

2017 This is Research: Student Symposium

Full Abstracts

Title: Comparisons among channel catfish *Ictalurus punctatus*, blue catfish *I. furcatus*, and channel ♀ × blue ♂ hybrid catfish for growth, and salinity tolerance

Primary Author (and presenter): Abass, Nermeen Y.

Additional Authors: Dunham, Rex A.

Department: Fisheries

College/School: College of Agriculture

Description: Shortage of freshwater is a global issue due to the competition for water among agriculture and other urban activities and climate change. Therefore, there is a great need to culture aquaculture in brackishwater and seawater. salinity tolerance of yolk-sac larvae and swim-up fry of channel catfish (*Ictalurus punctatus*), blue catfish (*I. furcatus*), and hybrid catfish (channel catfish ♀ × blue catfish ♂) was investigated at 0, 3, 6, and 9 ppt salinity. No yolk-sac larvae or swim-up fry survived for channel catfish, blue catfish, and hybrid catfish at 9 ppt for either stage of development, and no mortality was observed at 0 ppt for yolk-sac larvae for all genetic groups. Survival among the genetic groups at 3 ppt was different by day 3 and day 4 post hatch. At 6 ppt blue catfish had the highest survival for yolk-sac fry through day 2, but by day 3 blue catfish had the lowest tolerance and channel catfish the highest. Long-term survival of hybrid fry was better than that of the parent species at 0 ppt salinity, but highest for the channel catfish at 3 ppt and 6 ppt with the hybrid being intermediate. Channel catfish fry were more resistant to saltiness than hybrid catfish and blue catfish ($P < 0.0001$) at 6.0 ppt for swim-up fry, however, no difference was observed at the other salinities ($P > 0.05$). The resistance of hybrid catfish to salinity was intermediate to their parents. Genotype × environment interactions occurred for growth as hybrids grew faster than channel catfish and blue catfish at 0 ppt. Raising salinity to 3 ppt greatly increased the growth rate (50-75%) of channel catfish and blue catfish, but only slightly (10%) for hybrid catfish, which were still larger than the parent species. Channel catfish were the most tolerant of the genotypes at 6 ppt, had the largest size, but their growth was reduced. These results help identify the saline environments that might be suitable for long-term growth and disease resistance of these ictalurid catfish.

Title: How can we feed our growing planet?

Primary Author (and presenter): Abass, Nermeen, Y.

Additional Authors: Dunham, Rex A.

Department: Fisheries, Aquaculture, and Aquatics Sciences

College/School: Agriculture

Description:

Millions of people are hungry and most of them live in poverty. Fish are an important source of animal protein for people worldwide. Gene transfer represents a potential solution to develop the fastest growing. Catfish is the king aquaculture species in the United States. Growth hormone (GH) has been considered as a candidate gene for growth and development in teleost fish. Channel catfish, *Ictalurus punctatus*, GH

cDNA driven by the ocean pout *Zoarces americanus* antifreeze protein promoter (opAFP-ccGH) or rainbow trout *Oncorhynchus mykiss* metallothionein promoter (rtMT-ccGH) were transferred to the channel catfish via electroporation. GH transgenic (P_1) were mated to produce the F_1 generation. The present study was designed to compare the growth performance between male and female transgenic channel catfish GH cDNA and their full-siblings in earthen ponds at different ages. Body weight between the transgenic individuals and their full siblings were different at all ages. Catfish transgenic for opAFP-ccGH grew 1.67-2.8 fold larger than their full siblings and those transgenic for rtMT-ccGH grew 1.51-3.16 fold larger than their full siblings. Significant differences in body weight between the sexes were found at 12 and 36 months. Body weight of the males was significantly higher compared with those of the females at age 12 months ($P < 0.001$). However, body weight of the females was significantly higher compared with those of the males at age 36 months ($P < 0.0001$). The body weight of 36-month-old transgenic opAFP-ccGH females (2110 ± 880 g), was 1.20 times higher than that of the males (1760 ± 600 g). However, the body weight of transgenic rtMT-ccGH females (2340 ± 470 g), was 1.31 times higher than that of the males (1780 ± 570 g). In the case of non-transgenic GH siblings males grew faster than females at 12 and 36 months ($P < 0.001$). Apparently, elevation of growth hormone levels or associated epistasis alters sexually dimorphic growth after sexual maturation.

Title: Reactive oxygen production of blue crab hemocytes responds to probiotic and pathogenic *Vibrio* spp.

Primary Author (and presenter): Aceves, Alison, K.

Additional Authors: Schott, Eric, J. and Schreier, Harold

Department: Fisheries, Aquaculture, and Aquatic Sciences

College/School: Agriculture

Description:

The blue crab (*Callinectes sapidus*) is a valuable shellfish fishery in the Chesapeake Bay. The blue crabs' innate immune system depends on defense functions such as phagocytosis or reactive oxygen species (ROS) production to destroy invasive microorganisms. To investigate ROS production by blue crab hemocytes, we adapted a method from Moss and Allam using the fluorescent probe 2', 7' - dichlorofluorescein-diacetate (DCFH-DA). After this molecule becomes oxidized by ROS production, the highly fluorescent DCF can be detected using fluorometric tools. Preliminary experiments showed that we can use a plate reader to measure ROS production in hemocytes and there was no significant difference in ROS production with the addition of zymosan particles. The method was then used to investigate the effects of a bacterial challenge on ROS production in blue crab hemocytes. We used two strains of *Vibrio* spp.: OY15 (probiotic) and B183 (pathogen). We hypothesized that hemocytes challenged with the *Vibrio* spp. strains will produce a higher ROS production than hemocytes alone. Our results indicated that hemocytes challenged with OY15 and B183 were suppressing ROS production. The fluorometric method used in this study can be used to measure the ROS production of blue crab hemocytes and provides more information on the blue crabs' defense system.

Title: Novel PPAR-gamma agonist improve pathology and memory deficits in a 3xTg-Ad mouse model of Alzheimer's disease.

Primary Author (and presenter): Adamek, Danielle, N

Additional Authors: Govindarajulu, Manoj; Bloemer, Jenna; Briggs, Wynne; Lynd, Tyler; Suppiramaniam, Vishnu; Amin Muralikrishnan Dhanasekaran, Raj; Clark, Randall.

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Epidemiological and research evidence suggest a possible shared pathophysiology between type 2 diabetes mellitus (T2DM) and Alzheimer's disease (AD) and this association is also termed as 'type 3 diabetes'. Thiazolidinediones (TZDs) are insulin sensitizing peroxisomal proliferator activating receptor gamma (PPAR γ) agonists and have been recognized as promising agents for memory deficits in patients with AD. Although currently available PPAR γ agonists show promise for improving memory deficits in AD, poor blood brain barrier permeability results in inadequate bio-availability in the brain requiring high dosing with chronic time frames that are associated with increased incidences of adverse events including cardiac diseases like myocardial infarction and heart failure. This research is based on the development of novel selective PPAR γ modulators with high blood brain barrier permeability and less incidence of adverse effects.

We hypothesize that our lead compound, a PPAR γ modulator, improves cognitive deficits and pathologies associated from Alzheimer's disease better than current TZDs in a triple transgenic 3x Tg-AD mouse model. Triple transgenic 3xTg-AD and C57BL/6J mice were utilized. Six-month age group represents advanced stage of AD and the mice were treated for 4 weeks. Behavioral analysis was done using novel-object recognition, Y-maze and contextual fear conditioning tests.

Our data indicate that our compound and an existing TZD improve cognitive deficits in Y maze, novel-object recognition and contextual fear conditioning. In addition, these mice restored memory deficits in transgenic mice similar to control group in electrophysiological studies.

We plan to conduct further biochemical and electrophysiological studies to determine and validate the nature of synaptic deficits and pharmacokinetic studies to test the brain bioavailability of our compound compared to the existing TZD.

Title: Developing a dynamic tool for transplant survival analysis

Primary Author (and presenter): Ahady Dolatsara, Hamidreza

Additional Authors: Megahed, Fadel

Department: Industrial & Systems Engineering

College/School: Samuel Ginn College of Engineering

Description:

This study demonstrates an open-source tool specialized for analysing transplants' survival. Matching process and maintenance of the transplant are challenging problems for surgeons and medical practitioners. Understanding factors that may contribute in the survival of the transplants is beneficial for understanding matching process. Machine learning can provide predictive models to extract survival information from transplantation datasets. There are many predictive models such as Neural Network, Support Vector Machine (SVM), Classification and Regression Trees (CRT), Logistic Regression, and Tree Augmented Naïve base (TAN) models that can be employed for investigating factors that contribute in survival and predict donor-patient survival rate. On the other hand, since datasets are developed during a large window of time, they are consisted many records and columns therefore feature extraction and prediction phases might take a significant time. The objective of this study is presenting a tool that can be utilized for feature extraction, and prediction on transplants. Based on the dependent variable a dynamic process perform data cleaning process on the dataset. The cleaned data will go through feature selection and prediction phases. Finally, the output of models and other relevant information will be shown or emailed to the investigator(s). The provided sample balancing algorithms are synthetic minority over-sampling (SMOTE), random under sampling (RUS) and Hybrid which is combination of the both methods. By utilizing this tool, a researcher select different options for feature selections and prediction. In order to demonstrate a sample results, United Network for Organ Sharing (UNOS) is investigated and result of 5-year survival analysis and expected survival life on heart transplants is demonstrated. The tool has a graphical user interface (GUI) for ease of use and the codes is accessible through github.

Title: PDX (patient-derived xenograft) colon cancer tumor growth, morphology, and transcriptional profile in obese Rag1 mice

Primary Author (and presenter): Ahmed, Bulbul

Additional Authors: Hassani, Iman; Anbiah, Benjamin; Greene, Michael W.; and Lipke, Elizabeth A.

Department: Nutrition Dietetics and Hospitality Management

College/School: Human Sciences

Description:

CRC is the second leading cancer killer in the United States. As the body mass index increases by 5 kg/m², cancer mortality increases by 10%. According to the International agency for research on cancer (IARC), the percentage of cancer attributed to obesity is 11% for colorectal cancer (CRC). However, our understanding of the link between human obesity and CRC in the obese state has been troubled by reliance on long term cultured cell lines and subcutaneously implanted CRC. Thus new models are needed to examine the pathophysiology of obesity which promotes CRC growth. In this regard, we have been examining the effect of micro-environmental cues associated with the pathophysiology of obesity on patient-derived xenograft (PDX) colon cancer growth, development, and transcriptional profile in vivo using an orthotopic implantation model. Three human PDX lines were isolated from grade I and IIa adenocarcinomas that had not spread through the serosa of the colon. These tumors were propagated in NOD-SCID mice to examine their growth characteristics. We found that the three different tumor lines had different growth rates: the fastest tumor had a growth rate of x grams/day; the intermediate tumor had a growth rate of x grams/day; and the growth rate for the slowest tumor line was x grams/day. Using NOD-SCID mice to generate tumor material from the intermediate growing PDX tumor line, we orthotopically implanted PDX tumor fragments (~ 1mm³) into Rag1 mice that have been fed for 14 weeks a high fat-high sugar western diet to induce obesity or a chow diet as a lean control. Final tumor weight and morphology will be assessed 4-6 weeks after implantation in Rag1 mice. We will examine the effect of obesity on tumor histopathology, gene expression, and mutational status.

Title: Comparative water relations and desiccation tolerance of four invasive ant species

Primary Author (and presenter): Ajayi, Olufemi, S.

Secondary Authors: Appel, Arthur; Chen, Li; Balusu, Rammohan; Fadamiro, Henry

Department: Entomology and Plant Pathology

College/ School: Agriculture

Description:

The success of invasive insects is linked to their impressive tolerance to environmental stress, but little is known about such responses in the invasive tawny crazy ant, *Nylanderia fulva*, a rapidly emerging economically important species in the southern United States. Determining such tolerance of this ant provides insight into its invasive potential. Here, we examine the water relations and desiccation tolerance of *N. fulva* relative to that of the established *Solenopsis invicta*, *S. richteri* and *S. invicta* × *S. richteri*, invasive ant species that share similar native geographical distributions as *N. fulva*. We compared these variables among stages and species. This study gives insight on the adaptability and potential distribution of invasive ant species. The ecological significance and practical implications of the results are discussed.

Title: Evaluation of diacetyl boldine loaded microemulsion formulations for topical drug delivery: preparation, characterization, in vitro release and cytotoxicity studies

Primary Author: A. Al Saqr
Secondary Author: Babu, R.J.

Description:

The object of this study was to prepare novel microemulsion formulations of Diacetyl Boldine (DAB) for topical delivery and to evaluate in vitro cytotoxicity of microemulsion formulations against melanoma cell line (B16 BL6).

A simple, reproducible, accurate and sensitive method was developed for quantitative analysis of DAB in microemulsions using high performance liquid chromatography (HPLC) with UV detection. Pseudo-ternary phase diagrams was plotted to identify the formulation region and optimal microemulsions were characterized for their particle size, viscosity, pH and in vitro release properties. Permeation studies were performed using excised human skin using Franz diffusion cells. The cytotoxicity of the reported formulations on B16BL6 melanoma cell lines were evaluated by MTT assay

HPLC method for DAB was established by optimizing isocratic flow parameters of the mobile phase. Based on the pseudo-ternary phase diagram, four microemulsion formulations were selected, and the PH of the selected formulations ranged from 5.26 to 6.5. Optimized formulations showed globule size of <50 nm, and polydispersity index of 0.31. The ex vivo skin permeation study demonstrated that the microemulsions exhibited a potent skin enhancement effect to penetrate skin layers up to 8-13 fold higher compared with the control (DAB-MCT oil). Furthermore, there is a significant increase in cancer cell death for all DAB microemulsions compared to the control. The optimized formulations showed 160-180% higher cytotoxicity toward B16BL6 cell lines compared to control. The half-maximal inhibitory concentrations (IC50) of F12, F20, F26, and MCT formulations against B16BL6 cells were calculated to be 1 µg/mL, 10 µg/mL, 10 µg/mL, and 50 µg/mL respectively. By comparison, the IC50 of F12 was 50 fold lower relative to that of the DAB-MCT formulation.

Results of present study suggest that microemulsion could be a promising formulation for topical administration of DAB.

Title: Pharmacokinetic evaluation of a novel buccal midazolam gel in healthy dogs

Primary Author (and presenter): Aldawsari, Mohammed, F

Additional Authors: Lau, Vivian., Ramapuram. Jay., Arnold, Robert., Platt, Simon.

Department: Drug Discovery and Development.

College/School: Harrison School of Pharmacy.

Description:

To demonstrate the safety and pharmacokinetics of novel gel-formulations of midazolam after buccal administration in healthy dogs, and compare to intravenous administration of a commercially available midazolam solution.

The effect of two different gel dosages on plasma midazolam levels following buccal administration was studied. Midazolam buccal gels were formulated with Pluronic F127 (T18) or hydroxyl propyl methylcellulose (HPMC) K100M (T19) as the base polymers. Physicochemical properties of the developed formulations were evaluated in respect to appearance, PH value, drug uniformity content and rheological gel behavior. The formulations were evaluated in vitro for release behavior. T18 and T19 formulations were applied in vivo for buccal applications on healthy dogs. Midazolam concentrations on dogs' plasma were measured using LC-MS/MS. Based on the promising release and pharmacokinetic data, the HPMC gel (T29) was prepared and optimized with increased midazolam concentrations and higher gel viscosity.

All formulations were clear gels, the pH of the formulations was around 3.5, assay values were closer to the input drug loading (100%) in the gels. The viscosity of T18 formulation was about 30 and 10-fold higher as compared to T19 and T29 formulations, respectively. The pharmacokinetic parameters of T18 and T19 gels following buccal administration are compared to IV administration. Midazolam IV solution showed a

Tmax at 3 min, Cmax of 717.1 ng/ml and a t1/2 of 69 min. Formulations T18 and T19 had similar t1/2 (around 60 min), but the Cmax values were 47.74 and 98.26, respectively. The bioavailability of T18 and T19 gels was 25.16% and 28.42%, respectively. The formulation T29 resulted in a significantly higher Cmax (106.27 ng/ml) and bioavailability (40.77%) as compared to T19 or T18. Further, the T29 gel two-fold midazolam dose resulted in significantly higher Cmax (187.03 ng/ml) and bioavailability (62.98%). The results of this study demonstrated that the optimized formulation (T29), was effectively absorbed following buccal administration with peak plasma concentrations achieved within 15 minutes and with 63.0% bioavailability. Results of this study show promise for buccal administration of midazolam gel, but further evaluation of the efficacy of this medication in a clinical setting are needed prior to recommendations for routine use.

