed swine feed or ingredients are another route of transmission. Therefore, strategies are needed to mitigate this virus in feed. The objective of this experiment was to evaluate various feed additives to mitigate PEDv. Four additives (a commercial formaldehyde product, sodium bisulfate, sodium chlorate, and an organic acid blend) were applied to four different feed matrices (complete swine diet, blood meal, porcine meat and bone meal, and spray dried animal plasma). After treatment, the feed matrices were inoculated with PEDv. Commercial formaldehyde was the most effective additive (Mean RT-PCR cycle time of 32.5, P < 0.0001). The organic acid treatment was also an effective mitigant, but less successful than the commercial formaldehyde treatment (P < 0.0001). However, it offers a more consumer-friendly alternative that is still effective at PEDv destruction. The commercially-available formaldehyde product appears to be a possible mitigation strategy in feed and feed ingredients for limiting PEDv transmission. Further studies are needed to determine the most appropriate dosage for mitigation and animal health.

EVALUATION OF BROWN MIDRIB SORGHUM MUTANTS FOR EFFICIENT GRAIN AND SECOND GENERATION BIOFUELS PRODUCTION

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Sorghum is a model energy crop because of its high photosynthetic efficiency and abiotic stress tolerance. The objective of brown midrib (bmr) sorghum mutation is to improve quality of biomass for second generation biofuel production without compromising grain yield. The purpose of this research was to compare various sorghum genotypes including bmr mutants for grain yield and 2,3-butanediol production from stover. Three sorghum cultivars {Early Hegari (EH), Atlas, and Kansas Collier (KC)} and two bmr mutants of each cultivar (bmr6 and bmr12) were evaluated and compared for grain and biomass yields, biomass composition, and efficient production of 2,3-butanediol. The agronomic data showed that grain and stover yields reduced in bmr mutants, except grain yield in EH's mutants and stover yield in KC's mutants. The biomass composition indicated that the bmr mutants had 10 to 25 % less lignin, and 6 to 35% more extractives content than their parent cultivars, except EH's bmr12. The alkali pretreated bmr12 produced significantly higher amount of sugars during enzymatic hydrolysis than their parent cultivars. But, the reduced lignin content in bmr6 did not significantly improve the sugar yield, indicating that factors other than total lignin content also significantly affect the sugar release from biomass. Therefore, each bioenergy crop must be investigated individually for advanced biofuel production. Additionally, the production of the 2,3-butanediol per gram of released sugar using Bacillus licheniformis did not significantly differ among these biomass samples, indicating that regular sorghums along with bmr sorghums are potential bioenergy feedstock for advanced biofuel production.

FLAVOR OF RAW PECAN CULTIVARS GROWN IN KANSAS

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Kansas is one of fewer than 20 states with commercial production of pecans although it lags far behind other major producers. The neighboring state of Oklahoma saw a dramatic rise in the value of its pecan production (from 11.4 to 24.7 million dollars) from 2011 to 2012 (Agricultural Marketing Research Center, 2013). Previous research has primarily focused on nutritional properties of pecans with little research done on flavor properties. However, Lombardini et al. (2008) showed that flavor and taste properties are the most important factors for consumers when eating pecans. Thus, the objective of this study was to understand flavor differences in raw pecan cultivars to help in determining future cultivars that should be recommended for planting by growers in the state. Flavor profiles, which included intensities of 20 flavor attributes were developed by trained sensory panelists. Sixteen pecan cultivars from the 2013 growing season were analyzed using this descriptive analysis method. Significant differences were found in the intensity for eight of the 20 flavor attributes (overall nutty, nutty buttery, caramel, woody, overall sweet, oily, astringent, and bitter) for the 16 cultivars. Results from principal component analysis and cluster analysis indicate that two cultivars (Lakota and Giles) are different from the other 14 cultivars. These two cultivars also have the highest intensity scores for undesirable attributes (bitter and astringent). It is recommended to decrease the usage of these two cultivars.

UNSAFE BEHAVIORS OBSERVED IN CONSUMERS WHEN COOKING POULTRY AND EGGS

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Previous research has shown that many consumers do not follow recommended food safety practices for cooking poultry and eggs, which can lead to exposure to *Salmonella* and *Campylobacter*. Past research has been done through surveys and interviews, rather than observation. The objective of this project was to determine through observation if consumers follow food safety guidelines. One hundred one consumers in three locations (Manhattan, KS; Olathe, KS; Nashville, TN) were observed as they prepared a baked whole chicken breast, a pan fried ground turkey patty, a fried egg, and scrambled eggs. Observers measured the end point temperature for the cooked products within 30 seconds after the consumers indicated they were finished cooking. Thermometer use while cooking was low in all of the products; only 36% for the chicken breasts, and 22% for the turkey patties, with no thermometer usage for fried or scrambled eggs. Only 76% of the chicken and 68% of the turkey was cooked to a safe temperature (165°F), while 76% of scrambled and 49% of fried eggs reached a safe temperature (160°F). Safe hand-washing was noted in only 40% of respondents after handling the chicken breast and 44% after handling the ground turkey patty. This decreased to 15% after handling eggs for fried eggs, and 17% for scrambled eggs. These results show that there is a high prevalence of unsafe behaviors (undercooking and poor hand-washing technique) when cooking poultry and eggs, and a great need for improvement in consumer behavior with poultry and eggs.

IRON BIOAVAILABILITY OF SORGHUM, COWPEA, CORN AND SOYBEAN FORTIFIED BLENDED FOODS

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Fortified blended foods (FBFs) are widely used for food aid. Corn and soybeans are the common components of FBFs. Resistance to genetically modified (GMO) foods led to interest in non-GMO commodities like sorghum and cowpea. Additional advantages of these two commodities are that they are drought-tolerant, cost-effective and consumed globally. Both sorghum and cowpea are rich in iron; however their iron bioavailability is poor due to the presence of the anti-nutrients. A food processing technique, extrusion cooking reduces the anti-nutrients in foods. Hence, we developed extruded sorghum, soybean and cowpea FBFs. The objective of our study was to determine whether the iron bioavailability from extruded sorghum-cowpea and sorghum-soy FBFs is equal/ better than non-extruded corn-soy FBFs. Eighteen different FBFs; sorghum-cowpea (n=8), sorghum-soy (n=5) and corn-soy (n=5) were prepared and iron bioavailability was assessed using the in-vitro digestion/Caco-2 cell model. Iron bioavailability was determined by measuring Caco-2 cell ferritin (ng ferritin/mg cell protein) formation in response to 12 hour treatment with aqueous fraction collected from digested FBFs. Control cells were collected at time zero, to measure basal ferritin content. There was no significant difference in ferritin levels between newly developed extruded sorghum-cowpea, sorghum-soy, and traditional corn-soy FBFs. Ferritin was higher in all the blends compared to control with the exception of whole sorghum-soy (high fat) blend + antioxidants. Whole sorghum-soy (low fat) blend had significantly ($p<0.05$) higher ferritin levels compared to whole sorghum-soy (high fat) blend + antioxidants. Iron bioavailability of extruded sorghum-cowpea, sorghum-soy FBFs is comparable to traditional corn-soy FBFs.