Title: Doxorubicin alters mechanisms of memory formation in *ex vivo* and *in vivo* models of Chemobrain

Presenter: Alhowail, Ahmad

Additional authors: A. Alhowail, S. Bhattacharya, M. Eggert, J. Bloemer, M. Dhanasekaran, B. Smith2, R. Arnold, V. Suppiramaniam

Department: Drug Discovery and Development

College: Harrison School of Pharmacy

Description:

Doxorubicin (DOX) is a widely used chemotherapeutic agent. The optimal clinical effectiveness of DOX is limited due to its secondary effects including memory impairment. The chemotherapy induced memory loss is referred as “chemobrain” or “chemofog.” Chemobrain is observed in about 75% of cancer survivors exposed to chemotherapy, and persistent in 17-34% of cancer survivors. Although the exact mechanism of cognitive dysfunction induced by these drugs are not known, some chemotherapeutic agents may trigger memory impairment by accessing the brain via the blood-brain barrier. Our studies indicate that animals treated with DOX showed reduction in long-term potentiation (LTP – cellular model of memory) and altered expression of AMPA-type glutamate receptors, brain derived neurotrophic factor (BDNF) and α -stargazin in a rodent model of chemobrain. Furthermore, DOX treated animals showed increased GluR2 (AMPA receptor subunit) expression and no significant changes in synaptic proteins including PSD-95, pro-BDNF, synaptophysin as well as CaMKII expression compared to control. To further investigate the molecular mechanisms, we explored the direct effects of DOX by incubating brain slices in a concentration (250nM) that is similar to brain DOX concentrations due to peripheral injection. Using DOX treated slices, we assessed LTP and long-term depression (LTD) as well as hippocampal protein expression and oxidative stress. The results indicated that DOX-incubated (4hrs) slices exhibited reduced LTP, LTD and basal synaptic transmission as well as a decrease in mitochondrial complex I activity. In addition, phosphorylation of AKT, GSK3 β , ERK1/2 and lipid peroxidation were increased in DOX-incubated slices compared to control without significant changes in total protein expression. Therefore, we conclude that doxorubicin directly modulates glutamate receptor and associated synaptic protein expression and signaling and thereby cause memory impairment.

Title: Thermo-mechanical characterization of acrylic-polyurethane based interpenetrating polymer networks

Primary Author (and presenter): Alizadeh, Nima

Additional Authors: Barde, Mehul and Auad, Maria L.

Department: Polymer and Fiber Engineering

College/School: Samuel Ginn College of Engineering

Description:

Individual polymers are known to exhibit a wide range of characteristics that can be manipulated physically, thermally, and chemically. Combining polymeric materials through various mixtures can improve the properties offered by individual polymers. An interpenetrating polymer network (IPN) is a typical example of a multi-component polymeric material organized at the molecular scale. It comprises of two or more networks which are at least partially interlaced on a molecular scale but are not covalently bonded to each other and cannot be separated unless chemical bonds are broken. The present study is focused on the synthesis of sequential IPN from acrylic monomers and polyurethane precursors. Varying proportions of methyl methacrylate/styrene and bisphenol-A glycidyl methacrylate (bisGMA) were prepared and azobisisobutyronitrile was added as a thermal, free radical initiator. A stoichiometric mixture of 2-ethyl-2-(hydroxymethyl)-1,3-propanediol (TRIOI), poly (tetramethylene ether) glycol (PTMG) and diisocyanatohexane (DCH) was added to the mixture of the acrylic monomers. dibutyltindilaurate (DD) and triphenylbismuth (TB) were used for catalyzing polyurethane network. The entire mixture was stirred at room temperature, then it was transferred to molds and cured at 60°C and 80°C for 1 day. Specimens of 25 mm × 10 mm × 2 mm were cut and were analyzed using dynamic mechanical analysis in order to measure the glass transition temperature and storage modulus. It was observed that replacement of methyl methacrylate by styrene increased the glass transition temperature. Increasing the proportion of bisGMA also enhanced the glass transition temperature of IPNs.

Title: Comparing the dopaminergic neurotoxic effects of piperazine derivatives

Primary author (and presenter): Almaghrabi, Mohammed

Secondary authors: Katz, Daniel P.; Majrashi, Mohammed; Ramesh, Sindhu; Govindarajulu, Manoj; Bhattacharya, Dwipayam; Bhattacharya, Subhrajit; Shalgum, Aiman; Bradford, Chastity; Deruiter, Jack C.; Clark, Randall; Suppiramaniam, Vishnu; and Dhanasekaran, Muralikrishnan

Department: Drug discovery and development

College/ School: Harrison School of Pharmacy

Description:

Designer drugs are synthetic structural analogues/congeners of controlled substances with slightly modified chemical structures intended to mimic the pharmacological effects of known drugs of abuse so as to evade drug classification. Benzylpiperazine (BZP), a piperazine derivative, elevates both dopamine and serotonin extracellular levels producing stimulatory and hallucinogenic effects, respectively, similar to methylenedioxymethamphetamine (MDMA). However, the comparative neurotoxic effects of Piperazine derivatives (BZP & BZOP) have not been elucidated. Here, piperazine derivatives were synthesized in our lab and the mechanisms of cellular-based neurotoxicity were elucidated in a dopaminergic human neuroblastoma cell line (SH-SY5Y). The principle pathways leading to neuronal toxicity include oxidative stress, mitochondrial dysfunction, apoptosis, inflammation, excitotoxicity and necrosis. We evaluated the in vitro effects of benzylpiperazine and benzoypiperazine (BZOP) on the generation of reactive oxygen species (ROS), lipid peroxidation, mitochondrial complex-I activity, catalase activity, superoxide dismutase activity, glutathione content, Bax, caspase-3, Bcl-2 and tyrosine hydroxylase expression. BZP and BZOP induced oxidative stress, inhibited mitochondrial functions and stimulated apoptosis. Prior studies utilizing environmental neurotoxins such as 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), methylenedioxymethamphetamine (MDMA), methamphetamine, paraquat and corexit have established a link between oxidative stress, mitochondrial dysfunction and apoptosis with neurotoxicity. Parkinson's disease and Alzheimer's disease are associated with dopaminergic (substantia nigra) and cholinergic (basal forebrain) neuronal cell death, respectively. We postulate that exposure to BZP or BZOP will induce destruction of these pathways resulting in movement disorders and cognitive impairment. This study provides a germinal assessment of the neurotoxic mechanisms induced by piperazine derivatives that lead to neuronal cell death.

Title: Evidence of CXCR7 negative signaling to the ERK1/2 pathway in human coronary artery smooth muscle cells

Primary Author (and presenter): Alqurashi, Thamer

Secondary Authors: Wang, Chuang and Shen, Jianzhong

Department: Drug Discovery and Development

College/ School: Harrison School of Pharmacy

Description:

Whether CXCR7 is a signaling or non-signaling scavenger receptor is still in debate. Our previous study showed that during monocyte-to-macrophage differentiation, CXCR7 mediates positive signaling to the p38 and JNK, but not the ERK1/2 signaling pathways. Here, we studied the expression and signaling function of CXCR7 in human coronary artery smooth muscle cells (HCASMC). Real-time RT-PCR analysis detected medium level of CXCR7 mRNA expression in HCASMC, which was significantly upregulated by TNF α stimulation. Ligand screening assay found that among all the commercially available CXCR7 ligands, TC14012 was unexpectedly found to inhibit the phosphorylation of ERK1/2 in a time- and dose-dependent manner. This new ERK1/2-inhibitory effect of TC14012 was not due to cell toxicity, and it was not mimicked by CXCR4-selective antagonists, including AMD3100, AMD3645 and IT1t. Since TC14012 is a CXCR4 antagonist and CXCR7 agonist, our data suggest a potential role of CXCR7 in the negative signaling to the ERK1/2 pathway induced by TC14012 in HCASMC. This was supported by the fact that when CXCR4 was blocked by TC14012, SDF-1 switched signaling property from ERK1/2-stimulatory into ERK1/2-inhibitory effect. In addition, we found that TC14012 also suppressed the basal and SDF-1-induced phosphorylation of MEK1, a direct upstream kinase for ERK1/2. Furthermore, we found that TC14012 dose-dependently inhibited HCASMC proliferation induced by 5% FBS, consistent with the well-known cellular function of ERK1/2 signaling pathway. Selective activation of CXCR7 by TC14012 mediates a novel negative signaling to the ERK1/2 MAPK pathway, leading to a suppression of HCASMC proliferation. The finding highlights that CXCR7 may be a new drug target in combating stenosis or re-stenosis coronary artery diseases.

Title: Elucidate the mechanisms of action of the Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives

Primary Author: Anderson, Joseph, N

Additional Authors: Majrashi, Mohammed; Almaghrabi, Mohammed; Ramesh, Sindhu; Govindarajulu, Manoj; Deruiter, Jack; Clark C., Randall; Suppiramaniam, Vishnu; Dhanasekaran, Muralikrishnan.

Department: Department of drug discovery and development

College/School: Auburn University Pharmacy School

Description:

The major drug targets are receptors, enzymes, pump, channels and nucleic acid. Most of the drugs (medicines) and substances of abuse also exert their pharmacological &/or toxicological effects by acting on the above targets. Receptor binding assays is to measure interactions between a chemical or molecules (such as a protein or a nucleic acid). These assays are excellent tools to study receptor-ligand interactions, which can help in elucidating the mechanisms of actions of drugs (medicines) and substances of abuse like Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives. Abuse of Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives has increased in the United States of America and throughout the World.

Receptor binding assay for Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives was performed as per the protocol of National Institute of Mental Health Psychoactive Drug Screening Program (PDSP) at the University of North Carolina, Chapel Hill (Psychoactive Drug Screening Program. It was shown that Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives had significant binding on the serotonergic, adrenergic (alpha prominently and beta less significantly), histaminic, and the reuptake pump.

The major mechanisms of action attributed towards the addictive and abusive effects of Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives may be due to its effect on serotonergic neurotransmission.

Title: Assessing inclusion of Health Belief Model constructs in mass media messages targeting Meningitis B vaccination in college students

Primary author: Aref, Heba Adel

Secondary author: Garza, Kimberly

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

Vaccination is the best way to protect against meningococcal disease serogroup B (Men B) which resulted in 41 cases and 3 deaths due to outbreaks on college campuses since 2009. Thus, the objective is to assess to what extent developers of health-related mass media messages apply the constructs of the Health Belief Model (HBM) to influence health behavior using Men B vaccination for college students as an example. Publically available search engines were chosen to search for Men B vaccination mass media messages. Content analysis was used to assess for the application of the constructs of the HBM. Inclusion criteria were mass media messages targeting college students and/or their parents. News reports about Men B, general meningitis mass media messages, or those for other age groups were excluded. Thirteen mass media messages were identified: 7 (54%) videos and 6 (46%) textual messages either as a PDF, brochure, or website. The most commonly applied constructs are perceived susceptibility (69%) and cues to action (92%). The least commonly applied constructs are perceived benefits (53%) and barriers (46%). The self-efficacy construct did not appear in any of the media messages assessed. Perceived susceptibility and cues to action were the most commonly used constructs of the HBM in mass media messages targeting Men B vaccination in college students. The absence of the self-efficacy construct is a potential concern, as this construct reflects on the patient's confidence to adopt a behavior (accepting the immunization, completing the vaccine series, and overcoming potential barriers such as expense and pain). Perhaps including the self-efficacy construct within Men B vaccination mass media messages might lead to higher rates of vaccination among college students.

Title: Oxygen unveils the versatile personality of beryllium: The case of BeO_n=1,2,4

Primary Author (and presenter): Ariyaratna, Isuru, R.

Additional Authors: Miliordos, Evangelos

Department: Chemistry and Biochemistry

College/School: College of Sciences and Mathematics

Description:

The chemical bonding of BeO, cyclic BeO₂ and BeO₄ is explored by constructing potential energy profiles. We employ multi-reference approaches to obtain the energy as a function of the Be-O, Be-O₂, and O₂Be-O₂ distances for ground and excited electronic states. Our calculations reveal for the first time that BeO is triple-bonded formed by a dative bond from Be(¹S;2s²) to O(¹D) and two dative π-bonds to the opposite direction. The ground state of cyclic BeO₂ is shown to be ionic followed by excited states of covalent character. The lowest energy BeO₄ structure comes from an excited state of BeO₂ suggesting an *in-situ* Be(2p²) species. These three molecules disclose the various binding modes with which Be forms coordination complexes.

Title: Characterization of noise levels and auditory function in students at auburn universty football games

Primary Author (and presenter): Armstrong, Molly, K.

Additional Authors: Krishnamurti, Sridhar

Department: Communication Disorders

College/School: Liberal Arts

Description:

There is currently concern about the possibility of hazardous levels of noise in football stadiums experienced by spectators. The National Institute for Occupational Safety and Health (NIOSH) delineates that exposure to noise above 85 dBA for a period of eight hours may be hazardous to human hearing. It is important to recognize, however, while noise level is important, the duration of exposure is an equally important factor. A typical collegiate football game lasts approximately four hours, therefore levels close to 91 dBA are expected to be associated with at least temporary change in hearing thresholds (TTS). Personal sound level measurements were obtained from ten adult-aged individuals attending football games at Auburn University for a total of twenty ears tested. Hearing sensitivity and transient evoked otoacoustic emissions (TEOAEs) were measured for each subject prior to attending the football game and within fifteen minutes of the end of the game to assess possible shifts in hearing thresholds and emissions resulting from exposure to sound levels within Jordan-Hare Stadium. Results obtained indicate subjects did not have significant temporary shifts in their pure-tone thresholds and reductions in the intensity of their otoacoustic emissions following an Auburn University football game. However, personal sound level measurements indicated that noise levels at the football games attended did surpass the recommended noise levels set by the National Institute for Occupational Safety and Health. While there were not significant shifts in hearing sensitivity or otoacoustic emissions, it is recommended that Auburn University be aware of the hazardous noise levels exposure standards and the potential impact recreational noise exposure has on an individual's hearing health

Title: The effect of reduced barriers on remedial and college-level math success

Primary Author (and presenter): Askia, Rashida, E

Additional Authors: Birchfield-Rich, Kelly L.

Department: Educational Foundations, Leadership, and Technology

College/School: Education

Description:

Identifying ways to reduce barriers that inadvertently prevent students from succeeding in remedial math courses has become a growing concern in Alabama. This study was designed to determine if placement in ability grouped (remedial courses) college math courses contributed to an increased rate of student success and persistence. There is evidence that traditional remedial course enrollment impedes student college success (Bailey, Jeong, & Cho, 2008). Students are more likely to continue their education if a reduction in required remedial courses was imposed within the plan of study. At Alabama community colleges, enrollment is open to anyone with a high school diploma or evidence of passing the General Education Development test. Students entering with a basic knowledge skill set are not always prepared to take college-level math, and as a result, they are required to enroll in a remedial course. To help students remain committed, institutions in Alabama are trying innovative tactics to assist students reach their educational goals. A medium-sized Alabama community college implemented a program in fall 2014 introducing two new supplemented college-level and remedial math courses. These courses included a review of concepts from a basic level math course and content from a more advanced level math course. After this implementation, students who scored on the cusp of being placed in a more advanced course were enrolled in the supplemented math course, instead of being placed in the basic level math course. Researchers analyzed the outcome data to determine the following: 1) If students are placed in the advanced remedial math courses, are they more or less likely successful in their initial placement, are they more likely to

continue through the math sequence to obtain credit for college math? The results of this analysis will be examined and reported at the end of the study.

Title: Geometric design characteristics of exit ramp terminals with confirmed wrong-way entries

Primary Author (and presenter): Atiquzzaman, Md

Additional Author: Zhou, Huaguo

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

Wrong-Way Driving (WWD) crashes are a critical safety issue at controlled access highways. Although these crashes are rare and random in nature, they often result in severe injuries and/or fatalities. Therefore, it is important for the transportation agencies to identify locations with higher possibility of WWD crashes/incidents and apply safety countermeasures to reduce the chances of their occurrence. However, the random nature of WWD crashes makes it difficult for the transportation agencies to identify WWD high crash locations. As part of the on-going research project funded Alabama Department of Transportation (ALDOT), this study involves investigating the geometric design characteristics of exit ramp terminals with confirmed wrong-way entries and identifying geometric features that may have led to WWD crashes. To achieve this goal, five years (2009-2013) data has been used regarding the WWD crashes on controlled access highways in Alabama. During this period, there were a total of 93 WWD crashes. The hard copy of the crash reports for those 93 WWD crashes were obtained from ALDOT and used to locate the exit ramp terminals where the drivers initially entered the wrong-way. Further, the geometric design characteristics data for these exit ramp terminals is being collected using google earth. The collected geometric design characteristics includes intersection angle, control radius, types and widths of median on crossroad, channelizing island, distance from exit ramp to nearest access point, and intersection balance. The collected data will be used for further analysis and identify the geometric features of exit ramp terminals that may have led to WWD crashes. The outcome of this study will help the transportation agencies to identify the exit ramp terminals (with or without prior history of WWD crashes) with geometric features that are likely to cause WWD crashes/incidents, so that they can select and implement safety countermeasures to reduce the risk of WWD.

Title: Mineralogy determination via three-dimensional image analysis

Primary Author (and presenter): Ayers, Meredith, A.

Additional Authors: Beckingham, Lauren, E.