PREVALENCE OF SHIGA-TOXIN PRODUCING *ESCHERICHIA COLI* (STEC) IN HOUSE FLIES FROM CATTLE FEEDLOTS

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Shiga-toxin producing *Escherichia coli* (STEC) are a major food-borne pathogen affecting ~265,000 people annually in the U.S. alone. Cattle are an asymptomatic reservoir of STEC and bacteria are released to the environment in feces. House fly larvae develop in cattle manure and adult flies commonly build up very large populations in cattle feedlots. It has been shown previously that house flies (HF) carried one of STEC serotype (O157:H7) and were able to transfer these bacteria to cattle and their feed and water. However, over the past decade, the number of human infections from other STEC has greatly increased and little is known about their ecology. The objective of this study was to assess the prevalence of seven non-O157 STEC serotypes (O104, O26, O45, O145, O103, O121, and O111) in HF from cattle feedlots. HF were collected from ten feedlots in four states and individually tested for STEC by: 1) direct plating on MP agar and 2) enrichment in EC broth, both followed by multiplex PCR for genotyping and virulence screening. Out of 367 HF, 29.4% carried *E. coli* serotypes of interest (mainly O104, O103, O45) and 1.9% of HF were positive for STEC with the virulence genes *stx1*, *eae*, and *ehxA*. STEC prevalence in HF in cattle feedlots is relatively low; however, due to very large fly populations, this represents thousands of HF carrying STEC. HF likely play role in the dissemination of STEC within farms and possibly from farms to the surrounding environment.

HESSIAN FLY, *MAYETIOLA DESTRUCTOR*, RESPONSE TO DIFFERENT COLORS OF LEDS

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The Hessian fly, *Mayetiola destructor* (Say) (Diptera: Cecidomyiidae), is a major pest of wheat, reducing yields in Kansas since the early 1900's. However, distribution is spotty across the state, even varying between neighboring fields. Existing traps utilizing the Hessian fly female sex-pheromone are an effective and efficient surveillance strategy to monitor for male Hessian fly activity, but these traps do not always reveal the true level of Hessian fly infestation. To better monitor Hessian fly infestation levels, trap design needs to incorporate attractants of both sexes. Before traps can be improved, knowledge of Hessian fly behavior is required. The purpose of this research was to examine behavioral attraction of the Hessian fly to light emitting diodes (LEDs) of different colors. Hessian fly attraction was tested in a four-leaf, clover-shaped arena, which contained a different color LED within a collection cup in each of the four cloverleaves. LED colors used were blue, green, amber, and red. Flies were released from the arena center and left overnight, ~17 h. There was a significant difference in behavioral attraction of the Hessian fly among the different color LEDs ($F_{3,8} = 36.79$, $P < 0.001$). Hessian fly adults chose green 64% of the time, blue 32%, amber 5%, and red 0%. These results are the first to show that the Hessian fly prefers green light produced by an LED. Ultimately these results will be incorporated into new trap designs, improving trap attractiveness and effectiveness at monitoring changes in Hessian fly populations at the field level.

TIME-CONTROLLED THERMAL EFFECTS ON THE SYTHESIS OF INDIUM PHOSPHIDE NANOCRYSTALS

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Indium phosphide (InP) is a popular material for solar cells, light emitting devices and detectors. Nanocrystals of InP have advantages over bulk InP semiconductors because of their solution processability and tunable optical properties. Controlling the number of atoms (size) in InP NCs has been difficult because of the high reactivity of indium and phosphorous precursor molecules. Although some procedures requiring rigorous steps and methods have been made to control the size, the obtained materials lack a glowing nature. Our work focuses on preparing different sized InP NCs in a microwave reactor, a procedure that has previously generated InP NCs that glow. Indium acetate is treated with palmitic acid at 150 °C. After adding tris(trimethylsilyl)phosphine, the solution is heated to 50 °C. The obtained reaction mixture is reacted with an ionic liquid at 300 °C in a microwave reactor at powers ranging from 150 to 800W. From Ultraviolet-visible and photoluminescence spectroscopy, variation in the size of the NCs is observed. The NCs emit green, yellow and red color under ultraviolet radiation. Transmission Electron Microscope (TEM) images confirm the size of InP NCs is from 2-4 nm with spherical shape and narrow size distribution. The final size of the NCs changed with the power of microwave radiation applied. NCs prepared at the highest power have the smallest size. These emissive NCs can be used in LEDs and biomedical applications and this synthesis could be applied to other NC materials.

AIR VOID CLUSTERING IN CONCRETE

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Incorporation of microscopic air voids into the material matrix is a very effective way to prevent deterioration of concrete due to repeated freeze-thaw action in cold climates. Clustering of these air voids around coarse aggregates has been recently identified as a potential source of low strengths in concrete mixes around the country. Experimental research study was carried out to (1) develop a quantitative measure of air void clustering around aggregates, (2) investigate whether air void clustering can be reproduced in a laboratory environment, (3) determine if air void clustering can blamed for lower compressive strengths. Different types of coarse aggregates and air entraining agents (AEA) were included in the laboratory study. A total of 65 concrete mixes were made, implementing the frequently used technique of re-tempering that has been previously associated with air void clustering. Compressive strength was determined and the automated hardened void analysis (including a new method of clustering evaluation) was performed on all samples. It was found that it is possible to reproduce air void clustering in laboratory conditions. However, the results have shown that re-tempering does not always cause air void clustering. In addition, it was observed that clustering is not responsible for a decrease in compressive strength of re-tempered concrete as neither aggregate type nor chemical composition of AEA had a significant impact on severity of clustering. It was also observed that not air void clustering but the total air content and an inhomogeneous cement paste microstructure were responsible for lower strengths.

CORRELATES OF FRUIT AND VEGETABLE CONSUMPTION IN LOW-INCOME CHILDREN IN THE KANSAS CITY AREA

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Although eating fruits and vegetables is part of a balanced diet, many youth are not meeting the recommended daily serving amounts, and a poor diet may increase the risk of preventable chronic illnesses (e.g., obesity) and psychological concerns (e.g., poor quality of life), which negatively contribute to state and federal health care costs. For low-income families in particular, financial limitations make it challenging to afford nutritious foods and maintain a healthy lifestyle. Match programs at farmers' markets seek to make healthy foods more affordable and accessible for low-income families. The current study examined the association between family factors, household food insecurity, and fruit and vegetable consumption in low-income children. The sample consisted of 145 parents with children ages 5-10 recruited from farmers' markets implementing a match program for families using Supplemental Nutrition Assitance Program benefits in the Kansas City area. Results of the current study suggest the importance of family meals on child vegetable consumption; therefore, services, such as match programs at farmers' markets, may underscore the significance of eating together as a family and provide child-friendly recipes to utilize at meals. Although accessibility to nourishing foods is important, it may not be sufficient if parents lack the skills to effectively prepare these foods. Additional support, such as classes on cooking techniques, may be beneficial for low-income parents. Residents and legislators of Kansas are in a unique position to promote health behaviors among low-income families and potentially reduce future costs to the state's health care system.