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description: This study aims to identify the spatial mineral distribution of geologic samples in 3D X-ray Computed Tomography (X-ray CT) images by developing algorithms for image processing and analysis. Currently, the spatial distribution of minerals can only be determined using 2D Scanning Electron Microscopy (SEM) images; however, 3D X-ray CT images have the distinct advantage of non-destructive sample preparation and analysis, time-dependent image capture, and subsequently the capacity to monitor mineralogy and changes in pore space during and after geochemical reaction. This work will have widespread applications in many aspects of geochemical study including the study of CO₂ sequestration. Pairing 2D SEM images with 3D X-ray CT images enables the analysis of 3D voxel attenuation values using multiple point statistics. For coupling with 3D X-ray CT images, 2D SEM images were analyzed and processed. The results of this work include the following techniques for analyzing and processing 2D SEM images: the segmentation of back-scattered electron (BSE) images, the application of logic to evaluate

pixels indicating signal in energy-dispersive spectroscopy (EDS) images, and the registration of BSE and EDS images. These research products may be combined with 3D X-ray CT image analyses to achieve the final research goal, development of a method to infer spatial mineralogy from 3D images. Achievement of this research goal will be beneficial to geochemists for building realistic models of reactions in topsoil, rock formations, and in the subsurface. This research is attractive to commercial corporations as well and will solicit increased collaboration between academic and industrial communities.

Title: Kangaroo care education

Primary Author: Baker, Heather, A.

Secondary Author: Hamilton, Cam

College/ School: School of Nursing

Description:

Research presents evidence that utilization of kangaroo care in newborns contributes positively to infant's physiological status. Through staff education, knowledge maybe provided to patients during prenatal care. The purpose of this project was to assess the knowledge staff has on kangaroo care prior to and after education. Assessment of staff's knowledge was measured using a duplicate pre & post education questionnaire. Changes in scores after education were assessed for improvement. Target population included adult male and females in an obstetrician gynecologist office. Following consent from the facility, staff participants completed a pre-education questionnaire relating to knowledge on kangaroo care. A week later the project leader presented an in-service on kangaroo care in the facility. Following the in-service, a duplicate post-education questionnaire was administered to participants. Descriptive statistics analyzed the participants' gender, age, job description and education level. The pre-questionnaire results were compared with post questionnaire results and were paired with t-tests results. X consented to participate (Female-male). Average age range X-years. Education level of participants ranged from X. Job descriptions of participants ranged from X. X% of participants reported no knowledge of kangaroo care in all seven areas. Following the in-service, X% reported likelihood to provide this knowledge to patients. The means scores of the questionnaires improved from pre-education (mean) to post education (mean). Oral and visual presentation of education on kangaroo care improved the overall knowledge of staff. Education of staff in this area is vital to future well-being of pre-term and term newborns. Increased knowledge on kangaroo care is achievable through education. Education of staff increased likelihood of this knowledge being provided to patients. Implementation of this project is warranted for other facilities.

Title: Following the mass flow of Nitrogen throughout an aquaponics system.

Primary Author (and presenter): Bankston, Elizabeth, M

Additional Authors:

Department: Biosystems Engineering

College/School: College of Agriculture and College of Engineering

Description:

Aquaponics, the co-culturing of fish and plants for food production, is a field with growing interest, yet little research has been done on systems optimization around nutrient flows for economic benefits. Current research in aquaponics is empirical and lacks system models for describing the impact of the system mass flow transfers on the production process. Research was conducted on nitrogen cycling and utilization in an aquaponics system to better understand nitrogen balances within an integrated multi-trophic production system. The aquaponics system, based in the Auburn North Fisheries Unit, grows tilapia in the aquaculture section, cucumbers in the horticulture section, and algae in the water treatment

section of the system. Waste nutrients from the fish are used as fertilizers for plants and algae downstream. The research presented here focused on quantifying the inflows and outflows of nitrogen in each of the production houses and for the whole system. Concentration measurements were taken of nitrogen compounds in water, food products, and waste products from multiple input and output streams during two-week sampling periods over three seasons of production. Mass flux rates of nitrogen were calculated using concentration measures combined with mass flux rates of materials monitored as economics measures. Results show an imbalance of nitrogen in the analysis of the system, with input and output calculations not matching. Nitrogen use efficiency is calculated and shown to be variable related to seasonal temperature and production variation. The imbalance of nitrogen is likely the result of incomplete accounting for all possible inflows and outflows, showing the possible sources of inefficiency of the system. Future work will focus on closing analytical deficiencies while increasing efficiency of nitrogen use within the systems through operational parameter manipulation.

Title: Does cooperation increase when music is used in the care of people who have dementia?

Primary Author (and presenter): Bannon, Hannah, L.

Additional Authors: Haak, Nancy; Weaver, Aurora; and Sentell, Emily

Department: Communication Sciences and Disorders

College/School: Liberal Arts

Description:

Disruption of activities in the daily care of people with dementia may result in missed care, caregiver/nurse stress/burnout, and increased costs of living. Some literature suggests the use of music as a positive means of influencing behavior with persons who have dementia. Despite positive trends, clinical significance is not always demonstrated in the literature; therefore, health care professionals are motivated to expand our knowledge in this area. We conducted a systematic review to analyze the body of evidence, which relate to the use of music in gaining cooperation/compliance with activities of daily living and in enhancement of communicative exchanges. The initial sweep of interdisciplinary literature included nursing (CINAHL), medicine (PUBMED), and speech-language pathology and psychology (PSYCHINFO) databases. Search strings were music, dementia, and cooperation, compliance, or resistance to care. Studies providing sufficient detail (i.e., participant and research design information) were further selected for checklist review using an adaptation of the Scottish Intercollegiate Guideline Network (SIGN) recommendations for determining level of evidence ranking and quality assessment rating. Two investigators conducted all reviews independently and met to agree on a single response. A third investigator was available for dispute resolution. All titles and abstracts if available, were reviewed for the elimination of clearly irrelevant documents. A full text review for inclusion/exclusion criteria was conducted on the remaining articles. Additional full text reviews were incorporated should they meet the review criterion. We identified 24 articles that were reviewed in detail. These represent a range from randomized controlled trials to best evidence reviews. Although positive trends were noted, the final review yielded mixed results.

Title: Epoxy-novolac thermoset polymers based on pyrolytic bio-oil

Primary Author (and presenter): Barde, Mehul, R.

Additional Authors: Auad, Maria

Department: Polymer and Fiber Engineering

College/School: Samuel Ginn College of Engineering

Description:

The emphasis on the development of bio-based polymer networks is due to the ever increasing demand for renewable resources. Biomass pyrolysis oil (bio-oil) can be focused as an alternative to the limited petroleum resources. Multi-hydroxyl functionality of bio-oil can be utilized for specific polymerization to yield polymer networks. Bio oil was partially used for synthesis of phenol-formaldehyde novolac type polymer. The molar excess of bio-oil/phenol was reacted with formaldehyde in acidic medium to form BioNovolac. Fourier Transform Infrared spectroscopy (FTIR) was used to monitor the progress of synthesis of BioNovolac. BioNovolac was physically blended with epoxy resin synthesized from α -resorcylic acid - a compound found in natural sources including red sandalwood, chickpeas, berries and peanuts. The epoxy resin was cross-linked in the physical presence of BioNovolac to form interpenetrating type networks. Moreover, hydroxyl groups of BioNovolac were further modified by glycidylation reaction. Similar reaction was carried out for glycidylation of bio-oil separately. ^{31}P -NMR technique was used to measure hydroxyl number before and after glycidylation. The polymer networks were analyzed using differential scanning Calorimetry (DSC) and dynamic mechanical analysis (DMA). FTIR spectra of BioNovolac at successive intervals confirmed the consumption of phenol. DSC and DMA results showed the thermal transitions of the polymer networks, and the glass transition temperatures were measured for all the systems. The glass transition temperature improved with the increase of crosslinked epoxy phase. Initial storage modulus and the modulus in the rubbery plateau of bio-based polymer networks, were comparable to the conventional polymer networks. The results revealed that the raw materials of polymers can be partially substituted by the biomass pyrolysis oil.

Title: Examining telehealth monitoring for heart failure patients and the effects in hospital admissions and readmissions

Primary Author (and presenter): Barganier, Sharon, R.

Additional Authors: Gibson-Young, Linda

College/School: School of Nursing

Description:

Heart failure (HF) is a prevalent and costly condition. There is an estimated \$30.7 billion expenditures associated with healthcare services. Throughout the research, evidenced-based guidelines support telehealth monitoring for HF patients to reduce HF related hospital admissions/readmissions. The purpose of this project is to implement telehealth monitoring to improve HF self-management skills such as taking daily blood pressure, weighing daily, ensuring compliance of medication, and monitoring any HF symptoms. The target population included in the project include adults with a HF diagnosis and receiving healthcare in the Baptist Health Infusion Clinic. Participants completed a pre and post Minnesota Living with Heart Failure Questionnaire (MLQ) and Evaluation for Self-Efficacy (SE) Questionnaire over the 8-week project. Data were collected and entered on a data collection form, then entered into Statistical Package for the Social Services (SPSS) for analysis during visits to the infusion clinic and follow up telephone calls. Out of X participants invited to participate, X consented to participate (X females; X males) in this project. The average mean pre MLQ score was X% and for SE, X. Telehealth monitoring with follow up calls indicated X of participants self-managed their care with daily weights, blood pressure checks and stating if medication was taken as prescribed impacted a reduction in number of emergency room visits, unplanned doctor visits, and hospital admissions/readmissions over 30 and 60-day time frame. The outcomes showed improvement from pre- (X mean, X sd) to post (X mean, X sd) significantly ($p < 0.05$). The usage of telehealth monitoring for follow up care suggests a reduction in hospital admissions/readmissions. Telehealth monitoring inertly improves quality of life by self-management patients' HF disease process.

Title: Field-structural investigations of Engeløya-Steigen and their implications for Caledonian tectonic evolution, North Norway

Primary Author (and presenter): Barkley, Morgan N.

Additional Authors: Steltenpohl, Gregory F. and Steltenpohl, Mark G.

Department: Geosciences

College/School: College of Science and Math (COSAM)

Description:

In the Engeløya-Steigen area Baltic basement and its cover are exposed in a series of folds that plunge to the east, subparallel to the Caledonian transport direction. Granitic basement gneiss is exposed in the cores of antiformal folds where the rock units are bent to resemble a dome. These east-plunging folds are nearly perpendicular to the structural grain of the Caledonian Mountains and thus are referred to as orogenic crossfolds. Penetrative shear fabrics are intensely developed at the base of the vertical stack of thrust sheets (near-horizontal plates of rock above thrust faults) and they gradually disappear structurally downward into the basement. The nappe stack in this area is composed of several thrust sheets tectonically moved from their original area of deposition to overlay rocks deposited in a different area. The lowest thrust sheet contains an igneous complex comprising mafic and felsic rocks interpreted as part of an island-arc complex such as modern Sumatra. U-Pb LA-ICPMS ages on zircons from a sample of this complex are ca. 490 Ma, supporting its correlation to other arc complexes reported within the thrust sheets exposed elsewhere in the Caledonides. These complexes originated on the ancient Laurentian continent. Field observations show that four folding events have affected rocks of the study area. The fourth and final deformation event is categorized by orogenic backfolds, which indicate transport toward the west, opposite of Caledonian transport. We evaluate the following possible explanations for the crossfolds and backfolds as they may relate to: (1) Caledonian emplacement of the nappes across an inherited east-west trending structural grain imparted on the earlier-formed basement complex; (2) orogen-scale left-lateral strike-slip faulting; or (3) late- or post-Caledonian (i.e., ~400 to 350 million years ago) west-directed extensional faulting associated with continental rifting initiating the formation of a new ocean basin.

Title: Promoting antibiotic stewardship in pediatric patients

Primary Author (and presenter): Barksdale, Whitney

Additional Authors: Hamilton, Cam

Department: Nursing

College/School: Auburn University at Montgomery

Description:

There is strong evidence that the prescribing practice of antibiotics is found inappropriate in many pediatric patients. In reviewing evidence-based literature, it was determined that the audit/feedback tool on the prescribing of antibiotics has promoted the best outcome in decreasing the use of antibiotics. The purpose of this project is to determine, if educating pediatric clinicians on inappropriate antibiotic prescribing will decrease the amount of antibiotics prescribed by the provider. The audit/feedback recommendations and changes in prescriptive antibiotic practices were assessed. Target population included pediatric providers treating patients from birth to 18 years of age. Following agreement, providers completed clinical audits on sick patients seen in the office. The providers received feedback on the clinical audits and the prescribing practice of antibiotics. The providers then completed another clinical audit to determine if there was a decrease in the amount of antibiotic prescribing due to the feedback. Descriptive statistics were used to describe the patient population, treatment recommendations, antibiotics prescribed, and provider adherence to guideline recommendations. X providers saw X sick patients with an average age of X years. The providers recommended symptomatic treatment for X% of

patients, prescribed antibiotics for X% of patients, delayed antibiotics for X% of patients, and X% of prescribing practices followed recommended guidelines. Follow-up indicated that X% of providers prescribing practice followed recommended guidelines. The providers prescribing practices improved from pre- (mean) to post (mean) significantly ($p < 0.05$). The audit/feedback mechanism for providers of pediatric patients guided appropriate recommendations and treatment and decreased antibiotic prescribing. Identification of prescribing practices can promote an antibiotic stewardship and decrease antimicrobial resistance and mortality.

Title: Distribution and abundance of pelagic fishes in Southeastern US reservoirs containing blueback herring

Primary Author (and presenter): Bart, Ryan, J.

Additional Authors: Anderson, Patrick; DeVries, Dennis; and Wright, Russell

Department: Fisheries, Aquaculture, and Aquatic Sciences

College/School: Agriculture

Description:

In 2010, the first established Alabama population of blueback herring *Alosa aestivalis* was found in Lewis Smith Lake, Alabama. Since then, blueback herring have also been found to be established in Lake Martin, Alabama and Yates Lake, Alabama. As the threat of range expansion and competition with native fish such as threadfin shad *Dorosoma petenense* increases, the consequences of the introduction of blueback herring are becoming more complex. By evaluating the abundance and distribution of blueback herring, the positive and negative consequences of the introduction of this non-native species will become more distinct. Hydroacoustics in combination with verification sampling is a method of estimating the abundance and location of fish suspended in the water column. To quantify the abundance of pelagic fishes, hydroacoustic surveys were conducted July 2016 at Lewis Smith Lake, and Lake Martin, Alabama. Results show for Lewis Smith Lake that total fish densities were highest in the most productive arm (3,782 fish/ha) and lowest in the least productive arm (640 fish/ha). In Lake Martin fish densities were highest in the most upper portions of each arm (24,134 fish/ha) and lowest in the downstream portion of the reservoir (925 fish/ha). The highest fish density by depth for Lewis Smith Lake was found at 7m below the surface for each arm of the reservoir. Fish density across depths was highest from 6m to 10m in Lake Martin. Through winter hydroacoustic surveys and species verification sampling, target differentiation will allow estimation of individual abundances of blueback herring versus threadfin shad. These data will help with the monitoring and description of population dynamics, distribution, and allow for quantifying potential impacts of blueback herring in Southeastern US reservoirs and determine how the species is managed in the future.

Title: Evaluation of substrate specificity in the two-component alkanesulfonate monooxygenase system

Primary Author (and presenter): Bartlett, Abigail K.

Additional Authors: Ellis, Dr. Holly R.

Department: Department of Chemistry and Biochemistry

College/School: Auburn University College of Sciences and Mathematics

Description:

Global sulfur regulation is an important aspect of cellular function. Because sulfur is one of the main elements incorporated into biological molecules, maintaining an acceptable concentration within the cell is a priority. In times of sulfur limitation, many cells break down alkanesulfonate compounds to remove the carbon skeleton and obtain useable sulfite for growth. One enzymatic system responsible for this activity is the alkanesulfonate monooxygenase complex consisting of SsuD and SsuE. Both components

are encoded under the Ssu operon, which is activated when sulfur is limiting. SsuE is an oxidoreductase that provides reduced flavin to SsuD, which contains the catalytic active site for alkanesulfonates. Investigation into the substrate specificity of SsuD yielded new insights regarding the two-component system's function under sulfur-limiting conditions in the cell. Expression and purification of both SsuD and SsuE from *Escherichia coli* was a critical first step to performing *in vitro* coupled assays. Octanesulfonate, methylsulfonate, dimethylsulfonate (DMSO) and dimethylsulfone (DMSO₂) were identified as potential substrates for the system. The catalytic activity of the complex when utilizing these substrates was analyzed through both UV-Vis spectroscopic methods and mass spectrometry. Characterization of potential products was performed using mass spectrometric analysis. Consideration of SsuD and SsuE homologs in *Pseudomonas aeruginosa* and *Pseudomonas putida* allowed for a cross-genus examination of the system's function in single-celled organisms. Future directions for the project include evaluation of a similar two-component alkanesulfonate monooxygenase system, which is composed of MsuD and MsuE subunits and is also activated under sulfur-limiting conditions.

Title: Biodiversity patterns in upland streams of the southeastern US do not match the predictions of the Mighty Headwater Hypothesis

Primary Author (and Presenter): Bauer, Eric F.