DEVELOPMENT OF SUBUNIT VACCINES USING FUSION PROTEINS FROM *SALMONELLA*

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Salmonella is responsible for 1.3 billion cases of gastrointestinal and systemic disease annually in humans and food animals and, with over 2500 varieties, recurring infections pose a serious public health care threat. In the United States, *Salmonella* is the leading cause of hospitalizations and death due to food-borne illness. With the increasing occurrence of antibiotic resistance, the best approach for disease prevention is vaccination—yet there is currently no broadly protective vaccine available. To cause disease, *Salmonella* utilize essential virulence mechanisms conserved among the different varieties, which is why we chose to use components of these systems as vaccine candidates. Our previous work showed the protein components SipB, SipD and SseB confer partial protection against a lethal infection in mice. To simplify production and reduce costs, fusions of SipB and SipD (S1F), and SseB and SseC (S2F) were constructed. Immune responses to these are being tested using the mouse *Salmonella* model. Mice were vaccinated with S1F and S2F along with an adjuvant either intranasally, intradermally or intramuscularly. For each route, these fusions generated higher levels of antibody production at earlier timepoints than when the components are administered individually. Mice will be challenged with a lethal dose of *Salmonella* orogastrically and protection will be determined. Protection against infection in mice will allow us to optimize vaccine formulation and investigate protection in other animal models, including calves and pigs. Our research shows these formulations are effective using different administration routes and sets the groundwork for development of a broadly protective *Salmonella* vaccine.

EVALUATION OF CONSTRUCTED AGRICULTURAL WETLANDS FOR SEDIMENT, NUTRIENT, AND VOLUME REDUCTION FROM TILE OUTLET TERRACE FIELD RUNOFF

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Stormwater control and treatment practices for urban areas have transformed in recent decades, but continued advancement in agricultural Best Management Practices (BMPs) is needed. This research investigates tile outlet terrace farmland draining to wetland ponds as an agricultural stormwater management strategy with many potential benefits. Terracing can reduce topsoil and nutrient loss in fields which increases crop yields and maintains farmable acreage. Reduced runoff volume and flow rate can lessen flash floods and reduce erosion in receiving streams. Slowed flows allow for increased infiltration to the water table which helps maintain aquifer levels and baseflow in streams and rivers. Sedimentation and eutrophication are major issues facing Kansas reservoirs. These processes occur gradually in all natural systems, but higher suspended solids and nutrient loads in stormwater runoff can result in reduced water storage capacity, increased drinking water treatment costs, and poor ecological water quality. In this field study, the performance of three wetland ponds and the impact on two receiving streams are quantified for four tile outlet terrace sites in the Clinton Lake watershed in Northeast Kansas. Runoff samples from wetland pond influent and effluent as well as receiving streams are analyzed for sediment and nutrient (total and dissolved nitrogen and phosphorus) concentrations. Hydrologic monitoring at the wetland ponds provides total volume and peak flow rate reductions. This research and lessons learned during its implementation can help assist in the design, maintenance, and operation of similar tile outlet terrace farmland and constructed agricultural wetlands throughout the state.

High-Pressure Phase Equilibria of Compressed CO_2-Saturated Alkanes for Carbon Capture and CO_2-EOR Purposes

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Climate change is a phenomenon that is happening rapidly and affecting human lives all around the globe. Among the factors that accelerated this phenomenon in the 20th century was the increasing emission of greenhouse gases, especially carbon dioxide (CO_2) through human activities. One potential solution for mitigating CO_2 emissions is using carbon capture, utilization, and storage. Our research focuses on mitigating the footprint of CO_2 on the environment through its utilization for EOR purposes. This demands a thorough study of the thermodynamics, transport, and phase behavior properties of pure CO_2 as well as mixtures of CO_2 and other petroleum components. We perform experiments on CO_2-Alkane mixtures to measure their transport properties including thermal conductivity, viscosity, and mass diffusion coefficients. CO_2 injection can increase the recovery from an oil reservoir up to 30% of the original oil in place. There are huge petroleum reservoirs in the U.S as well as the state of Kansas which have produced for years and are currently producing with rates as low as 1 barrel per day. Our studies show that there are good economic incentives to implement CO_2 injection plans in these reservoirs. In this way, we can produce big volumes of incremental oil. Kansas residents can benefit from these projects through the taxes that will be paid to the state. In addition, by performing this study we can develop the capture technology which, other than a contribution to solving the environmental problems, can be considered as a valuable asset for the state.

SOIL, WATER, AND THE STATE: THE CONSERVATION-INDUSTRIAL COMPLEX AND AMERICAN AGRICULTURE SINCE 1920

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The twentieth-century United States witnessed two seemingly contradictory trends: a vast expansion in federal authority, and an enduring political culture of anti-statism. This was particularly true in American agriculture. "Soil, Water, and the State" reconciles this apparent dichotomy by exploring the history of the *conservation-industrial complex*, a term I coined to explain the evolution of soil and water conservation since 1920. This complex was a diffuse network comprised of various public and private parties who shared political, economic, and (in some cases) moral interests in practicing and promoting agricultural conservation. Drawing on extensive archival research and an array of sources—government documents, industrial pamphlets, political correspondence, advertisements, and scientific reports—this project advances our understanding of American state development. It argues that federal authority in agricultural conservation expanded not by centralizing power, but by filtering it through the decentralized network of the conservation-industrial complex. "Soil, Water, and the State" also examines how this complex pursued the dual objectives of economic production and environmental protection. Conservation technologies helped regulate and stabilize the nation's soil and water resources, but a commitment to economic development often facilitated market pressures which continue to produce rates of soil erosion that exceed rates of soil formation by a wide margin. Finally, this project moves the history of agricultural conservation beyond its associations with the Dust Bowl. While the "black blizzards" of the High Plains marked a critical moment in this history, they were but part of a broader and equally fascinating national story.

UNDERSTANDING THE MOLECULAR FUNCTIONS OF LOXL2 IN INVASIVE BREAST CANCER CELLS

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Breast cancer is the number one diagnosed cancer among women in Kansas. This year ~32,300 women in our state will be diagnosed with breast cancer. Fortunately, research has led to significant improvements in breast cancer treatment such as chemotherapy, hormonal therapy, targeted drugs, and advanced early diagnostics, allowing the present average five-year survival rate of women with localized breast cancer to be 99%. However, for patients who have progressed to invasive/metastatic breast cancer (cancer that has spread to other parts of the body), the 5-year relative survival rate plunges to 24%. This is mostly because the molecular mechanisms that drive non-invasive (localized) breast cancer cells to become invasive still remains undefined and a targeted therapy to retard the progression of metastasis/invasion of tumor cells has not yet been developed. In the last decade, lysyl oxidase-like 2 (LOXL2) has been considered to be a promising therapeutic target for breast cancer patients. LOXL2 is highly expressed in invasive/metastatic breast cancer cells but nearly absent in non-invasive breast cancer cells, and LOXL2 has shown to induce the transformation of non-invasive breast cancer cells into invasive breast cancer cells, and to promote tumor cell growth and metastasis. Our research focuses on understanding the molecular mechanisms of LOXL2 in invasive breast cancer cells and tissues. Our ultimate goal is to develop strategies to inhibit the production and/or activity of LOXL2, which could potentially be developed into a targeted therapy for cancers expressing LOXL2. In this presentation, I will summarize our progress in this research field.

HUMAN TRAFFICKING IN THE HEARTLAND: JUSTICE, PREVENTION, AND SUPPORT IN KANSAS CITY

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Kansas City, Missouri and Kansas City, Kansas are critical sites to examine human trafficking due to their rising number of prosecuted trafficking cases and proximity to major trafficking routes. While much human trafficking justice primarily centers on the "Three Ps" model of prevention, protection, and prosecution, prevention remains elusive and understudied. In August 2013, the Anti-Slavery and Human Trafficking Initiative (ASHTI) at the University of Kansas began a pilot project addressing the causal factors of human trafficking in this metro area, focusing particularly on prevention. Based on 35 interviews with service providers who work extensively in Kansas's communities, ASHTI sought to identify and explore how a public health approach to human trafficking could open accessible paths to justice for survivors of vulnerability, exploitation, and trafficking. The service providers in the legal, medical, non-profit, and religious sectors advocate for an approach that places clients at the forefront of their services, creating a non-linear way for survivors to access services and support while reasserting their agency. This exploratory research presents the factors ASHTI has identified in Kansas and potential policy implications for how human trafficking support can function beyond Kansas's borders. Due to legislative and academic priorities, Kansas is in a unique position to contribute to the larger conversations surrounding human trafficking that primarily focus on urban settings in major cities or the coasts. The flexible, "client-first" approaches used with these vulnerable populations in Kansas could be one way to approach trafficking justice outside of the reactive punitive model.

INTER-SPECIES VARIATION IN DECELLULARIZATION OF AORTIC HEART VALVES

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Approximately 2.5% of the U.S. population suffers from valvular heart disease, with >100,000 valve replacements performed annually. Currently, two options are available for valve replacement, mechanical valves and bioprosthetic valves. However, neither of these options is ideal and there are associated complications with each. Unfortunately, these complications are amplified in children with the additional problem that current replacements do not allow growth after implantation. Decellularized heart valves hold great potential as heart valve prosthetics and as a scaffold for the tissue engineered heart valve (TEHV). Before decellularized valves see clinical use however, regulatory guidelines require pre-clinical animal evaluation in the ovine (sheep) model. My research has been focused on characterizing the mechanical and biochemical properties of human and ovine decellularized heart valves. Results from this work have presented significant differences in the mechanical properties of ovine leaflets compared to their cryopreserved counterpart; this has not been observed in human leaflets. Both species also presented a significant reduction in sulfated glycosaminoglycan (sGAG) concentration yet collagen content, the primary structural protein, was similar in cryopreserved and decellularized groups of both species. The results of this study indicate a species specific response to a decellularization process, which leads to the conclusion that decellularizatoion must be optimized dependent upon donor tissue species. This work has implications towards the clinical translation of decellularized heart valves as prosthetic implants and as a scaffold for the TEHV.

ENHANCED EXTERNAL COUNTERPULSATION AND ITS EFFECTS ON VASCULAR HEMODYNAMICS IN COGNITIVELY IMPAIRED PATIENTS

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Individuals with Alzheimer's disease (AD) or mild cognitive impairment (MCI) often have diminished cerebral blood flow (CBF). Enhanced external counterpulsation (EECP) is a device that is mainly used for the treatment of cardiovascular diseases due to its hemodynamic benefits. In this pilot study, we investigated primarily the effects of EECP therapy on CBF and secondarily the cognitive function in patients with MCI. Four patients with MCI received 1-hour EECP treatment five days per week for seven weeks. The Hachinski ischemic index questionnaire was used to exclude patients with vascular dementia. Arterial spin labeling perfusion magnetic resonance imaging was used to measure CBF in each patient before and one day after the 7-week treatment period. Cognitive function was also evaluated before and after the treatment period using the Alzheimer's Disease Assessment Scale-cognitive subscale (ADAS-cog). The combined average CBF in the precuneus, inferior parietal, and hippocampus increased by 2.68 ml/100 g/min ($p = 0.04$) after seven weeks of treatment. The increased average CBF linearly correlated ($R^2 = 0.995$) with changes in the patients' ADAS-cog scores ($p = 0.02$). EECP therapy improves CBF and may be an effective treatment for cognitive decline in patients with MCI. Larger patient trials need to be conducted to verify these results and to further investigate the benefits of EECP for patients with AD or MCI.

DEVELOPING AND IMPLEMENTING A CIRCUMCISION MULTIMEDIA DECISION AID: A QUALITY PROCESS IMPROVEMENT PROJECT

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Background: Parents of newborn males are typically asked by health care providers if they would like their newborns circumcised. If a parent says no, the conversation generally ends. Without dialogue on risks and benefits, in a manner the parent can understand, the parent is limited in making a true informed decision. Decision aids are evidence based interventions designed to help patients make informed decisions based on detailed, specific, and personalized healthcare options in situations when there is no clear advantage in health outcomes, patients' values vary, and each decision has benefits and risks (Stacey et al., 2012).
Objective: The purpose of this quality improvement project was three fold: (1) to develop and implement a circumcision multimedia decision aid (CMDA) providing parents with education using both pictures and words, (2) to assess mothers' perceptions of their decision-making preparedness, (3) to ask mothers in an open-ended format to comment on their thoughts about the CMDA.
Methods: A quality improvement process was used to implement and evaluate circumcision multimedia decision aid in a convenience sample of 30 inpatient postpartum mothers of newborn males. The instrument, Preparation for Decision Making Scale (PrepDM), was used to assess the CMDA's ability to prepare mothers to make a decision regarding circumcision.
Results: The Cronbach's Alpha reliability coefficient for the PrepDM was .946. The mean item scores for the PrepDM ranged from 4.43-4.6 representing good preparation for decision making. The number of total scores ≥ 4 on the PrepDM as a percentage of the total sample was 87%. Mothers used the following words to describe the CMDA: Helpful, visual, educational, liked, and right decision.

Keywords: multimedia, decision aid, circumcision, parental decision

OVEREXPRESSION OF INTERFERON STIMULATED GENES IS CRITICAL FOR THE SURVIVAL OF AROMATASE INHIBITOR-RESISTANT BREAST CANCER CELLS

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The majority of breast cancers rely on estrogen to stimulate their growth and survival. Estrogen is made from testosterone by the enzyme aromatase, whose action is blocked by aromatase inhibitors (AIs). Unfortunately, the majority of patients treated with AIs eventually develop resistance and the tumor cells survive even though there is no estrogen present. AI-resistant breast cancer is very aggressive and does not respond well to other treatments. It is not currently known how breast cancer cells become AI-resistant. The goal of our lab is to determine the mechanism by which AI-resistance develops. Analysis of samples taken from breast cancer patients indicates that interferon stimulated genes (ISGs) are highly expressed in AI-resistant tumors. ISGs are not normally expressed by cells and are typically produced by stimulation with interferons (IFNs) to protect the body from viral infections. The significance of high expression of ISGs in AI-resistant breast cancer is not known. In this study, we developed an AI-resistant breast cancer cell model that is highly aggressive and naturally overexpresses several ISGs. The overexpression of these ISGs gives the AI-resistant cells a survival advantage that allows them to grow in an estrogen-deprived environment. Mechanistic studies revealed that the AI-resistant breast cancer cells produce elevated levels of IFNα which drives ISG expression. Notably, blockade of IFNα signaling in AI-resistant breast cancer cells dramatically reduced ISG expression, which caused cell death. Overall these findings suggest that suppressing ISG expression might be an effective strategy to treat and possibly prevent AI-resistant breast cancer.