Additional Authors: Helms, Brian and Feminella, Jack

Department: Biological Sciences

College: College of Science and Mathematics

Description:

The Mighty Headwater Hypothesis (MHH) suggests that compositional differences among biological communities are highest in headwater streams and decline with increasing stream-size in contrast to expected patterns of species richness. If these predictions are correct, the MHH could indicate that small streams, with greater differences in community composition than larger streams, should be of higher conservation priority than they currently are. We tested the hypothesis that there is a significant negative relationship between stream-size and among-stream compositional differences in aquatic assemblages. We collected fish and macroinvertebrate assemblages from streams of varying sizes in the Black Warrior (n = 17) and Tallapoosa River (n = 16) watersheds of Alabama. A null model derived Raup-Crick (R-C) and Sorenson's dissimilarity values were calculated as measures of among-community compositional differences. Sorenson's β -diversity of Tallapoosa River fish assemblages was negatively related to stream-size ($R^2 = 0.28$, $p = 0.02$), but there were no other significant relationships with Sorenson's or R-C indices and stream-size. The discordance between β -diversity metrics for Piedmont fish communities is likely due to the independence of the R-C metric from differences among-sites in species richness, which makes the R-C metric more appropriate when testing the predictions of the MHH. These results suggest that the MHH is not a good model of stream assemblage diversity patterns at the intra-regional or watershed scale, unlike inter-regional scales from which it was derived.

Title: Evaluating the effectiveness of prescribed fire to restore longleaf-slash pine ecosystems

Primary Author (and presenter): Baxter, Tyler, D

Additional Authors: 2nd: Yang, Shaoyang

College/School: School of Forestry and Wildlife Sciences

Description:

The primary objectives of this study are to evaluate the effectiveness of prescribed fire treatments through the temporal and spatial changes of a set of metrics/indicators that quantify the structure and composition of forest ecosystems that have been experimentally burned with reference to the desired conditions. We

prepared and installed the study plots and transects on the Mississippi Sandhill Crane National Refuge and the Grand Bay National Refuge located in south Alabama. I measured each study plots and transects that we put in to obtain data for the spring term. My goal was to analysis the data that I obtained and give a report in the form of a poster or presentation. For each plot, we put in a 1/10th acre plot and measured total height, DBH, and canopy closure. We also counted the number of longleaf pine, slash pine, and Chinese tallow tree. For the transects, we made a 1 chain by 1 chain transect and put plots inside each transect. We also went 1 chain length between each transect and measured the same things as we did for the permanent plots. For each plot and transect, we used a GPS unit to mark each plot so we could put the data into a GIS-shapefile. We found in our data that tallow prefers to invade slash pine instead of longleaf pine. This is due to finding tallow in only 2 longleaf plots while compared to 28 in slash pine plots. We also found in the transects that the tallow seemed to decrease from open areas to deeper parts of the forest.

Title: The development of sustainable walls for a steel framed house for developing countries.

Primary Author (and presenter): Bell, Matthew

Additional Authors:

Department: Building Construction

College/School: Architecture, Design, and Construction

Description:

The intent of this research is to investigate and develop sustainable materials for the use of constructing walls in developing countries such as Haiti and Panama. This research is a continuation of research based on the design and fabrication of a steel framed house. A steel framed house has already been designed and the shop drawings for the fabrication of the parts will be performed in conjunction with the design of the walls. This research specifically focuses on different types of materials used around the world from developing countries to determine what is the best type of wall to construct for sustainability and functionality purposes. The purpose of this house is to develop the frame in such a way that it can be delivered as a kit for anyone to assemble. Then the type of walls will be dependent on the area and the materials available. The goals are to determine the most structurally adequate indigenous materials that can be used to construct wall panels for the use in a home, design the panels and build the panels. The methods of research include a literature review of several materials that have been used around the world to construct different types of homes. From the materials researched, some will be selected to construct sample panels. The purpose of this research is to develop adequate housing to meet the high poverty and housing issues around the world with sustainable and satisfactory housing.

Title: Building Relationships, Accessing Resources and Creating a Context for Community Based Learning in Community Garden

Primary Author (and presenter): Benbaba, Asmaa

Additional Authors: 2nd Author Last name, First name; 3rd Author Last name, First name; and so on

Department: Adult Education

College/School: Education

Description:

This paper attempts to assert that learning can be both formal and informal, triggers social participation, inclusion and the concept of “lifelong learning”. However, these learning goals are hard to achieve when the school as an institution is isolated from other communities. O Grows community garden is a project that forms a new alliance between the school and the community. In an effort to strengthen the community based function a set of planning interventions are proposed to support learning for the community. As a result, this helps extend the role of the school and takes learning outside the classroom. I will sketch up all

the dimensions of the community garden as a profound transformational practice. The main dimensions I am considering in this work are connectivity, accessibility, design and branding all together work as immediate resources for teaching/learning.

For this project, the method used was mainly based on observation that starts at an early stage of the installment of the garden in April 2015. For the period of eight months, I spent twenty hours a week working on the project. My tasks included an active participation in the decision making, to observe the community gardening and the flow of planting and harvesting, to collect data, analyze and react on knowledge transformation to the students and the locals respectively.

As a result, the community garden becomes a site for skill building opportunities: gardening workshops, skills in leadership, curriculum and program planning. This projects leads to interactive learning opportunities to take place: websites, brochures...The community garden initiative helps foster civic pride, neighborhood ownership Community gardens promote learning across communities. Finally, the logic of planning is relevant to implement a context where higher education students can learn. It leads to an increase of memberships at the level of the community. It leads to a growing interest in participation within the community.

Title: Overseeding Eastern gamagrass with cool-season grasses or grass-legume mixtures

Primary Author (and presenter): Bennett, Katie, M.

Additional Authors: Mullenix, Mary; Tucker, Jennifer; Muntifering, Russell; Angle, Jay; and Yeager, Jamie

Department: Animal Sciences

College/School: College of Agriculture

Description:

Overseeding Eastern gamagrass (EG) with cool-season grasses or grass-legume mixtures may provide an alternative to tall-fescue based forage production systems in the Alabama Black Belt region and reduce need for stored feed throughout the winter. However, little is known about potential effects of overseeding on native warm-season grass (NSWG) system sustainability. This study was conducted to determine the effects of overseeding with cool-season forage mixtures and grazing management on forage production, nutritive value, and persistence of Eastern gamagrass. During the cool season, October through April, four overseeding treatments were used in a small plot study: Control (no overseeding), Florida 401 rye (early-maturity), Wrens Abruzzi rye (mid-maturity), and Wrens Abruzzi Rye + AU 'Red Ace' Red Clover. Mob stocking was used to simulate rotational grazing every 28 days, and forage samples were clipped at each grazing event to determine forage mass and nutritive value. In the first year, cool-season component, Eastern gamagrass overseeded with Florida 401 rye was available earliest to graze, but had less overall forage mass than the Wrens Abruzzi rye or Wrens + Clover mixture. All treatments provided adequate crude protein (>15% CP) for any class of grazing cattle and were highly digestible (>94% *in vitro* true digestibility). Although the majority of the cool-season forage production was later in the season, EG yield response was similar among treatments following spring application of nitrogen (67 or 134 kg N/ha) in Year 1. A second year of this study is being conducted in 2017.

Title: Identifying *RECQL* breast cancer variants in an Alabama cohort

Primary Author (and presenter): Bergstresser, Sydney N

Additional Authors: Chandler, Madison; Watkins, Anna; Merner, Nancy

Department: Department of Drug Development and Discovery

College/School: Harrison School of Pharmacy

Description:

RECQL is a protein within the DNA Helicase family that helps stabilize replication forks to prevent breaks in double stranded DNA. In 2015, Cybulski *et al.* associated *RECQL* germline mutations with breast cancer risk. Exome sequencing revealed two truncations mutations of statistical significance. The basis of this research project is to determine the contribution of *RECQL* variants towards hereditary breast cancer risk in an Alabama cohort. Fifty-four cancer probands (defined as the first cancer affected individual in a family) underwent PCR and Sanger sequencing in order to identify variants within *RECQL*'s sixteen exons. My project has three specific aims: 1) analyze all of the Sanger sequencing data and systematically record all detected variants, 2) validate any rare variants found, and 3) provide an estimate of pathogenicity of all validated variants through bioinformatics prediction programs. Here, we report the results of this study, which provides a better understanding of how *RECQL* variants contribute to breast cancer risk across the globe.

Title: Consequences of hotel green washing: The moderating effect of customer's previous experience

Primary Author (and presenter): Bernard, Shaniel, A.

Additional Authors: Chen, Han and Imran, Rahman

Department: Nutrition, Dietetics, and Hospitality Management

College/School: Human Sciences

Description:

The greenwashing phenomenon is a growing concern among hotel consumers; if not contained or analyzed thoroughly, this may pose a threat to green hotel initiatives. This study implemented a quasi-experimental design to test consumers' reaction to hotel greenwashing scenarios such as; towel reuse and energy saving practices. We focused on consequences that include green perceived risk, green consumer confusion as well as green trust, which in turn might influence consumer's switch intention, intention to spread negative word of mouth and intention to participate in the hotel green practices as well as the moderating role of consumers previous. There was a gap in literature on whether these hotel greenwashing practices increased consumer confusion and perceived risk. Seven out of eight hypotheses were supported. These findings shed light on a less studied area in hotel research. Also, the future implications for marketers and hotel operators are discussed.

Title: The part and the whole: The multiple perspectives of Tara Donovan's *Untitled (Styrofoam Cups)*

Primary Author (and presenter): Bewley, Shannon, A

Department: Department of Art & Art History

College/School: College of Liberal Arts

Description:

Tara Donovan arranges thousands of mundane objects, ranging from toothpicks to receipts, into generative sculptures. In critics' analyses of Donovan's works, they focus on the whole of her creations' formal beauty and advocate that the transformative effect of her assemblages remove the relationship between her mass-produced subunits and their associations with wasteful over-consumption. In writers' comparisons of Donovan's visual language and process to that of the Minimalists, they fail to examine the symbolic identity of the individual parts of her sculptures. Yet, the artist and her gallery's clear avoidance of stating her thematic intent allows for numerous interpretations of her works. This paper argues against the predominant idea that the distanced view of Donovan's sculptures denies the connotations carried within their parts, discovered through close looking, to instead propose that the whole of her sculptures build upon their subunit's relationship to environmental damage. *Untitled (Styrofoam Cups)* (2004) offers a prime example for the examination of the role of part and the whole in the artist's sculptures. From a distance, the 25,000 containers of *Untitled (Styrofoam Cups)* allude to natural phenomena, yet nearness

reveals the subunit of Styrofoam. The artist metamorphizes manufactured cups into a rolling landscape through her own assembly-line process – a system mimicking the containers’ production in factories. Donovan uses a mundane object to create a sculpture fraught with contradictions in order to condemn the environmental damage caused by the very material she relies on. Her methods often produce large amounts of unrecyclable refuse which further indicates her, like others’, complicit participation in consumer culture. The installation offers a critique of the proliferation of disposable goods through its own dependency on mass-produced products and the process of manufacturing.

Title: An efficient data-driven algorithm for retrospective motion correction in MRI

Primary Author (and presenter): Bian, Yuan

Additional Authors: Reeves, S. J.

Department: Electrical and Computer Engineering

College/School: Samuel Ginn College of Engineering

Description:

Magnetic resonance imaging (MRI) is widely used for hospital diagnosis. As one of the most important medical imaging techniques, MRI is non-invasive, uses non-ionizing radiation, and provides high contrast in soft-tissue structures. Unlike other kinds of imaging technique, MR Imaging does not acquire data directly in the space domain. Instead it acquires data in a different domain, called k-space, and then transforms to images. Object motion during MRI scans may cause severe problems. Motion artifacts, such as blur and ghosts, degrade image quality, sometimes affecting medical analysis. This poster focuses on solving the problem of imaging an object that has undesirable motion. A new approach is presented to reconstruct a single image of the object with only partial k-space data in each image frame. The main idea of this approach is to strategically combine the k-space data in different object positions to obtain the whole k-space data in one position. In this approach we use the process of image registration—transforming different image datasets into one coordinate system. This efficient data-driven algorithm implements a robust correlation method in k-space to increase computational speed. In order to obtain motion information between the data segments, spatial registration between non-overlapping data segments is achieved with the proposed image registration criterion, which is ordinarily selected to be the absolute value of the sum of two images. The proposed algorithm performs well on the normal line-by-line sampling pattern, which can be used in a basic MRI system without modifying common sequences. The proposed algorithm only depends on the acquired data without additional equipment or modified trajectories, which make it especially suitable for clinical use. Simulations and experiments show that the proposed algorithm is accurate and efficient.

Title: Mice lacking adiponectin display cognitive deficits and impaired synaptic plasticity

Primary Author (and presenter): Bloemer, Jenna, E.

Additional Authors: Bhattacharya, Dwipayana; Smith, Warren; Alhowail, Ahmad; Chauhan, Alisa; Judd, Robert; and Suppiramaniam, Vishnu;

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Adiponectin is an insulin-sensitizing hormone produced by adipocytes, which has recently been under investigation for potential neuroprotective effects. Insulin resistance in the brain is one factor that can lead to hippocampal dysfunction and cognitive impairment in disorders such as Alzheimer’s disease (AD). In fact, a recent study showed that the adiponectin receptor agonist, osmotin, decreased pathogenic amyloid beta and phosphorylated tau, which are major hallmarks of AD. Therefore, the goal of this research is to

determine the role for adiponectin and adiponectin receptors in cognitive function and synaptic plasticity. Adiponectin receptors (AdipoR1 and AdipoR2) are found in the hippocampus of the brain, but the function of these receptors in learning and memory is unknown. We hypothesize that adiponectin plays a role in hippocampal synaptic plasticity, and lack of adiponectin leads to cognitive deficits. We first determined behavioral and synaptic deficits produced by adiponectin knockout mice. Deficits were observed in the novel object recognition test. Supporting the behavioral data, synaptic plasticity was also impaired in these rodents. Long-term potentiation was impaired with no significant changes in basal synaptic transmission. Acute application of the adiponectin receptor agonist AdipoRon was directly applied to acute hippocampal slices to observe changes in synaptic transmission in plasticity. Taken together, these data indicate that adiponectin is needed for normal synaptic communication. We also plan to use the adiponectin receptor agonist, AdipoRon, in a mouse model of AD. This research may provide evidence for drug development and clinical trials involving adiponectin-signaling pathways in AD. Because adiponectin receptor signaling pathways have also been investigated for therapeutic effects for other brain disorders, such as stroke, greater understand could provide basis for testing in other models of central nervous system disease.

Title: Knock-out of Obesity-Related Genes in Zebrafish (*Danio rerio*) using the CRISPR-Cas9 System

Primary Author (and presenter): Bonner, Andrew, B

Additional Authors: Bloodworth, Lucian; Kesterson, Robert; Challa, Anil

Department: Genetics Department

College/School: University of Alabama at Birmingham

Description:

This investigation was performed to create *in vivo* gene knockout models of obesity-related genes in Zebrafish (*Danio rerio*) using selective genome editing with CRISPR(Clustered Regularly Interspaced Short Palindromic Repeats)-Cas9 endonuclease system. The process used to explore the *in vivo* knock-out of 11 obesity-related genes in *Danio rerio*: Neuromedin S, Parm1 (prostate androgen-regulated mucin-like protein 1), Ghrelin, Leptin-A, Leptin-B, Mc4r, Cannabinoid receptor 1, Pmch (melanin concentration enzyme), Pmch-I (melanin concentration enzyme), Stearoyl-CoA desaturase (delta-9-desaturase) - Scd, Stearoyl-CoA desaturase (delta-9-desaturase) -Scd-b is discussed. Specific sequences were targeted through the synthesis of ~4 to 5 CRISPR/single guide RNAs (sgRNA) per gene. A cloning-free approach was used to synthesize sgRNA and inject a Cas9 protein complex into one-cell stage zebrafish embryos. To test the efficiency of nuclease activity of various CRISPR/sgRNAs, embryos were genotyped two days post-fertilization using a PCR-based heteroduplex mobility assay (HMA). Pairs of genotyping primers were designed to identify small insertions-deletions ('indels') as well as large deletions. Data were collected from HMA profiles post-PCR for Neuromedin S, Parm1, Ghrelin, Leptin-A, Mc4r, Pmch-I, Scd, and Scd-b. Subsequently, sequence information of specific mutations was also obtained by Sanger sequencing cloned PCR products. Studies are underway to raise F₀ animals in an effort to generate outcrossed F₁ lines with successful transmission of mutant alleles. The above studies revealed evidence for active CRISPR/sgRNAs that efficiently targeted Neuromedin S, Stearoyl-CoA desaturase (delta-9-desaturase) - Scd, Stearoyl-CoA desaturase (delta-9-desaturase) - Scd-b, and Mc4r to cause gene knock-outs. This was validated by Sanger Sequence Analysis. HMA profiles of Ghrelin and Parm1 also suggest gene knock-out, but further analysis via Sanger Sequencing is required for confirmation.

Title: The observation of lined BioRetention cells as a closed system

Primary Author (and presenter): Bonts, Emily, G.