STRUCTURAL BRAIN DIFFERENCES IN PATIENTS WITH CHRONIC LOW BACK PAIN

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Chronic Low Back Pain (LBP) is the most common pain condition affecting millions of people worldwide. It is estimated that up to 85% of chronic LBP cases are idiopathic and lack a pathoanatomical diagnosis. Recent brain imaging studies have found significant differences in subjects with LBP in relation to their brain chemistry, function, and structure (brain volume and gray matter density). Such findings might indicate an alteration in pain processing pathways in the brain associated with the chronicity of the condition. However, brain volume differences are inconsistently reported in the literature. Therefore the main aim of this study is to examine structural brain differences in patients with chronic LBP in comparison to healthy controls. Twenty eight subjects (14 with chronic LBP and 14 healthy age- and sex-matched controls) had T1-weighted MPRAGE structural images using 3T Allegra and Skyra Siemens scanners to acquire 1 mm thick scans. Imaging parameters were: 0.9x0.9x1.0 mm voxel size, TR=2300 msec, TE=3.05 msec, flip angle=8º and matrix=256x256. Images were preprocessed and analyzed using VBM8 toolbox through SPM8 software that operates under Matlab. The preliminary findings indicate voxel-based morphometric (VBM) whole-brain volume differences between groups. Subjects with chronic LBP have significantly (p <0.001 uncorrected for multiple comparisons) reduced VBM whole-brain volume as compared to healthy controls. Additionally, the correlation analysis between pain duration and normalized whole-brain volume showed a significant negative correlation (R = -0.461, p <0.05). Such findings might indicate the central differences that can accompany chronic LBP. Whether such differences are the cause or the result of chronic

LBP is still unclear.

SPECC1L MODULATION OF ADHERENS JUNCTIONS AND PI3K-AKT SIGNALING IS REQUIRED FOR COLLECTIVE CELL MIGRATION IN FACIAL MORPHOGENESIS.

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Orofacial clefts are a frequent birth defect, with cleft lip and palate (CL/P) alone affecting 1/800 live-births. Previously, we identified *SPECC1L* mutations in two patients with severe clefts that extend from the oral cavity to the eye, termed Oblique Facial Clefts (ObFC) [Saadi, 2011]. We proposed that mechanisms underlying ObFC and SPECC1L function are directly related to common CL/P malformations. Indeed, new heterozygous missense *SPECC1L* mutations have been identified in two patients with nonsyndromic CL/P (Dr. Murray, U. Iowa) and in two families with syndromic CL/P [Kruszka, 2015], underscoring the significance of this novel cytoskeletal protein. We have created severe and hypomorphic mouse models of *Specc1l* deficiency. Hypomorphic homozygous mutants exhibit perinatal lethality with incompletely penetrant exencephaly and cleft palate phenotypes. Severe homozygous mutants die during embryogenesis with impaired neural tube closure and delamination/migration of neural crest cells (NCCs). Mutant embryos show increased apoptosis and reduced AKT signaling. SPECC1L protein is stabilized at cell-cell boundaries and interacts with canonical components of adherens junctions (AJs). Further, SPECC1L-deficient cells show altered AJ staining predicted to reflect *more dense* AJs, which leads to *poor* cell migration. Live-imaging analysis indicates that the migration defect is not due to slower speed, but rather due to *poor collective movement*. Modulation of cell-cell contacts is important not only for NCC delamination from the neural folds, but also for collective migration of NCCs to their defined destinations. Thus, SPECC1L is an entirely novel modulator of AJ stability, and of AKT signaling affecting collective cell movement in craniofacial morphogenesis.

AUTOMATIC TALK BACK AND EXOSKELETON SYSTEM USING BRAIN NEURAL COMPUTER INTERFACE FOR ALS PATIENTS

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We propose an effective model for ALS patients to enhance their mobility and to increase the possibilities of interaction such as talking and sending an email. The model additionally caters to their everyday requirements empowering a simple cooperation without controls such as joysticks, buttons and switches. Here, we design a talk back system and exoskeleton interfaced to the human brain using Brain Neural Computer Interface (BNCI). The system converts EEG signals generated by human brain to electronic commands that are processed by the computer. The logic unit then differentiates between a control and a communication signal. Accordingly, the output of the logic unit is directed either to the exoskeleton or the text to speech converter. The subjects are initially trained to ensure maximum effectiveness of the system. During the training phase, EEG signals are collected while they work on some common tasks, such as concentrating on various objects and moving the right hand. Once this training is accomplished and maximum effectiveness is ensured, the system is deployed to the patient. After deployment the control unit compares with predefined logic and is used to control legs and limbs fixtures automatically. The system uses non-invasive EEG electrodes placed on the scalp to detect and receive brain signals. In addition to EEG electrodes, force detecting sensors are placed on the body to maintain stability (just like a Segway). A virtual gaming software based system where subjects learns controlling in a gaming environment can also be developed.

HEALTHCARE ASSET REPLACEMENT PROBLEM UNDER TECHNOLOGICAL CHANGE AND DETERIORATION

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In this study, we study the multiple style and type parallel asset replacement problem (MUST-PRES), which determines an optimal policy for keeping or replacing a group of assets that operate in parallel under a limited budget and a fixed purchasing cost. Operating assets generally suffer from deterioration, which results in high operation and maintenance costs and decreased salvage value, while technological improvements make it possible for new assets to operate more efficiently at a lower cost. In order to address these issues, we formulate a multi-objective optimization model, which minimizes fixed and variable costs of purchasing new assets, while considering a combined effect of technological change and deterioration as a gain and loss in capacity, respectively. The optimization model also allows some demand to be unmet due to strict budget limitations while imposing a penalty when demand is not met in each period. We apply our model to a case study of healthcare assets involving two different types of assets: a *full-body magnetic resonance imaging* (MRI) machine and a *smaller-extremity MRI* (eMRI) machine. Each MRI and eMRI machine has two types: high-field and low-field. We perform computational experiments and sensitivity analysis using key model parameters, and present study results for four cases of technological change and deterioration to illustrate optimal replacement strategies. Numerical results show that the proposed optimization model provides valuable insights and strategies for companies, decision-makers, and government entities on optimal asset replacement as well as healthcare asset management.

CHARACTERIZATION OF ISCHEMIC MUSCLE OF PERIPHERAL ARTERY DISEASE PATIENTS BY ELEMENTAL CONCENTRATION USING ENERGY DISPERSIVE X-RAY SPECTROSCOPY

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Peripheral artery disease (PAD) is characterized by atherosclerotic blockages of the arteries supplying blood to lower extremities and affects approximately 10 million lives in the United States. Functional testing, such as ankle brachial index (ABI), can identify reduced blood flow (due to blockages in the arteries) based on blood pressure differences between the ankle and arm. However, there is a need to measure more than just abnormal blood flow – there is a need to measure the secondary effects on the end organ (skeletal muscle). In this study, we evaluated the hypothesis that severity of muscle damage can be characterized by analyzing the differences in muscle elemental concentration. The objective of this study was to compare elemental concentration including sodium, potassium, calcium, magnesium and sulfur in myofibers of gastrocnemius biopsies from control subjects and PAD patients. We obtained gastrocnemius biopsies from three subjects including control, claudicating and critical limb ischemia (CLI) patients. In total, 15 myofibers were analyzed, 5 from each tissue specimen. Using a scanning electron microscope (SEM) and energy dispersive X-ray spectroscopy (EDS), differences in elemental concentrations between control and PAD muscle samples were quantified. An analysis of variance was performed and significant differences ($p<0.05$) in muscle elemental concentration were found. SEM and EDS were able to characterize changes to the elemental concentration in PAD muscle, which correlated with clinical diagnosis of PAD. These findings may aid in the identification of neglected therapeutic targets and the development of specialized preventive or rehabilitative treatment plans.

NURSE STAFFING FOR INPATIENT SETTINGS USING A STOCHASTIC MODELING APPROACH

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Consistent evidence from observational studies suggests that inadequate nurse staffing in hospitals and heavy nurse workload threaten patient safety and quality of care. Every additional registered nurse per patient is associated with a risk reduction in hospital-related mortality by 9 and 16 percent in intensive-care and surgical units, respectively. There are recommended nurse-to-patient ratios for different types of inpatient settings. However, patients in a hospital unit may have different acuity levels based on the severity of care needed. This may impact the staffing needs of the unit potentially rendering a fixed nurse-to-patient ratio ineffective. To address this gap, this study aims at determining nurse-staffing strategies that account for the patient acuity. A stochastic model and solution approach are proposed to identify the optimal staffing level for an inpatient unit with any given patient mix. The objectives are to minimize staffing costs while ensuring timely delivery of patient care, which is measured using metrics such as the probability of excessive delays in providing care. The proposed model will capture the uncertainty associated with the volume and duration of care provided to different acuity levels. This will be achieved through the application of Queueing Theory and Discrete-event Simulation techniques.

METHODS FOR THE OPTIMIZING TRAJECTORIES OF ALL-ELECTRIC SATELLITES FOR MULTIPLE VARIABLES AND LAUNCH CONDITIONS

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With the current shift from chemical to all electric thrusters and satellites that is currently being undertaken in the space industry, the state of Kansas is set in a prime position to benefit greatly as new technologies and designs are experimented with and implemented. New designs for spacecraft also mean new jobs for manufacturers of components of all-electric spacecraft and associated launch vehicles as satellites become smaller, lighter and less expensive. The expertise in aerospace manufacturing that already exists can be utilized to attract both new companies and facilitate any expansion that might occur in order to address servicing the needs of all-electric spacecraft. As part of the research being conducted, the implementation of a transfer path from a starting orbit to Geosynchronous Earth Orbit (GEO) is being analyzed and optimized for a number of factors: minimum transfer time, minimum fuel expenditure, and minimum radiation damage. It is important to consider all of these aspects because of the degree to which they are interconnected. The longer a space craft in in transit, the more it is exposed to damaging radiation which in turn limits the amount of power available to thrust, meaning longer transfer times, etc. Each of these factors contribute in different ways to creating an optimum design to make sure that the spacecraft are able to perform comparably, if not exceed, the current designs resulting in possibly saving millions of dollars in launch and operation costs.

HEALTHCARE DELIVERY AND POLITICAL CAMPAIGN PLANNING WITH LIMITED RESOURCES: AN OPTIMIZATION APPROACH

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In this paper, a mathematical model is developed to address two problems. The first problem is on healthcare delivery planning in which the objective is to diagnose and treat as many patients as possible by determining the locations to be visited assuming that patients have the ability to travel a predetermined distance, e.g., to clinics in different locations. For example, a doctor may plan to visit many locations with Ebola patients in a country in Africa. In the case of a natural disaster, where there may be significant damage to the existing infrastructure, a similar scenario may happen. The second problem considers a politician who would like to visit as many locations as possible while attracting voters who would consider travelling to the campaign centers from other locations. In both applications, it is assumed that there is a limited budget and duration to achieve these objectives. These problems are modeled as a mixed integer mathematical model-a variation of travelling salesman problem with covering, budget and time constraints which is known to be an NP-Hard problem. In order to solve this problem efficiently in a reasonable amount of time, a hybrid genetic algorithm is developed. Extensive computational results are presented. It is observed that where there is very limited budget and time, or very extensive resources, solving the resulting problem takes significantly less computational resources compared with other problems. The computational experimentation also provides insights about the effect of budget and distribution of potential visit locations on service rate and profit.

S.N.A.P. GAP

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Childhood hunger is a health issue prevalent among children throughout the United States. Many families who live at or below the poverty level enroll and participate in programs to reduce the effects of hunger. The standardized Federal food assistance program, Supplemental Nutrition Assistance Program or S.N.A.P., is a program based on household income, disbursing monthly benefits to qualified participants. Other supplemental nutrition programs further assist families, such as the Free and Reduced school lunch program allowing qualifying students to consume breakfast and lunch meals at school. When school is not in session, however, the additional meals that qualified children receive within the school environment are not available to them. Instead, families must create additional meals out of their existing S.N.A.P. benefits or rely on various other supportive programing to meet their food needs. Using a small-scale community needs assessment approach, the current pilot project analyzed 35 publicly available news articles (18 in national news sources & 17 in Kansas news sources) published since 2013 in order to explore available programing and accessibility issues brought to the public's attention. Analysis focused on identifying gaps and resources that are in place to supplement the S.N.A.P. program. Findings indicate the majority of news articles focus on needed changes with slightly more articles focusing on national assistance programs than local despite an emphasis on charitable funding options. Implications for Kansas are highlighted.

SYNTHETIC MODELS FOR THE ACTIVE SITE OF THE NICKEL SUPEROXIDE DISMUTASE ENZYME (NiSOD)

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The superoxide molecule is an inevitable byproduct of aerobic respiration, which is the process by which nutrients are converted into useful energy in cells. If not regulated, superoxide causes significant cellular damage, leading to various diseases such as cancers, rheumatoid arthritis, osteoporosis and some neurological diseases such as Alzheimer's and Parkinson's disease. Superoxide dismutases (SODs) are enzymes which are responsible for detoxifying superoxide by helping to convert it into molecular oxygen and hydrogen peroxide, thereby protecting biological systems from oxidative damage. Among the four different SODs known, nickel-containing superoxide dismutase (NiSOD) has been discovered recently in *Streptomyces* species and cyanobacteria. NiSOD has a strikingly different geometry from other SODs and the relationship between the structure of NiSOD and its function is still not fully understood. We have been making two kinds of synthetic models for the NiSOD active site, which is the part of the enzyme responsible for its function. All these models have been characterized by various physical methods, including single-crystal X-ray crystallography. The ability of the model compounds to perform the enzymatic function will also be assessed. Using the information gained from this study, we hope to understand how the NiSOD enzyme works and suggest a new direction for the development of a new class of drugs to treat SOD deficiency and related diseases.

EMERGENT LITERACY: A LOOK AT HOW PRESCHOOLERS BEGIN TO DEVELOP SPELLING SKILLS

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Reading and spelling success in school relies on early phonological development. Much is known about emergent reading during preschool years, but less is known about spelling, the "hard copy" of phonological processing. The purpose of this study is to determine if there is a difference in sensitivity between two spelling score systems: invented spelling and bi-gram analysis as related to phonological awareness. Scores from forty children who have participated with a caregiver in an emergent literacy play group were examined. Data were gathered from both pre- and post-tests of the APELS. Preliminary analysis suggests that there is no difference in sensitivity between invented spelling and bi-gram analysis. An analysis of variance used to determine if there is a relationship between spelling and phonological awareness suggests that there is a significant positive relationship between phonological awareness and spelling scores.