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

The Biosystems Department at Auburn University recently installed two BioRetention Cells in a concrete courtyard behind the Corley building on campus. BioRetention Cells (BRC, cell) are a low impact development control that utilize engineered, small-scale environments to promote controlled infiltration and evapotranspiration within urban areas. Though BRCs are used in many regions of the U.S., there is not a firm consensus on the optimal BRC design. Some of this uncertainty comes from the different soils and stormwater concerns specific to each region. In addition, BRC's mimic a small ecosystem with many variable components and unknowns which impact the efficiency of the design. The Corley BRCs were designed with a concrete lining, internal water storage (IWS) and overflow outlets which connect to the stormwater drains. The concrete lining in the BRCs allows them to be placed in close proximity to buildings without the concerns of water damage to underground structures. The hydrology and nutrient removal efficiency of these cells is uncertain, but the IWS presents the opportunity to observe the BRCs as a semi-closed system. By recirculating the stormwater stored in the IWS for irrigation, unknowns such as plant water uptake, soil water storage, and flow rate through the soil media can be quantified. Successful, long-term water recirculation may also lead to a more sustainable BRC design, using native vegetation without requiring an external water supply during the dry summer months. Overall, the analysis of lined BRCs in a semi-closed system could lead to increased implementation of ecological practices for stormwater conveyance and reclamation in urban areas.

Title: Adolescent methylmercury and *d*-amphetamine exposure alter sensitivity to monoamine uptake inhibitors in adulthood

Primary Author (and presenter): Boomhower, Steven, R.

Additional Authors: Johnson, Katelyn, R.; Simpson, Savannah, B.; and Newland, Christopher

Department: Psychology

College/School: Liberal Arts

Description:

The brain and behavior continue to mature during the adolescent period, making them especially vulnerable to neurochemical insult during this time. Methylmercury (MeHg), an environmental neurotoxicant, distorts dopamine neurotransmission and choice behavior when exposure occurs in gestation, but the neurobehavioral effects of adolescent MeHg exposure remain poorly explored. Adolescent MeHg exposure may permanently alter sensitivity to psychotropic medications that block monoamine uptake, such as *d*-amphetamine (a dopamine uptake inhibitor), desipramine (a norepinephrine uptake inhibitor), and clomipramine (a serotonin uptake inhibitor). The present study was designed to determine (a) whether adolescent MeHg exposure and chronic *d*-amphetamine (*d*-AMP) administration could interact synergistically to alter adult behavior, and (b) whether these exposures altered sensitivity to monoamine uptake inhibitors. Male C57Bl/6n mice were assigned to two MeHg- (0 ppm and 3 ppm) and two *d*-AMP-exposure groups (saline and 1 mg/kg), producing four treatment groups ($n = 10-12/\text{group}$): Control, MeHg, *d*-AMP, and MeHg + *d*-AMP. MeHg exposure spanned postnatal day 21 to 60 (murine adolescence), and once daily injections of *d*-AMP or saline spanned postnatal day 28 to 42. In adulthood, lever pressing was maintained under a multiple fixed-ratio (FR) schedule of reinforcement for milk (FR 1, 5, 15, 30, 60 and 120). Following baseline, acute i.p. injections of *d*-AMP, desipramine, and clomipramine were given. Adolescent *d*-amphetamine exposure increased sensitivity (measured via response rates) to acute *d*-AMP, and adolescent MeHg exposure prevented this effect. These data provide indirect evidence for the hypothesis that disruption of DA neurotransmission is a mechanism of MeHg-induced behavioral toxicity. Further, exposure to MeHg during adolescence can alter sensitivity to psychotropic medications later in life.

Title: Nickel(II) complexes with quinol-containing ligands as redox-responsive PARACEST agents

Primary Author: Boothe, Robert, S.

Additional Authors: Goldsmith, Christian, R.

Department: Chemistry and Biochemistry

College/School: College of Science and Mathematics

Description:

The goal of the research was to develop nickel(II) complexes with redox-active ligands as MRI contrast agent sensors for reactive oxygen species. Analogous complexes with manganese(II) were found to display increased T1-weighted relaxivity in response to hydrogen peroxide, resulting in enhanced MRI contrast. This activity has been attributed to the oxidation of the ligand itself, as opposed to the metal. The oxidation of the ligand eliminates protons that can exchange with those from bulk water. We hypothesize that ligand oxidation can also enable the detection of hydrogen peroxide by eliminating chemical exchange saturation transfer (CEST) between the pre-activated sensor and water. Since CEST results in decreased contrast, activation of the sensor should result in enhanced contrast. We synthesized two Ni(II) complexes with quinol-containing ligands and characterized them with NMR, mass spectrometry, X-ray crystallography, UV Vis, and potentiometric pH titrations. The anti-oxidant behavior was assessed through common assays in order to determine the compounds' abilities to donate hydrogen atoms and degrade superoxide. The synthesized nickel(II) complexes are more water stable and should be thereby more amenable to in vivo studies.

Title: The impact of heat tolerance on the maintenance of sexual characteristics

Primary Author: Borders, Jared, L

Hoffman, Alex; Caskey, Andrew; Sardinha, Rhea; Still, Natalie; Wada, Haruka

Department: Biological Sciences

College/School: College of Sciences and Mathematics

Description:

Sexual characteristics such as bovid horn size and avian plumage coloration have evolved through female choice and male-male competition. These characteristics are thought to be an honest signal of male condition and resilience to developmental stressors. In male zebra finches (*Taeniopygia guttata*), beak color has shown to be directly influenced by varying levels of testosterone and been linked to dominance and aggression. Beak color also can signal current condition of males in zebra finches as cold stress causes expression of duller beak color. This suggests that temperature stress imposes a trade-off between maintaining the sexual trait and self-maintenance. We hypothesized that individuals that acquire stress tolerance develop more elaborate sexual traits. More specifically, we predicted that juvenile heat conditioning promotes higher heat tolerance in adulthood with redder, brighter beak coloration. Our approach to test this hypothesis began by exposing juvenile zebra finches to mild prolonged heat stress (38°C) over a period of 28 days. Once adults, the birds were subjected to a high heat stressor (42°C) for 3 consecutive days. Pictures of beaks in adult males were taken pre- and post-high heat stress in order to analyze the effect of stress on the beak color in different treatment groups using hue, saturation, and brightness (HSB) measurements. On the final day of treatment (day 3), the birds were sacrificed and their testes removed in order to be weighed. We predicted that the juvenile conditioned birds would have more intensely colored red beaks after undergoing high heat stress than birds that did not. Our results showed that while neither treatment had any effect on hue or testes weight, birds that underwent the mild heat

treatment as juveniles had a beak color with significantly higher saturation ($p=0.033$) and marginally lower brightness ($p=0.062$) compared to control birds.

Title: Associations of trauma, victimization patterns, and aggression during adolescence

Primary Author (and presenter): Bovee, M. G.

Additional Authors: Thompson, K. R., Pollard, K., Pass, A.L., Burkhart, B.R.

Department: Psychology

College/School: Liberal Arts

Description:

Current literature suggests that childhood trauma plays a significant role in the presentation of deviant behaviors in adolescents, particularly aggression (Hunter, Figueredo, Malamuth, & Becker, 2003). The authors also found that the level of aggression engaged in during the offense had a significant linkage to the age of the victim such that adolescents with peer age victims were found to engage in more aggression and force during the offense. Hunter et al. (2003) related the results of the study to two subdivisions of aggression categorized by an individual's motives: reactive aggression and proactive aggression. Reactive aggression is driven by a defensive response to an external stimulus; whereas, proactive aggression is unprovoked and involves less victimization (Card & Little, 2006).

The current study will examine the relationship between different types of aggression and exposure to childhood abuse and victim age patterns. The sample consisted of 125 adolescent males adjudicated for illegal sexual behavior at a secure juvenile detention facility. Linear regression analyses were used to test the hypothesis that aggression levels, both reactive and proactive, can be predicted by childhood abuse and victim age patterns. The overall model accounted for a significant amount of variance for reactive aggression, $R^2 = .09$, $F(2, 124) = 6.32$, $p < .01$; but not for proactive aggression, $R^2 = .04$, $F(2, 124) = 2.78$, $p = .07$. For reactive aggression, childhood abuse was found to be a significant predictor, $b = .30$, $t(124) = 3.49$, $p = .001$. Victim age patterns, however, were not a significant predictor, $b = .07$, $t(124) = .82$, $p = .41$. While the study design itself does not allow for any causal relations to be drawn, results do indicate that exposure to childhood trauma, irrespective of victim age patterns, may play a role in the development of reactive aggression specifically, but not proactive aggression. Assessment and treatment implications will be discussed.

Title: Victimization patterns and emotional and behavioural dysregulation in adolescence

Primary Author (and presenter): Bradley, S.A.

Additional Authors: Thompson, K.R., Burkhart, B.R.

Department: Psychology

College/School: College of Liberal Arts

Description:

Adolescents exposed to traumatic events experience a wide range of emotional and behavioral symptoms; trauma is not particularly the cause to these problems but traumatic stress (Ford, Chapman, Hawke, & Alber, 2007). This study sought to explore the connection between victimization patterns and emotional and behavioral dysregulation in adolescents involved in the juvenile justice system, as they tend to experience a high rate of victimization (Ford, Chapman, Connor, & Cruise, 2012). Data was collected during an intake psychological evaluation at a secure juvenile detention center. We created groups based on the total amount of self-reported traumatic events experienced (low, medium, and high victimization groups). ANOVAs were conducted using composite scores from the BASC (i.e., internalizing problems, emotional symptoms index, hyperactivity/inattention, and personal adjustment). All ANOVAs were significant [$F(2, 84) = 7.72$, $p = .001$, $F(2, 84) = 6.92$, $p < .01$, $F(2, 84) = 6.40$, $p < .01$, $F(2, 84) = 6.68$,

$p < .01$, respectively]. Means and standard deviations will be presented in a table. Post hoc testing using a Bonferroni correction indicated that the high victimization group reported significantly higher mean levels of internalizing problems and emotional dysregulation and lower levels of coping skills to manage this stress. Interestingly, the medium victimization group reported significantly higher levels of externalizing problems. While the data was not longitudinal or experimental in nature, this surprising result may indicate that adolescents with moderate levels of victimization may initially present with behavioral dysregulation symptoms characteristic of an ADHD presentation whereas adolescents with higher levels of victimization may later present with more internalizing problems that may be more difficult to spot. Overall, the results highlight the need for trauma screening when working with adolescents involved in the juvenile justice system.

Title: Rapid Prototyping of Electronics Cooling Nozzle Arrays

Primary Author (and presenter): Brannon, William, D

Additional Authors: Knight, Roy; Bhavnani, Sushil

Department: Mechanical Engineering

College/School: College of Engineering

Description:

Traditional air cooling methods no longer suffice for the small electronics in modern vehicles. This has created a demand for superior cooling strategies, one of which involves liquid cooling. It is desirable to incorporate the electronics into the radiator flow loop due to the engine coolant that is already present. Though not currently done, it would be most ideal for the liquid coolant to come into direct contact with the heat spreader via an array of jets.

A current constraint in evaluating this system is the time required to manufacture nozzle arrays. With the advent of 3-D printers, prototypes can be fabricated in hours instead of days. By utilizing Computer Aided Design and transferring that information to a 3-D printer, these modules can be designed, built and tested, yielding an enhanced understanding of the physics of fluid flow and heat transfer in jet arrays. This results in improved electronics cooling system design.

Because there are numerous variables affecting the heat transfer and pressure drop of the system, it is necessary to develop a tool with the purpose of rapid modification of prototypes. An effective means of creating a 3-D CAD model in a swift manner involves the production of a Graphic User Interface; several GUIs have been developed using SolidWorks API coding software to fulfil this purpose. These allow the user to select the desired number and orientation of nozzles, whether that be inline or staggered, and enter the desired parameters of the array, the most important of these being distance between nozzles and angle of the confining wall. However, the GUIs allow the user to go further and adjust parameters such as diameter and thickness of the nozzles, and distance of nozzle extrusion below the confining wall. This, along with 3-D printing, results in quick sampling of prototypes, and ultimately shortens the time needed to begin a series of testing cycles.

Title: Does relative activity prior to breeding improve mitochondrial function and oxidative damage following a reproductive event?

Primary Author (and presenter): Brasher, Adam L

Additional Authors: Zhang, Yufeng; Taylor, Halie A; Kavazis, Andreas N; Hood, Wendy R

Department: Department of Biological Sciences

College/School: College of Sciences and Mathematics

Description:

Our understanding of the physiological responses to stress of wild animals is often based on studies where data is collected over a short period of time. Although many fundamental insights have been gained from this approach, this design often ignores the fact that each individual has experienced a unique set of sequential events that may have altered its physiology. These carry-over effects may explain much of the variation in performance and fitness found among individuals in wild populations. Moderate activity, or exercise, is associated with a plethora of benefits at the cellular level including improved mitochondrial function. For this study, we asked if the beneficial effects of exercise on mitochondria carry over to reproduction, improving the impact that reproduction has on mitochondrial capacity and function. We used the outbred IRC mouse as a model. Half of the mice were given access to a running wheel and half were not. The impact of running on mitochondrial function was then quantified after 1 month in half of the animals, with equal numbers collected from each group. The remaining animals were then bred so that the impact of running prior to breeding could be quantified. Relative to mice that did not have access to a running wheel, mice that ran demonstrated significantly higher total leg muscle mass, increased respiratory capacity measured through RCR, significantly lower levels of ROS, no change in oxidative damage, and the offspring of active mice showed significantly higher body mass ($p = 0.04$). These results support prior findings that suggest exercise improves mitochondrial performance and thus, provides an exciting framework for our ultimate prediction that the positive mitochondrial effects of exercise will persist following a future reproductive event. These findings will be presented.

Title: Tracking of *Staphylococcus aureus* Infections Through Bioluminescence and IVIS MiSpinner

Primary Author (and presenter): Brazelle, Morgan, L

Additional Authors: Wesolowski, Alec; Brannen, Andrew; Panizzi, Peter

Department: Department of Drug Discovery and Development

College/School: Harrison School of Pharmacy: Auburn University

Description:

This project presents an improved method of tracking *Staphylococcus aureus* infections via bioluminescent imaging. A bioluminescent strain of *S. aureus*, Xen 29, was grown in brain-heart infusion media supplemented with the antibiotic kanamycin for selection purposes, and consistency was maintained by using lyophilized stocks. The gene encoding for the synthesis of luciferase is inserted into the bacterial genome so that as the enzyme reacts with luciferin, ATP, and oxygen, light is produced as a byproduct. Since these bacteria produce light as they develop, we captured images that detect this light via bioluminescent imaging using a camera designed to have a long integration/exposure time and low background noise. The primary issue with this method is difficulty in maintaining consistent position of the mouse relative to the camera. The semi-automated IVIS Lumina XRMS system, MiSpinner prototype is used to correct for this. The mouse is positioned in a conical tube fitted with a nose cone administering anesthesia, isoflurane. This is then rotated along a 360-degree axis resulting in actuated rotation and subsequent imaging of the mouse. This method reduces positioning bias and allows for more precise information to be collected for bio-distribution of the infection. The mice were given a bolus injection intravenously via their tail vein and imaged approximately five days following injection. Bioluminescent signal was mainly detected from the kidney, liver, and spleen. Further confirmation of infection sites was achieved through histology, gram staining, and hematoxylin and eosin staining of affected tissues. Imaging with the IVIS MiSpinner presents a more precise avenue to study Staphylococcal infections with bioluminescent imaging.

Title: SIRT3 agonists attenuate beta-Amyloid production in vitro through SIRT3-PGC1 α -AMPK signaling pathway.

Primary Author: Briggs, Gwyneth, H

Additional Authors: Lynd, Tyler; Ademek, Danielle; Schumann, Zoë; Suppiramaniam, Vishnu; Dhanasekaran, Muralikrishnan; Govindarajulu, Manoj

Department: Drug Discovery and Development

College: Harrison School of Pharmacy

Description:

Recent research has shown mitochondrial dysfunction in the development and progression of Alzheimer's disease. ABeta is one of the hallmark characteristic of Alzheimer's Disease. It is formed through the cleavage of APP (amyloid precursor protein) by *beta*-secretase and *gamma*-secretase. ABeta-induced neuronal death is characterized by mitochondrial release of second mitochondrion-derived activator of caspase (Smac), an important precursor event to cell death. Complete elucidation of the mechanism of ABeta-induced apoptosis promises to accelerate development of neuroprotective interventions for the treatment of AD. SIRT3 is a member of the sirtuin family of NAD⁺-dependent deacetylases localized to the mitochondria and are implicated in improving the pathology of AD. To date, very limited research studies have been done to measure the effects of SIRT3 agonists on ABeta production. The purpose of this study was to determine the effects of SIRT3 agonists in decreasing ABeta production and to elucidate its effects through SIRT3-PGC1 α -AMPK signaling pathway. The neuroprotective effects of SIRT3 were evaluated using PS70 cell lines and signaling mechanisms were elucidated. Our data indicate SIRT3 agonists promote PGC1 α levels and thereby decrease ABeta formation. Further studies are to be conducted to validate our results and explore new avenues.