ADDING GAME-LIKE ELEMENTS TO AN ARMORED VEHICLE RECOGNITION TRAINING

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Fratricide, or friendly-fire accidents, account for an overwhelming number of casualties during military operations. Gadsden and Outteridge (2006) examined the varying causes of fratricide across the reported incidents. They noted that misidentification accounted for a significant number of fratricide accidents. If methods to reduce misidentification errors are found, fratricide accidents should decrease as a result (Gadsden et al., 2008; Keebler, Sciarini, Jenstch, Fincannon, & Nicholson, 2008). The purpose of this research is to investigate novel training techniques that manipulate the structure of training rewards to reduce misidentification errors. Participants were trained to identify armored vehicles in one of three two-alternative forced-choice training conditions. Specifically, participants received feedback that emphasized response time, response accuracy, or neutral feedback. The feedback was manipulated using game-like points and sound effects. During training, participants receiving accuracy-emphasized feedback exhibited significantly higher training scores than both the speed emphasized, and control groups. As expected, the participants who received speed-emphasized feedback performed significantly faster than the other groups during training. Interestingly, when participants were later tested with a video armored vehicle identification task without feedback, the participants who received the accuracy-emphasized feedback were still significantly more accurate than the other groups. Future research should further manipulate the accuracy-emphasized reward structure to identify optimal ways to deliver feedback during armored vehicle recognition training

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GENDER DIFFERENCES IN SPACE-USE PATTERNS OF SOUTHERN FLYING SQUIRREL (*glaucomys volans)* THROUGHOUT NORTHEASTERN IOWA

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Southern flying squirrel (*glaucomys volans*) are common throughout the eastern deciduous forests of the United States and Canada. However, within the state of Iowa *G. volans* are currently listed as a "species of special concern." This status is due to general loss of local habitat as well as lack of information on this species within the state. Understanding movement patterns and habitat associations becomes increasingly vital should this species be preserved within the state. Research was conducted at two study sites: Mines of Spain State Recreational Area (MoSRA) as well as private property. Both sites are located in northeastern Iowa in Dubuque and Clayton counties. They are similar topographically and are adjacent to the Mississippi river. Beginning in the summer of 2012 and continuing in the summer of 2014 male and female *G. volans* were fitted with radio transmitters. Researchers located individuals using radio telemetry techniques. While some individuals yielded only a few locations, others were successfully tracked for over a month. The purpose of this research continues to investigate 1) the spatial requirements / differences for male and female southern flying squirrel, 2) changes in spatial use over time, and 3) topographic needs for individuals within this area. Males were found to have generally larger home ranges than females. Most home ranges exhibited topographic choice by individuals. It appears that spatial needs of both male and female squirrels are variable. These data will hopefully yield a better understanding of space-use and ecology of the southern flying squirrel.

CLASSROOM-BASED INSTRUCTION OF NARRATIVES USING SKILL

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Children's ability to produce narratives has been linked to later success in school (Catts, Hogan, & Fey, 2003; Tabors, Snow, & Dickinson, 2001). The need for narrative instruction within the general education classroom has become more relevant as a result of the adoption of Common Core State Standards in which the English Language Arts Standards for first grade focus on narrative structure in both oral language and comprehension. For instance, CCSS.ELA-Literacy.RL.1.2 requires students to retell stories, including key details, and demonstrate understanding of their central message or lesson. In another standard, CCSS.ELA-Literacy.RL.1.7, students are to use illustrations and details in a story to describe its characters, setting, or events. The purpose of this study was to determine if classroom-based narrative instruction using *Supporting Knowledge in Language and Literacy* (SKILL) improves the comprehension and oral narrative skills of first-grade children. 17 first-grade students (High Risk Students = 7; Low Risk Students = 10) participated in narrative instruction as one of their language arts centers twice a week for 20 minutes. Five of the seven high-risk students improved their standard language scores to above 90. As with previous research (Petersen, 2011; Petersen et al., 2010), improvements in the use of story grammar and complexity were observed following explicit narrative instruction. Specifically, students were better able to answer questions about stories, included more story grammar elements in their stories, and increased their use of adverbs and mental/linguistic verbs following instruction.

EFFECTS OF ENVIRONMENTAL AND HUMAN DISTURBANCE FACTORS ON THE RANGE CONTRACTION OF NORTH AMERICAN BIRD AND MAMMAL SPECIES

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The successful conservation of species stems from an understanding of how and why they decline. Decline can often be observed in the form of range contraction, which is how the geographic range of a species decreases over time. Because habitat destruction is the largest contributor to biodiversity loss, focusing research on range contraction can aid us in our efforts to conserve species. We sought to gain a deeper understanding of some of the factors that potentially influence range contraction by determining which factors had the greatest effect. We assessed the effects of several environmental and human disturbance variables on the range contraction of 16 bird species and 22 mammal species of North America. Human disturbance variables analyzed were proportion of land converted to urbanized areas, proportion of land converted to rangeland, and proportion of land converted to cropland. Environmental variables analyzed were elevation, mean annual temperature, and mean annual precipitation. Results indicated that, of the variables included in this analysis, cropland had the greatest negative effect on where species persist and precipitation had the greatest positive effect, indicating that species tend to disappear from areas with greater proportions of cropland and tend to persist in areas with greater amounts of precipitation. The findings of this study can serve as a foundation upon which other studies can build and provide conservationists with a better understanding of the relative effects of environment and human disturbance on the extinction or persistence of species.

EXAMINING FACTORS USED BY STUDENTS TO SELECT A MAJOR IN COMMUNICATION SCIENCES AND DISORDERS

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There is a shortage of practicing speech-language pathologists (SLP) in the United States. According to Edgar and Rosa-Lugo (2007), this shortage will not be improving due to the increased need and the high turnover rate in settings like the public schools. This study explores factors used by graduate students to decide about their profession, applying the knowledge of these factors to the recruitment process. The results found that most people decided to pursue the major in college because of the desire to help others, the availability of jobs, and expected salary. The most influential people were working SLPs and parents. Location and tuition costs were the top factors when deciding on a graduate program. Knowing these factors can help with the recruitment process. College programs and professionals can base their recruitment tactics off of these influences. Speech-language pathologists, audiologists, communication disorders students, and assistants need to take a more active role regarding communication disorders as a career path to help the younger generation become more aware of the professions at an earlier point in career decisions.

BLACK FOOTED FERRET (*mustela nigripes)* DISPERSION IN WESTERN KANSAS

***Mitchell Meyer,*[1]** *Elmer J. Finck,*[1] *and Victoria Jackson*[2]
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The black-footed ferret (*Mustela nigripes*) is an endangered endemic species in North America. Ferret populations have declined over 90% and this is attributed to habitat loss, disease, and the eradication of their target prey, prairie dogs (*Cynomys*). Only small reintroduced populations exist in the Great Plains region of the United States. Population surveys are conducted around the months of March and September in Kansas. Only spotlighting occurred in the March survey. In the September survey ferrets are spotlighted, live trapped, PIT tagged, and then released. I wanted to know if ferret dispersion was different between two sampling years and among the four sampling seasons. Using Google Earth and ArcMAP, I plotted ferret locations collected by the United States Fish and Wildlife Service. A nearest neighbor analysis indicated ferrets showed high levels of clustering in March 2011, September 2011, and September 2012, while in March 2012 ferrets were more randomly dispersed. A 2-factor ANOVA indicated there was no significant difference in dispersion between sampling years, but significance showed among the sampling seasons. A post hoc test showed two statistically significant groups: September 2011 = September 2012 = March 2011, and March 2011 = March 2012. It is possible March 2012 was different than the other sample seasons due to the smaller sample size. Ferrets might disperse differently according to population size. More survey years and survey seasons should be taken into account. This could help better understand ferret dispersion in different sampling seasons and affect management strategies.

GENERATION OF ELECTRICITY FROM PHOSPHORESCENT INSECTS

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The light that a firefly creates is produced through a chemical reaction. Very little heat is given off by this light which means that not very much energy is wasted. ***This "cold light" has a 96% efficiency rating; which, when compared to an incandescent light that has only 10% efficiency, is rather impressive.*** The nanorods are composed of an outer shell of cadmium sulfide and an inner core of cadmium seleneide. Both are semiconductor metals. Manipulating the size of the core, and the length of the rod, alters the color of the light that is produced. The colors produced in the laboratory are not possible for fireflies. Maye's nanorods glow green, orange, and red. Fireflies naturally emit a yellowish glow. The efficiency of the system is measured on a BRET scale. The researchers found their most efficient rods (BRET scale of 44) occurred for a special rod architecture (called rod-in-rod) that emitted light in the near-infrared light range. Infrared light has longer wavelengths than visible light and is invisible to the eye. Infrared illumination is important for such things as night vision goggles, telescopes, cameras, and medical instruments. "The nanorods are made of the same materials used in computer chips, solar panels, and LED lights," Maye says. "It's conceivable that someday firefly-coated nano rods could be inserted into LED-type lights that you don't have to plug in." By these firefly-coated nano rods, we can light up our city, homes which conserves energy and also non-renewable energy resources.

GREEN SYNTHESIS OF α-PHELLANDRENE AND β-CARYOPHYLLENE BIO-BASED POLYOLS AND THEIR APPLICATION FOR POLYURETHANE

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Recently non-petrochemical based materials have attracted considerable research attention due to sustainability issues. Chemicals from plant derived resources are good candidates for polymer synthesis as they are renewable and environment friendly. α-phellandrene and β-caryophyllene are two naturally occurring cyclic terpenes which contain two alkene groups. α-phellandrene can be isolated from eucalyptus oil and β-caryophyllene, from *Cannabis.* Novel bio-based polyols were synthesized from these renewable materials through a photochemical thiol-ene reaction with 1-thioglycerol and 2-mercaptoethanol in varying chemical equivalents. The polyols produced were characterized by FT-IR, GPC, viscosity, hydroxyl number and acid value. Bio-based polyurethane foams will be produced from these polyols and the properties of the foams will be determined and compared to industrial standards. α-phellandrene and β-caryophyllene could serve as renewable sources for the preparation of rigid polyurethane foams for thermal insulation of buildings and/or refrigerators/freezers.

SPIN COATING AS A TECHNIQUE FOR OPTIMIZING THE POWER CONVERSION EFFICIENCY OF DYE SENSITIZED SOLAR CELLS

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Spin coating technique is not popular as a basic fabrication technique in the field of photovoltaics though it is commonly used in depositing electron blocking layers, compact layers and counter electrodes in the fabrication of photovoltaic materials. In this project we seek to fabricate very efficient dye sensitized solar cells (DSSC) using spin coating technique as the basic fabrication method. The goal is to enhance the incident photon-to-current efficiency (IPEC) by optimizing the angular speed of the spin coater with thickness variance in nanostructured semiconducting metal oxide n-TiO2- layer. The TiO2 nanoparticle layer was prepared by spin coating on indium-doped tin oxide glass by annealing. The carbon counter electrode and the ruthenium dye anchored electrode were then assembled as a function of thickness of the TiO2 layer. The thickness of the thin films were adjusted by varying the speed of the spin coater in the range of 1 - 4 rpm. The DSSC was illuminated with a solar simulator under AM 1.5 G illumination at 100 mW/cm2 in the presence of I-/I3- electrolyte solution. I-V characterization was performed to extract cell parameters. Current recorded maximum energy conversion efficiency (η) is 3.32% ; a short circuit current density of 10.20 mA·cm-2, open circuit voltage of 0.50 V and fill factor of 65.33% for the optimized speed of the spin coater of 3.35 rpm for one layer of n-TiO2 layer. Our studies show that the IPEC value of a DSSC can be optimized by adjusting the angular speed of the spin coater and thin film thickness.

PSMA-RECEPTOR TARGETING MAGNETIC NANOPROBES: NOVEL NANOTHERANOSTICS FOR THE TREATMENT OF PROSTATE CARCINOMAS

*Kalee Wood[2], **Jyothi Kallu[1]**, Shoukath Sulthana[3] and Dr. Santimukul Santra[1]*
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The imaging, diagnosis, and successful treatment of prostate cancer (PCa) continue to be a challenging problem and it is estimated that 1 out of 6 men will be diagnosed with the disease during their lifetime, making this disease the second leading cause of death among men. Therefore, developing more effective therapeutic agents against advanced PCa that allow for simultaneous therapy and monitoring of tumor growth are equally important. Particularly, theranostic (dual therapy and diagnostic) agents are targeted to the disease regimes that allow delivery of therapeutic agents in high concentrations to PCa, while monitoring of drug localization to the tumor. The concept of a nanoparticle-based therapeutics is ideal as a single agent that could deliver a drug and imaging agent to the prostate tumor via recognition of surface receptor markers highly expressed on the tumor cells.

In this presentation, we will discuss a new method of targeting prostate cancers. For the first time glutamate ligand-decorated and taxol anti-cancer drug encapsulating magnetic nanoparticles were used to target PSMA-bearing PCa cells. Prostate Specific Membrane Antigen (PSMA) is over-expressed on the surface of LNCaP prostate cancer cells and successfully targeted by glutamate-decorated magnetic nanoparticles. Results showed more than 80% LNCaP cells were dead after 24 hour incubation of the drug-carrying nanoparticles. No apoptosis was observed in PC-3 cells due to the absence of PSMA receptors. These results were further confirmed using optical microscopy and magnetic resonance imaging technologies.

CHANGES IN ESTROGEN RECEPTOR ALPHA (ERα) PHOSPHORYLATION IN HUMAN T CELLS

Samantha Meneely *and Dr. Virginia Rider*
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In breast cancer cell lines, certain sites of ERα are differentially phosphorylated (ser104/106, ser 118, and ser167) resulting in altered ERα action. The purpose of the present study was to compare the amount of ERα phosphorylation at these sites between resting and activated human T cell samples. T cells were purified from normal blood samples (n = 8) by negative selection and proteins were extracted. Some T cells were cultured in T cell activation medium containing PMA (10 ng/ml) and ionomycin (0.5 µg/ml) for 4 h. Proteins were immunoprecipitated with ERα for 1 h and protein A/G PLUS slurry overnight. It was then washed with PBS-0.1 M NaCl. Proteins were size fractionated by SDS-PAGE and transferred to nitrocellulose membranes. The blots were sequentially reacted with ERα and three phospho-specific antibodies ERα 118, 167, 104/106 that recognize ER-α only when the specific site is phosphorylated. The amount of phosphorylation was compared by chemiluminesence detection and the relative intensity was adjusted to total ERα (100%) for each sample. Phosphorylation at Ser104/106 increased slightly in activated T cell samples (79.03% versus 82.49%) while phosphorylation at Ser118 and Ser167 decreased in response to activation (82.13% versus 63.24% and 83.61% versus 66.75%, respectively). These results indicate that T cell activation changes ERα phosphorylation and suggest altered phosphorylation could underlie differential estradiol action in systemic lupus T cells.

NOTES:

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