Title: Work-life enrichment and work outcomes: A meta-analysis

Primary Author (and presenter): Britton, Erica

Additional Authors: Kelner, William C.; Hartman, Paige; Michel, Jesse S.

Department: Psychology

College/School: College of Liberal Arts

Description:

Work-life enrichment, the extent to which either the personal life or work domain positively impacts performance in the other domain, has been an often overlooked construct within the work-life interface until recent years. To date, there has only been one meta-analysis on work-life enrichment (McNall, Nicklin, & Masuda, 2010). Since this meta-analysis, many new studies on work-life enrichment have been published due to the rise in popularity of work-life enrichment as a viable construct, and a call for a greater focus on work-life enrichment has become evident. To answer this call, our project examines common outcomes of the work-life enrichment construct, along with relevant moderators of those relationships (i.e., demographic variables). By doing this, our goal is to create a clearer picture of the work-life enrichment nomological network. The present findings focus on seven of the most prominent work-related outcomes of work-life enrichment. We employed Schmidt and Hunter's (2014) meta-analytic technique to determine the sample size weighted mean observed correlations and the reliability-corrected mean correlations. Our preliminary results show positive relationships between work-life enrichment and job satisfaction, organizational commitment, engagement, job performance, and organizational citizenship behaviors, as well as negative relationships with turnover intentions and burnout. Specifically, these analyses and the remaining analyses will reveal general relationships of work-life enrichment and possible work- and family-related outcomes. The implications of our results should provide researchers with a more definitive scope of the work-life enrichment construct which can aid future research and the overall conceptualization of work-life enrichment.

Title: Does community conservation improve human and wildlife health?

Primary Author (and presenter): Broadhead, Jordan, T.

Additional Authors: Zohdy, Sarah

College/School: School of Forestry and Wildlife Sciences

Description:

Forest loss on the island of Madagascar contributes to the endangerment of some of the world's most threatened species and infectious diseases of poverty in human populations. Community driven conservation efforts in Madagascar therefore have the potential to improve the livelihood and health of surrounding human and wildlife populations. Here, we test the hypothesis that community conservation improves human and wildlife health in the eastern rainforests of Madagascar by comparing human and small mammal health in and around a community protected forest (Mitsinjo) with those living in disturbed habitats. Small mammals such as mouse lemurs, rodents, and tenrecs were captured using live Sherman traps in both sites. The species diversity, body mass, and ectoparasites for the small mammals captured was compared across sites. Simultaneously, health surveys were administered to human communities surrounded by protected forest and communities surrounded by disturbed habitat. There was a greater endemic species diversity in the protected forest (n=6) than in the disturbed forest (n=2). Small mammals in the protected forest were not heavier (p=0.31) or more parasitized (p=0.38) than those in the disturbed forest. More individual invasive rodents (*Rattus rattus*) were captured in the disturbed forest than in the protected forest. Humans in disturbed habitats self-reported more febrile illness and a higher prevalence of ectoparasite infestations (lice, fleas, and ticks) that was two times greater than communities surrounded by protected forest. In this study we compare indicators of health in small mammals such as: species diversity, body mass, and ectoparasites across a gradient of habitat disturbance, and we evaluate indicators of health in human communities. Our results indicate that community driven conservation has the potential to benefit human health and wildlife conservation, and may be used as a One Health intervention strategy in biodiversity hotspots in the future.

Title: Researching food insecurity at Auburn University

Primary Author (and presenter): Brown, Katie N

Additional Authors: Wofford, Ruthie; Binion, Abby; Church, Madison; Pruett, Clay; Rogers, Makenzie; Miller, Veronica; Hopkinson, Jessica; Singleton, Olivia; Masucci, Celia

Department: Department of Global Education

College/School: College of Human Sciences

Description:

The hunger studies capstone course brought together 13 students across campus to collaborate on a research project: finding out how many students on Auburn's campus were food insecure and understanding the lived experience of hunger at Auburn. With the guidance of Dr. Kate Thornton, the students worked to research how other universities have studied and addressed this problem, to collaborate with graduate students conducting quantitative research on student food insecurity, and to conduct their own qualitative research project. The students conducted interviews with food insecure students at Auburn, and held focus groups to collaborate to find a solution to this issue.

The class has spent 2 semesters working on this project, from its' conception to the final data and conclusions. The students wish to share their experience with research and the process used to define the goals, and thereby, the methodology of the project. It is unique for undergraduate students to have the opportunity to define their own research project, and conduct it themselves. The students understand how rare their experience was, and wish to share their knowledge and advice with other Auburn students who are pursuing research. In addition to defining the research process used in the study, the students wish to share their results with the audience.

Title: Elucidation of the heme d_1 biosynthetic pathway in *Paracoccus denitrificans*

Primary Author (and presenter): Brown, Matthew H

Department: Biochemistry

College/School: Auburn University

Description:

Some denitrifying bacteria can function anaerobically due to their ability to reduce nitrite using nitrite as a terminal electron acceptor, via nitrite reductase. Nitrite reducing *Pseudomonas aeruginosa* is an opportunistic pathogen responsible for many nosocomial infections, the leading cause of infection in the air passages of Cystic Fibrosis patients, and difficult to treat. The site of nitrite reduction is the heme d_1 cofactor present in the enzyme. Studying the biosynthesis of this cofactor could provide insights into the development of new methods of treating these infections. In *Paracoccus denitrificans*, the second step, a dehydrogenation, may be performed by the enzymes coded by Pden_2496 and Pden_2334 working in tandem. Alternatively, Pden_2333, Pden_2335, or Pden_1323 are being studied to determine if they have a role in this step. A CbiX homolog may be involved in the last step that CysG catalyzes, the ferrochelation of sirohydrochlorin. The *pden_2496* gene and the *pden_2334* genes were amplified via polymerase chain reaction with primers containing NdeI and XhoI restriction sites, double digested, and inserted into pET-28b(+) vectors containing an N-terminal His₆-tag. Sequence verified *pden_2496*, *pden_2334*, and *cbiX* were transformed into chemically competent *E. coli* BL21 cells and IPTG was added to inoculated broth to induce specific protein production. Pden_2496 production was purified using a nickel affinity column with both Tris and phosphate buffers, which was confirmed by SDS PAGE. Assays were run with Precorrin 2 in the presence of Pden_2496 and NAD⁺ which confirmed that Pden_2496 does not perform the dehydrogenation. It was discovered that Precorrin 2 will undergo chemical changes in the presence of light or oxygen. Additional assays were run to determine the reactivity of sirohydrochlorin with various metals. It was shown that Fe, Co, Zn, and Cu will spontaneously chelate with sirohydrochlorin. Therefore, CbiX may not be necessary for the production of siroheme.

Title: Health coaching as an intervention for Type 2 diabetic patients

Primary Author (and presenter): Burch, Mary, M.

Additional Authors: Ellison, Kathy

Department: Nursing

College/School: Auburn University at Montgomery

Description:

There is evidence to suggest that as many as one in three adults will have type 2 diabetes by the year 2050. Strong evidence highlights the role of health coaching as a powerful method to elicit patient commitment, accountability and self-efficacy along with better blood glucose control. The purpose of this project was to examine the effect of health coaching on blood glucose levels in persons with type 2 diabetics. Patient development of an action plan and self-management skills were assessed along with blood glucose levels. Target population included adults (18 years and older) with diabetes type 2 in a primary care practice. Following informed consent, participants completed two questionnaires to assess their knowledge of diabetes (DKT2) and self-management skills (PAM-10). A point of care blood glucose was also obtained. Participants engaged in bi-weekly health coaching sessions for 4-6 weeks. At the project's conclusions, participants again completed the two questionnaires along with a blood glucose level. Descriptive analysis was performed along with improvement in outcomes using the T-tests for the interval/ratio variables on blood glucose level and self-management. Finally, the Mann-Whitney U tests was used to evaluate the action plan variable. Twelve persons agreed to participate (% females & %

males), average age of X (sd) yrs. X% completed all health coaching sessions and completed all requested forms/questionnaires. Follow-up results indicated that blood glucose levels and self-management ability improved significantly from pre (mean, sd) to post (mean, sd). The action plan was also evaluated with statistically significant results ($p < 0.05$). Utilizing health coaching as an intervention for type 2 diabetes led to a decrease in blood glucose levels and an increase in self-management skills. The addition of health coaching is both appropriate and beneficial in the primary care setting and further implementation of the project is warranted.

Title: Origin, composition, and diversity of the gut microbial communities in channel catfish "*Ictalurus punctatus*"

Primary Author (and presenter): Burgos, Francisca, A.

Additional Authors: Ray, Candis and Arias, Cova

Department: Fisheries, Aquaculture, and Aquatic Sciences

College/School: Agriculture

Description:

Gut microbiota has become an integral component of the host, and received increasing attention. The acquisition of gut microbes does not occur randomly and is highly dependent on host factors, environmental cues, and self-assembly rules exerted by microbes themselves. The information on the channel catfish gut microbiota is insufficient and more effort should be exerted to manage and improve the gastrointestinal bacterial community. Aquaculture industry has been trying various means of altering the intestinal microbiota to achieve favourable effects on the health and physiology in the host organism, mostly without much success. The main objective of this project was to analyse the gut microbiota during the early stages of development of channel catfish to identify i) which bacteria are the main constituents of the gut microbiota, and ii) the key times at which specific microbiota develop and become stable. Gut microbiomes were surveyed with high-throughput DNA sequencing of 16S rRNA V4 gene amplicons derived from 12 sampling time points covering the fish ontogenetic life stage including fertilized egg (pre-hatch) until they reach 150 days post hatch, while also characterizing the microbial communities from the water and the administered diets. OTU analyses showed that channel catfish core gut microbiome is composed of Proteobacteria, Firmicutes, Fusobacteria and Cyanobacteria. At early stages the microbial communities assembling were highly dynamic and diverse, with significant shifts occurring at the transitions between sac fry to swimming up fry (6 to 15 d.p.h) and when the microbiota somewhat stabilized at pre-fingerling to fingerling stage (21 to 150 d.p.h) with a trend to reduce the biodiversity. Regarding the relative abundances of different organisms present, the composition of the intestinal microbiome in fingerlings over time presented the most relative stable members of the gut community suggesting they might truly represent resident microbiome in the gut.

Title: Nanoparticle targeted testosterone degradation for the treatment of androgen-dependent prostate cancer

Primary Author (and presenter): Byers, Elizabeth J.

Additional Authors: David, Allan; Cullum, Richard

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Prostate cancer is the second most common cancer in America. Most tumors are initially sensitive to the primary treatment of androgen deprivation. This treatment has proven effective but is coupled with severe side effects that may detract from quality of life. Androgen deprivation therapy is known to cause

impotence, osteopenia, decreased libido, and metabolic alterations. Local hormone deprivation through testosterone-degrading enzyme loaded nanoparticles could prove effective in halting cell proliferation in prostate cancer while minimizing the risk of global side effects associated with systemic treatment.

Nanoparticle drug delivery systems have demonstrated promising advances in improving the efficacy of anticancer drugs due to the nanoparticle's ability to take advantage of the leaky vasculature commonly associated with the tumor microenvironment. Nanoparticles too large to pass through the walls of healthy blood vessels are able to pass through the poorly formed blood vessels within the malignancy, allowing loaded nanoparticles to accumulate within the tumor microenvironment. Testosterone receptors in the cytoplasm require nanoparticles to be intracellular to be efficacious against cancer cells. Therefore, it is highly desirable to have testosterone-degrading enzyme loaded nanoparticles that are easily internalized by prostate cancer cells.

Currently invertase is being used as a model enzyme to study the effects of attachment to nanoparticles on enzyme activity. Future work will evaluate the use of 17- β -hydroxysteroid dehydrogenase to locally degrade testosterone for the treatment of androgen dependent prostate cancer. The studies of enzyme attachment performed on invertase will be replicated using the enzyme of interest. Other milestones to be reached throughout this project include synthesis of nanoparticles, characterization of nanoparticle properties and stability, *in vitro* cell culture studies including nanoparticle uptake, and size optimization.

Title: The effects of insulin signaling on sexually dimorphic gene expression in head tissues

Primary Author (and presenter): Bynum, Ryan C.

Additional Authors: Armstrong, Madison; Howard, T.S.; Tzeng, R.; Arbeitman, M.N.; Graze, Rita

Department: Biological Sciences

College/School: Auburn University ****

Description:

The insulin signaling pathway, which is highly conserved from fruit flies to humans, is commonly involved in sexual dimorphism of growth, behavior, aging and reproduction. In order better to understand how the insulin signaling pathway contributes to sexually dimorphic gene expression in *D. melanogaster*, we identify the genes which are affected by perturbations of insulin signaling in adult males and females. Transgenic constructs, which allow the *Drosophila* insulin receptor (encoded by the *InR* gene) to be rendered non-functional when exposed to a drug, were used to perturb the insulin signaling pathway in adult fruit flies. This method uses a dominant negative *InR* transgene (InRDN) which was previously introduced into the fly genomes. Upon exposure to the drug, the transgene is turned on via an actin-5C-geneswitch and expressed. RNA sequencing (RNA-seq) of head tissues was used to evaluate gene expression in flies expressing InRDN and the effects of the perturbation were compared to genetically matched controls. Analysis was conducted to determine the quality of RNA-seq data, including analysis of a set of artificially synthesized control sequences of known quantity. The sequences were aligned to the *D. melanogaster* reference genome and gene expression was estimated. By comparing gene expression between males and females in treatment (InRDN expressing) and control groups (functional insulin signaling), we explore how the genetic networks affected by this perturbation are the same or different in males and females. Males and females have a shared regulatory response to the perturbation, which as expected is heavily enriched for genes and pathways involved in metabolism. However, there are many genes which show striking sex differences only under the perturbation conditions, which mimic starvation-like stress. This includes large effect changes in expression of immune, defense and stress response genes driven by male-specific effects of the perturbation.

Title: Global transcriptional analysis of biofilm development by fish pathogen *Flavobacterium columnare*

Primary Author (and presenter): Cai, Wenlong

Additional Authors: Arias, Cova

Department: Fisheries, Aquaculture and Aquatic Science

College/School: Agriculture

Description:

Flavobacterium columnare is an important bacterial fish pathogen that causes great economic losses in aquaculture. Bacteria living in biofilm (cells attached to solid surface and embedded with exopolysaccharides) is difficult to eradicate due to their increased resistance to antibiotics and disinfectants. Using a microcosm study, we tested biofilm formation of *F. columnare* in glass flasks with different Ca^{2+} concentration (0 to 6.5 mM) and found that high concentrations of Ca^{2+} consistently enhanced biofilm formation. Furthermore, in order to decipher the underlying molecular mechanisms that are regulated by calcium, as well as to shed light onto the different metabolic pathways between biofilm and planktonic cells, RNA-Seq analysis was conducted to identify genes that were differentially expressed among the following three samples, i.e. planktonic cells in control medium (P), planktonic cells in calcium-enhanced medium (P/Ca), and biofilm cells in calcium-enhanced medium (B/Ca). The mRNA was reverse transcribed after rRNA reduction and sequenced using an Illumina HiSeq platform. Overall, we identified 441 significant (FDR < 0.05, Fold change > 2) differentially expressed genes (DEGs) between P and B/Ca samples; 112 significant DEGs between P/Ca and B/Ca samples, and 175 significant DEGs between P/Ca and P samples, corresponding to 15.87%, 4.03% and 6.30% of the total protein-coding sequences, respectively. The significant DEGs fell into different functional categories including polysaccharide synthesis, quorum sensing, iron homeostasis, type IX secretion system, and respiratory metabolism. Together, our data suggested that that biofilm is significantly affected by calcium, which seems to serve as a critical signal in controlling bacterial surface adhesion and biofilm formation in *F. columnare*. These results demonstrate that calcium supplementation induced a transcriptional response that promotes continued biofilm formation.

Title: Understanding engagement and motivation in learning a complex motor skill

Primary Author (and presenter): Camp, Peyton, N

Additional Authors: Leiker, Amber; Lohse, Keith

College/School: College of Science and Mathematics; School of Kinesiology

Description:

Game-based training improves learning through physical practice itself but also because video games can increase engagement (ENG) and motivation (MOT) in participants. The current experiment investigated how increased interactivity affects ENG and MOT in motor skill learning. In these pilot data, twenty participants were randomly assigned to a self-controlled (SC) group, who chose the level of difficulty block-by-block during practice, or to a yoked group, who had the same difficulty as their SC counterpart, but did not have choice. During practice, participants' in-game score, ENG, and MOT were assessed. We also collected EEG data during practice to explore neural correlates of ENG/MOT. These physiological data are currently being processed. Following practice, participants completed validated surveys for MOT and ENG, for comparison to the single item "block-by-block" measures. One week later, participants returned and completed retention tests to measure learning. Although not statistically significant, the SC group had higher ENG on average (4.51) than the yoked group (3.96), $p=0.16$. Similarly, the SC group (4.58 pts) was not different from the yoked group (4.30 pts) in overall MOT, $p=0.57$. Block-by-block assessments of ENG/MOT revealed that both constructs were significantly correlated with the longer, validated surveys

given at the end of practice (ENG $r=0.59$, $p=0.006$; MOT $r=0.64$, $p=0.003$). This finding suggests that the faster, block-by-block assessments are a valid (albeit less reliable) way to quickly assess ENG and MOT. Linear mixed-effect regression revealed complicated interactions between difficulty, performance, and block-by-block ENG/MOT, such that high performance only elicited increased ENG at sufficient levels of difficulty. Performance was not significantly related to MOT. These findings are important because they suggest that challenge, rather than performance, is a better indicator of a participant's ENG or MOT during practice.

Title: Understanding engagement and motivation in learning a complex motor skill

Primary Author (and presenter): Camp, Peyton, N

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Title: Effects of different movement postures due to breathing zone restrictions on physiological demand during evacuation

Primary Author (and presenter): Cao, Li

Additional Authors: Davis, Jerry

Department: Industrial and Systems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Humans may adopt atypical locomotive postures due to breathing zone constraints during emergency evacuations. Except for upright walking, other locomotion strategies during evacuation are sparsely researched. Current International Building Code (IBC) standard enforces that the distance to an exit for the building with a sprinkler system shall not exceed 250 feet. However, no clear evidence shows that people are able to crawl that long distance. How far and how fast people are able to crawl have not been well studied. This research study evaluated human physiological demand as a function of breathing zone height using different types of locomotion. Twenty-four (24) subjects (12 males and 12 females)

participated in this study to travel 300 feet (91.4m) with five different locomotive postures representing different breathing zone heights: Upright Walking (UW), Stoop-Walking (SW), Feet and Hands Crawling (FHC), Knees and Hands Crawling (KHC), and Low Crawling (LC). Results of the study indicated that locomotive posture affected human velocity and physiological demand. Crawling velocities were significantly slower than bipedal velocities ($p < 0.05$). Of all three crawling postures, Feet and Hands Crawling (FHC) was faster in velocity but much more physically demanding ($p < 0.05$). Maximum crawling distance for an average person measured in this study was less than 250 feet. Results of the study can provide additional guidance about the effects of different postures (breathing zone heights) on egress physiological demand and recommendations for building evacuation route design.

Title: conGRADulations!

Primary Author (and presenter): Carlin, Margaret, L

Department: Environmental Design

College/School: College of Architecture, Design and Construction

Description:

A research project in ENVD 4010 that allowed the students to pick a local and global issue and complete research on each issue.

This research is important because our elementary education is very vital to our nation's economy, intelligence, innovations, health, and much more. Finland's educational system is one of the best in the world. Finland is relatively high on the Program of International Student Assessment (PISA) and yet Finland doesn't require standardized testing in schools. Finland also has one of the highest graduation rates compared to America's graduation rate. For my global board, I looked at Japan's, Canada's, and Finland's graduation rates, teaching salaries, employment rate compared to the population size, and PISA scores that are higher than America's scores. For my local board, I focused on concepts that Finland is doing successfully and concepts American education could fix. Some of the concepts that I focused on are standardized testing, homework, teaching time, recess, and enrolment. Finland has changed the way they approach these concepts in their educational system, and I believe we could benefit from reforming these concepts in our educational system. These American students affected by our nations educational system will one day become our nation's CEOs, leaders, and innovators.

Title: Suicidal behaviour as a network of causally connected symptoms: A new strategy for prevention

Primary Author (and presenter): Cero, Ian, J.

Additional Authors: Billor, Nedret and Witte, Tracy

Department: Psychology

College/School: Liberal Arts

Description:

Traditional approaches to psychopathology treat mental disorders and other forms of pathological behaviour as diseases, each driven by a singular cause that explains the co-occurrence of their respective symptoms. For example, the co-occurrence of sore throat, fever, muscle aches is explained by the fact that they all result from a common cause: streptococcal bacteria. The powerful implication of this framework is that the common cause becomes the most important target of treatment; eliminate the bacteria, tumour, or other pathological process and the symptoms will remit. The success of this approach in medicine has also made it the most popular approach to modelling psychopathology as well (i.e., 'there is such a thing as "suicidality" and that is the ideal target of treatment'). Unfortunately, multiple decades implementing this approach have led to limited success in suicide intervention – the assumptions of the common cause model (e.g., local independence of symptoms after conditioning on the common cause) are seldom met and model

fit is very often poor. This investigation takes an alternative approach, modelling suicidal behaviour as a network of causally connected symptoms – sharing no common cause, but instead reciprocally causing each other. This model effectively accounts for the covariation of symptoms observed in the data, but more importantly, it points to new treatment targets. Rather than target some underlying common cause – which is typically unobservable, and thus, unverifiable – this network model of suicidal behaviour proposes treating the symptoms that are most central to the network. By breaking key links in the causal chain, the network model predicts the pathological process remits.

Title: Insights from gene panel screening using a newly established Alabama cancer cohort

Primary Author (and presenter): Chandler, Madison, R.

Additional Authors: Watkins, Anna; Shah, Amit; Shively, Melissa; Bilgili, Erin; Jackson, Ebony; Daniell, Kathleen; Stallworth, Betsy; Spina, Stephanie; Shepp, Kasey; Davis, Amber; Dean, Holly; Johnson, Brandon; and Merner, Nancy

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Although an average U.S. woman has a 12.5% lifetime risk of developing breast cancer (BC), many risk factors, including genetic risk factors, can influence an individual's lifetime risk. Inherited genetic risk factors cause hereditary/familial BC and can be grouped into three general categories: high, moderate and low penetrant variants based on the reported, relative lifetime risk. Genes that harbor these risk variants are called BC susceptibility genes. So far, over 35 BC susceptibility genes that carry high to moderate BC risk variants have been suggested. Interestingly, mutations in these BC susceptibility genes only explain ~35% of hereditary BC cases, leaving a large portion of cases genetically unexplained. Unfortunately, the majority of the research published to date focused on Caucasians, so less information is known about cancer genetics in other ethnicities. The medically underserved population in Alabama includes a large African American (AA) population, an extreme group with many health disparities. For instance, African American women have a higher incidence rate of BC under the age of 40, which is a hallmark of hereditary BC. Therefore, we believe that genetic risk factors are contributing to this disparity. Two recruitment mechanisms, hospital and community-based recruitment, have been established in order to involve the Alabama population in BC genetic research. After two years of recruitment, 147 participants from 81 cancer families have been recruited. Forty-three of the recruited individuals have been screened for variants in known susceptibility genes using our custom-designed next generation sequencing gene-screening panel. This research study informs participants of identified mutations, providing genetic information that is typically inaccessible to the medically underserved and has been proven to save lives. Furthermore, this effort aims to identify additional BC susceptibility genes and, ultimately, address cancer health disparities.

Title: Econometric modeling of the U.S. hotel industry revenue

Primary Author (and presenter): Chen, Han

Additional Authors: Bernard, Shaniel; Chen, Rui; and Rahman, Imran

Department: Nutrition, Dietetics, & Hospitality Management

College/School: Human Sciences

Description:

Predicting hotel industry and its sub-segment revenue is critical to hotels that actively plan for the future. In this study, an econometric model was developed to forecast hotel sales using domestic trips, consumer confidence index, and international inbound trips as predictor variables. Additionally, the model was

tested in six sub-segments of the hotel industry – luxury, upper upscale, upscale, upper-midscale, midscale, and economy. Using monthly aggregate data for the past 20 years, the model was found to have reasonable utility in terms of forecasting accuracy. In particular, domestic trips and consumer confidence index positively affected aggregate revenue and sub-segment revenue across all six sub-segments. Inbound trips by international tourists positively influenced revenues for midscale and economy hotels and negatively influenced revenue in the upper-upscale segment. Based on the variability in forecasting accuracy across sub-segments, practitioners and stakeholders are urged to undertake segment-specific forecasting of hotel revenue. Numerous takeaways and implications are offered based on these findings.

Title: Investigating the influence of workplace fun and humor on hospitality employees' selected work outcomes

Primary Author (and presenter): Chen, Han

Additional Authors: Ayoun, Baker

Department: Nutrition, Dietetics, & Hospitality Management

College/School: Human Sciences

Description:

This study investigated the interplay between workplace humor styles, workplace fun, workplace aggression and job embeddedness in the hospitality workplace in the U.S. The survey-based research was conducted with 171 students majoring in hospitality management who are currently or were previously working in the hospitality industry. Results, employing structural equation modelling, showed that both affiliative humor and aggressive humor positively influenced supervisor support for fun and co-worker socializing. In addition, affiliative humor also enhanced hospitality employees' perception of fun activities. Both fun activities and supervisor support for fun are shown to influence employees' job embeddedness positively. Moreover, co-worker socializing was found to reduce the perceived aggression from both co-worker and supervisor significantly. However, supervisor support for fun increased hospitality employees' perceived supervisor aggression and co-worker aggression. Findings highlight the importance of workplace fun in enhancing hospitality employees' job embeddedness and reducing perceived workplace aggression. Suggestions on how to better design fun activities to form a fun working environment and how to train employees on the use of humor at workplace are provided.

Title: The outer membrane protein MopB is associated with biofilm formation, twitching motility and virulence of the plant pathogen *Xylella fastidiosa*

Primary Author (and presenter): Chen, Hongyu

Additional Authors: Kandel, Prem; Cruz, Luisa; and De La Fuente, Leonardo.

Department: Entomology and Plant Pathology

College/School: Agriculture

Description:

The gram-negative bacterium *Xylella fastidiosa* is the causal agent of many economically important disease including Pierce's disease in grapevine, citrus variegated chlorosis, and others. This pathogen is spread by sharpshooter insect vectors and is restricted to live inside the xylem vessels of host plants. MopB is a major outer membrane protein in the plant pathogen *X. fastidiosa*. Based on DNA sequence analysis of the gene encoding MopB, the C-terminal part of MopB is a homologue of the OmpA family, and a conserved calcium binding motif has been predicted. However, the function of MopB protein in *X. fastidiosa* remains poorly understand. Here, MopB function has been studied by mutational analysis. Taking advantage of the natural competence of *X. fastidiosa*, *mopB* mutants were obtained in two different *X. fastidiosa* strains, the type strain 'Temecula' and the more aggressive 'WM1-1'. *mopB*

mutants in both background strains were impaired in surface attachment, biofilm formation and twitching motility. Moreover, the *mopB* mutants were impaired in pilus formation as observed by electron microscopy. Additionally, *mopB* mutants in both backgrounds showed the virulence reduced when tested on tobacco (*Nicotiana tabacum*) as a host under greenhouse condition. These results suggest that MopB has an effect on biofilm formation, twitching motility and is important for virulence of *X. fastidiosa*.

Title: Patterns of healthcare provider utilization for breast cancer patients with comorbidities in the United States

Primary Author (and presenter): Cheng, Ning

Additional Authors: Qian, Jingjing; Chou, Chiahung; and Hansen, Richard

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

Little is known how patients with breast cancer and comorbid chronic conditions are cared for by healthcare systems. This study aims to assess utilization patterns of healthcare provider for breast cancer patients with comorbidities in the United States. We analyzed 2009-2012 data of the household and medical provider components from the Medical Expenditure Panel Survey for breast cancer survivors. Specialties of healthcare providers caring for identified patients were categorized into oncologist only (Oncologist), primary care providers only (PCP), all other specialists (Other), Oncologist-Other, Oncologist-PCP, PCP-Other, and Oncologist-PCP-Other. Patients were divided by the number of chronic conditions (hypertension, hyperlipidemia, diabetes) they had, and their demographics were summarized. Healthcare provider utilization pattern changes were described across patient groups with different numbers of comorbidities, as well as examined based on cancer survival years for patients with comorbidities. From 2009 to 2012, breast cancer patients aged 65-84 years old were more likely to have concurrent chronic conditions than other age groups. As the number of comorbidities increased, the proportion of patients visiting single specialists decreased and the proportion of patients visiting Primary-Other and Primary-Oncology-Other increased. As breast cancer survival years increased, the percent of patients using Primary-Other gradually increased across all survival years, while the percent of patients using Oncologist became the highest at year 3 and then decreased. The complexity of healthcare provider specialties involved with breast cancer patients increased with the number of chronic conditions. As survival years increased, the proportion of healthcare from oncologist varies.

Title: Memristor-based Spiking Neural Network for Pattern Recognition

Primary Author (and presenter): Cheng, Ran

Additional Authors: Hamilton, Michael

College/School: Samuel Ginn College of Engineering

Description:

The unbalance between data processing speed and memory access speed restricts the development of Von Neumann architecture. In other word, non-Von Neumann architectures like brain-inspired neuromorphic computing have become very popular in recent years with the emerging memristive memory technology. Although conventional Artificial Neural Networks (ANNs) are capable of solving complex computation problems, researchers are focusing on designing hardware of Spiking Neural Networks (SNNs), which are also known as the third generation of ANNs. SNNs more biologically emulate brain behaviours than traditional ANNs. As the fourth basic circuit element, a memristor can change its resistance when the voltage across its two terminals changes. It can mimic Spike-timing-dependent plasticity (STDP) which occurs in the brain and causes neurons to change synaptic weights. Therefore, it can act as a synapse

connected between two neurons. The nanoscale memristors make them possible for large scale and complicated neuromorphic computing. In this work, we firstly designed neuron models and synapse models based on mathematical methodology. By using these simple and convenient models, we were able to simulate neuron learning behaviours. Then we designed a neural network for pattern recognition based on IBM 120nm technology. The network consists of Leaky-Integrated & Fire (LIF) neurons, memristor models, Winner-take-all (WTA) neurons and digital control circuits. After training, it can correctly recognize the corresponding 3x3 pixels images with or without noise. The on-chip learning is fast and reliable. The saved patterns can be forgotten by resetting the memristors. The system can be scaled up to hundreds or thousands of neurons for recognizing images with more pixels. However, we used verilogA memristor models instead of a real memristor. Once real memristors are integrated to this system, it would be quite efficient in terms of processing large amount of images.

Title: Virtual water trade: Do bilateral tariffs matter?

Primary Author (and presenter): Chen, Rui

Additional Authors: Wilson, Nobert, L.

Department: Department of Agricultural Economics and Rural Sociology

College: College of Agriculture

Description:

Economic growth, changing dietary habits, and climate change may exacerbate problems of water scarcity and uneven distribution of water. Virtual water trade (VWT) is the trade of water embedded in trade, and links food, trade and water. Thus, an evaluation of the movement of water between nations may serve as a useful tool for monitoring and mediating the challenges of water scarcity. Few empirical studies of virtual water trade using international trade theory exist. The purpose of this paper is to estimate how bilateral tariffs alter the flow of VWT across 19 different crops using gravity model with ad valorem equivalents (AVE) of tariffs included. Specific objectives are to 1) derive hypotheses for VWT from HOV model; 2) estimate whether the determinants of VWT differ for blue and green virtual water trade over different crops; and 3) evaluate the effects of tariffs on VWT. Results show there are no big different effects between determinants of blue virtual water import and green virtual water import; there are difference effects among the determinants of VWT of 19 crops; tariff has a negative effect on the blue and green virtual water import for more water intensive crops, but positive or no effect on less water intensive crops.

Title: Banking crises and the performance of MIFs

Primary Author (and presenter): Chen, Rui

Additional Authors: Hartarska, Valentina

Department: Agricultural Economics and Rural Sociology; Department of Finance

College: Agriculture; Harbert College of Business

Description:

The global financial that started in 2008 affected financial markets across the world. In many countries, it was followed by local financial crises with severe consequences for marginalized borrowers such as micro and small businesses and consumers with already limited access to financial services. Such clients are typically served by Microfinance Institutions, which provide loans, savings and payment facilities to a target clientele. We study how the spread of the financial troubles resulting from the 2008 crisis affected these MFIs institutions' ability to achieve their double bottom line to remain financially sustainable and to reach as many marginalized clients as possible. Our data consist of 2,611 MFIs from 118 countries and is for the 1998-2011 period. We employ the Difference in Difference (DID) model and control for country

and organization-specific characteristics. Results show that the global financial crisis had a negative impact on the ability of MFIs to serve many clients (measured by the number of active borrowers but it had no negative impact on financial sustainability (measured by operational self-sufficiency and return on assets. This suggests that MFIs have dealt with the crises just like banks, namely restricting credit and serving fewer presumably larger borrowers.

Title: Preventing patients with pre-diabetes from developing diabetes

Primary Author (and presenter): Childs, Mindy, E.

Secondary Author: Ellison, Kathy Jo

Department: School of Nursing

College/ School: Auburn University

Description:

There is strong evidence in current research that minimal pre-diabetes patient education without patient support does not produce the best outcomes achievable. The evidence suggests that increased pre-diabetes education may lead to decreased diabetes diagnoses and health complications associated with it. The purpose of this EBP project was to implement a more intense pre-diabetic patient education program with fasting blood sugar (FBS) being the main measurement of success. The target population included adults over the age of 18 with a pre-diabetes diagnosis with an A1c between 5.7 and 6.4 who were patients at the local primary and urgent care center. Following agreement, participants completed a pre-project diabetes self-assessment form and a FBS was recorded. A Pre-diabetes education and counseling program was then completed. After 4-6 weeks a post-project diabetes self-assessment form was completed as well as another FBS. Descriptive statistics were used to describe the patient population, diets used, activity levels, and self-efficacy. The pre-post diabetes self-assessment responses and FBS levels were compared with paired t-tests. X patients agreed to participate (% females), average age of X (sd) yrs. Participant follow-up indicated that X% showed improvement in diet, exercise, self-efficacy, and fasting blood sugar. Among all of the participants with pre-diabetes diagnoses involved, the mean FBS levels improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Increased pre-diabetes education with family or healthcare provider support among those diagnosed with pre-diabetes has shown positive improvements on fasting blood sugar along with helping to prevent pre-diabetes from developing into diabetes. Prevention of diabetes diagnosis and maintenance of pre-diabetes fasting blood sugars are achievable at this primary and urgent care setting and further implementation of the project is warranted.

Title: Patterns of Ni concentration among populations of the high-Ni insect *Melanotrichus boydi* (Hemiptera: Miridae), a specialist on the Ni hyperaccumulator plant *Streptanthus polygaloides* (Brassicaceae)

Primary Author: Choi, Jiyeong

Additional Authors: Mincey, Katherine; Cobine, Paul; Boyd, Robert

Department: Department of Biological Sciences

College/School: Department of Biological Sciences

Description:

The Ni hyperaccumulator *Streptanthus polygaloides* (Brassicaceae) is an annual herb endemic to the California Sierra Nevada. It consists of four morphs that vary in sepal color, morphology, and geographic location: yellow (Y), purple (P), yellow/purple (Y/P), and undulate (U). This species hyperaccumulates Ni from the soil, which allows it to defend itself from enemies such as herbivores and pathogens. Despite this defense, the high-Ni specialist insect *Melanotrichus boydi* is adapted to feed on *S. polygaloides* via cellular disruption and has a high whole-body Ni concentration. This study examined Ni concentrations of *M. boydi* to determine if insects collected from different host plant morphs vary significantly. We

collected *M. boydi* specimens feeding on individuals of the four morphs of *S. polygaloides*, and also collected the host plant on which they were feeding. Other hemipteran species found during our sampling were collected to compare their Ni concentrations to *M. boydi*. We used Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) to analyze Ni concentrations of individual insects and host plants. Nickel analysis confirmed the status of *M. boydi* as a high-Ni insect species: its Ni concentrations (mean: 740 $\mu\text{g Ni/g}$) were significantly greater than those of other non-high-Ni hemipterans (mean: 107 $\mu\text{g Ni/g}$). In addition, one-way ANOVA revealed that Ni concentrations of *M. boydi* differed depending on the host *S. polygaloides* morph. *Melanotrichus boydi* from U morph plants had significantly greater Ni concentrations (1,430 $\mu\text{g Ni/g}$) than *M. boydi* from P (450 $\mu\text{g Ni/g}$), Y/P (380 $\mu\text{g Ni/g}$) or Y (710 $\mu\text{g Ni/g}$) morphs (the latter three morphs did not differ significantly from one another). Analysis of host plants showed no significant differences in Ni concentrations among morphs, indicating that other factors are involved in the *M. boydi* variation.

Title: Renal cystic disease progression monitoring over time in a new animal model of polycystic kidney disease.

Primary Author: Chumley, Mary C

Additional Authors: Shan, Dan; Rezonzew, Gabriel; Mullen, Sean, and Mrug, Michal

Department: Department of Nephrology

College: UAB School of Medicine

Description:

Polycystic Kidney Disease (PKD), a genetic disorder, affects approximately 1 in 500 to 1,000 people. Cystic kidney enlargement in these patients leads to kidney function loss and the eventual need for dialysis and/or kidney transplant. There is no FDA approved drug for PKD. To facilitate development of therapies for this disorder, our group has recently developed a novel rat model. As the initial step to characterize this model, we monitored growth of kidney cysts in these rats using Magnetic Resonance Imaging (MRI) at age 3, 7, and 14 weeks. We used the ImageJ image processing software to determine kidney volume and number of cysts in each kidney. This approach allowed a three dimensional reconstruction to improve visualization of each kidney for quality control assessment and measurement of kidney volumes. In addition, individual renal cysts were scored in each kidney. A 2-way ANOVA was used to test the mutation and gender differences. The rats carrying the PKD mutation developed renal cysts in progressively growing kidneys across all studied time points. Already by 3 weeks of age 1-7 renal cysts (average 4.5) were present in each animal with the PKD mutation (n=12) vs zero cysts in age-matched controls (n=9) that carried the wild type gene (all $p < 0.001$ for number of left and right kidney cysts and total number of cysts). Gender had no effect on difference in cyst number in this cohort. In summary, we used MRI imaging for efficient scoring and monitoring of renal cystic disease progression over time in a newly developed PKD model. This MRI- based approach will be used in this model to enhance efficiency of ongoing preclinical studies aimed at development of future therapies for PKD patients.

Title: Towards the synthesis of a functionalized cycloparaphenylene

Primary Author (and presenter): Cimino, Addison, M.

Additional Authors: Merryman, Caroline; Merner, Bradley

Department: Chemistry

College/School: College of Sciences and Mathematics

Description: The aim of this project is to develop a synthetic strategy for accessing a selectively functionalized [*n*]cycloparaphenylene (CPP). Cycloparaphenylenes are macrocycles composed of benzene

rings that are linked at the *para* position and possess many interesting properties due to their cyclic, conjugated pi-orbitals and the inherent strain energy, which makes them difficult to synthesize. Introducing functional groups in a selective manner into these macrocycles is of great interest, since strategically placed functional group handles can be used to direct controlled, oligomerization reactions and subsequent tube-like growth. *Para*-terphenylophanes (PTPPs) have been previously synthesized by the Merner group to act as surrogate systems to develop new strategies that can be used in CPP synthesis. The goal of this project is to synthesize a selectively functionalized PTPP, and possibly use these functional handles to direct cross-coupling with another biaryl or teraryl system to afford a functionalized CPP. The synthesis of the desired PTPP has proved challenging, as the order of operations of the reactions is crucial to maintaining the desired functionalization while completing the synthesis of the macrocycle. Recent synthetic results will be discussed in this presentation.

Title: Kinematics of youth baseball pitching and football passing

Primary Author: Clardy, Kathryn, A.

Additional Authors: Gascon, Sarah, Gilmer, Gabby, Oliver, Gretchen, Washington, Jessica

Department: School of Kinesiology

College: College of Education

Description: There are scarce data regarding throwing mechanics of youth baseball pitchers and football quarterbacks. The purpose of this study was to examine throwing kinematics of youth baseball pitchers and football quarterbacks. It was hypothesized that there would be kinematic differences between the two youth athletes, baseball pitchers and football quarterbacks. Eighteen youth baseball pitchers (13.6±1.3 years; 169.3±8.0 cm; 62.3±10.2kg) and fifteen football quarterbacks (14.3±1.6 years; 174.9±7.9 cm; 69.1±14.0 kg) participated. Baseball pitchers were instructed to pitch three fastballs to a catcher (46 ft 14.0 m). Football quarterbacks were instructed to throw three 15 yard (13.7 m) passes to a receiver. Throwing motion was divided into four events: foot contact (FC), maximum shoulder external rotation (MER), ball release (BR), and maximum shoulder internal rotation (MIR). Baseball pitchers displayed significantly greater trunk flexion at MER, BR, and MIR ($p < 0.001$, $p = 0.003$, $p = 0.007$); as well as greater trunk rotation opposite the throwing arm side at BR ($p = 0.048$). The football quarterbacks displayed greater trunk rotation to the throwing arm side at MER ($p = 0.002$); shoulder horizontal adduction at FC ($p = 0.004$); shoulder external rotation at BR ($p = 0.036$); and elbow flexion at FC and MER ($p = 0.018$, $p = 0.044$). Differences at the trunk can be attributed to differences in playing surfaces, as pitchers release from a mound instead of a flat surface. Differences in kinematics of the throwing arm may be result of differences in size and weight of a baseball versus a football.

Title: Weaving societal pillars into preventative care

Primary Author (and presenter): Clark, Jeremy

Secondary Authors: Bobo, Ashton; Buhl, Aubrey; and Soper, Lauren

Department: Consumer and Design Sciences

College/ School: Human Sciences

Description:

Alzheimer's Disease (AD) is the underlying cause of approximately 500,000 deaths in the United States each year. 5.1 million Americans are currently diagnosed with AD and the diagnoses are expected to continually increase to 13.5 million by 2050 if no cure is found. This increase threatens to bankrupt health care systems. People with AD were put into institutional mental hospitals until the 1960's. In 1987, President Reagan signed the Nursing Home Reform Amendments of the Omnibus Budget Reconciliation Act, which set new standards for patients in nursing home facilities. Today, the ultimate question is still

how we can do better in this area. Three aspects that can make a memory care space successful are learning, remembering, and feeling. When designing for patients of memory loss diseases, focus should shift back on the core sensory aspects. Therefore, concentrating on the most important task of architecture: to provide shelter and enrich lives. The designer also serves to create opportunity for people to decide what they want and need to feel in the space, rather than forcing a feeling on residents. While there are an abundance of factors that play into the prevention of and coping with AD, mechanisms have been discovered that compensate for existence of cognitive impairment. As residents remain more physically, socially, and intellectually engaged throughout their lives, they are more likely to remain resilient to memory loss. Doctors are now advocating for preventative care and its effectiveness regarding AD. Caring for the brain as well as you care for the rest of your body can fend off cognitive decline. This project serves to focus on preventative and existing care, social interaction balance, and keeping residents' lives as parallel as possible to how they prior before memory loss.

Title: Geochemical analysis of the karstic Bobcat Cave watershed: A case study in Northern Alabama

Primary Author (and presenter): Clements, Allen, C.

Additional Authors: Lee, Ming-Kuo; Wolf, Lorraine; and Shepherd, Stephanie

Department: Geosciences

College/School: College of Sciences and Mathematics

Description:

The Bobcat Cave watershed is part of a large Mississippian-limestone aquifer system that serves as a vital water supply in northern Alabama. The cave is also home to the endangered Alabama Cave Shrimp (*Palaemonias alabamae*). The watershed is situated in the "Industrial Zone" of Redstone Arsenal, a military installation adjacent to Huntsville in Madison County, Alabama, causing concern for potential groundwater contamination. Watershed delineation is crucial for the development of a scientifically defensible water resource research and management plan and protection of the *P. alabamae*. This research incorporates analysis of various parameters including geochemical (major ions and trace elements), stable isotope ($^{18}\text{O}/^{16}\text{O}$, $^2\text{H}/^1\text{H}$), dissolved organic and inorganic carbon concentrations, and volatile organic compounds (BTEX, PCE, TCE) to investigate the hydrologic regime and structure of the karstic Bobcat Cave catchment basin. Preliminary results from water samples collected throughout the study site show there are variations in geochemical signatures on either side of Indian Creek. The east side of the creek has elevated trace element compositions, as well as higher dissolved organic carbon concentrations and an entirely different ionic concentration make up. These results suggest there is weak hydrologic connection between the east and west sides of the creek and that the creek may serve as a groundwater divide, acting as a barrier to contaminant migration on the west side of the creek from sources to the east.

Title: Preventing the progression of pre diabetes to diabetes

Primary Author (and presenter): Clemons, DeLana, C.

College/School: School of Nursing

Description:

The lack of provision of effective lifestyle modification information in the primary care setting places patients at-risk for type 2 diabetes. The purpose of this small test of change is to determine the likelihood that individuals will participate in a lifestyle modification program recommended by the American Diabetes Association. The objectives are to observe the baseline lifestyle habits of the participants, provide a nutritional and exercise program, and observe the percentage of the participants who are willing to receive and apply the information. The target population is adults ages 19-64 with fasting blood glucose values between 99 and 120 followed in a primary care office. The outcome measures include

willingness to participate, feasibility of the program, and adherence. Diet and physical activity survey tools will be used to obtain baseline lifestyle habits, and will again be given over the phone at weeks two and four to assess adherence to the program. Phone calls will be used as the implementation/evaluation strategy. If the individual prefers, information may be sent via email. Results will be reported in the following format: X(%) were willing to listen to the information, but were not willing to apply it to their lifestyles, X(%) were willing to participate, X(%) reported adherence to the program at week 2, and X(%) reported adherence all four weeks at follow-up. We hypothesize that the recommended lifestyle modifications will prove feasible based on the adherence results ($p < 0.05$). Feasibility will be determined based on the individuals' willingness to listen to and apply the information provided. If the adherence rate is statistically significant, the process will be recommended to the facility for use for patients with risk factors for diabetes development.

Title: Fresh market tomato yield and quality as affected by potassium rates and sources.

Primary Author (and presenter): Cofer, Trevor, L

Additional Authors: Guertal, Beth; Pitts, Jim

Department: Crop, Soil, and Environmental Sciences

College/School: College of Agriculture

Description:

For many Alabama vegetable growers, fresh market tomatoes represent a significant source of income. Typically grown in a raised, plastic-mulch covered system, fertilizers are either delivered through the drip irrigation tape that lies under the plastic mulch, or by incorporation throughout the planting bed at the time of bed formation. High rates of potassium fertilizer are thought to be needed for tomato growth and to promote uniform ripening, and as such, growers often apply high rates at planting. However, there is little information for Alabama growers as to exact rates of K for best tomato yield, and there is no information as to specific K sources. Thus, the objective of this research was to examine rates and sources of K fertilizers for tomato growth, yield, and fruit quality. The one-year study was conducted at the Auburn University Chilton Research and Extension Center in Clanton, AL. The experiment design was a randomized complete block design of three replications with treatments of K rate (0, 60, 90, 120, 150 and 180 lb $K_2O A^{-1}$) and K-source (potassium chloride (KCl), potassium sulfate (K_2SO_4), potassium thiosulfate (KTS), and potassium magnesium sulfate (KMag)). Tomatoes that received K at high rates often had greater K in leaf tissue than those that were not fertilized with K. However, this did not translate to increased fruit yield, nor did it reduce the instances of incomplete ripening (yellow-shouldering) of the fruit. Neither K source nor K rate significantly affected fresh weight of tomato over the harvest period, although the plants showed a significant response to K rate with respect to height and stem diameter. Background soil test K was likely high enough to supply sufficient K for crop needs, and additional K was not needed. Such information could help AL farmers avoid unneeded application of K when it is not warranted.

Title: Competitiveness of *Amylostereum* spp. fungi against *Leptographium* spp. fungi

Primary Author: Cole, Andrea

Secondary Author(s): Nadel, Ryan Slippers, Bernard Eckhardt, Lori

Department: Forestry and Wildlife Sciences

College/ School: Agriculture; Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa

Description:

Amylostereum spp. are basidiomycetes white rot fungi of pine trees. Spores of these fungi are vectored by *Sirex* spp. woodwasps, who infect host trees by ovipositing eggs into the affected trees xylem. The invasive complex associated with *Sirex noctilio* and *Amylostereum areolatum* (native to Europe and Northern Africa) has been devastating to planted non-native pine forests in the Southern Hemisphere, but has not been problematic in North America where *S. noctilio* has also been introduced. While there is currently no evidence that *S. noctilio* is in the Southeastern United States, studies are being carried out to determine how its symbiont, *A. areolatum*, might interact with other fungi that are already present within the southern pine ecosystem. For this study two species of *Leptographium* were chosen, since they are commonly found in industrial pine stands in Alabama. Both are ascomycetous root pathogens that behave differently than *Amylostereum* spp., but would both also affect the overall tree vigor if inoculated into the same substrate. Isolates of *Amylostereum* spp. from around the world were plated on petri dishes with isolated of *Leptographium terebrantis* and *Leptographium procerum*. Growth rates were determined by measuring the leading edge of mycelia with a planimeter every other day for two weeks after inoculation. In most cases, *Leptographium* isolates outcompeted *Amylostereum* isolates, and in some cases completely overgrew them. This study suggests that *Amylostereum* spp. would likely not outcompete *Leptographium* spp. in a forest setting, although further studies need to be undertaken to see how the two fungi would compete *in situ*.

Title: Habitat segregation and population structure of coral reef sea anemones and symbiotic crustaceans

Primary Author (and presenter): Colombara, Alexandra, M.

Additional Authors: Quinn, David and Chadwick, Nanette, E.

Department: Biological Sciences

College/School: College of Sciences and Mathematics

Description:

Habitat partitioning enhances biodiversity, but is poorly understood for sea anemones and their associated crustaceans which function as centers of fish parasite cleaning networks. We quantified patterns of population structure and microhabitat use for 3 giant sea anemones (*Bartholomea annulata*, *Condylactis gigantea*, and *Stichodactyla helianthus*) and 10 associated crustaceans on coral reefs at Akumal Bay, Mexico. Populations of *C. gigantea* and *S. helianthus* significantly segregated habitat use in the bay. They exhibited exponential size distributions, indicating high recruitment and stable population structure. Crustaceans associated mainly with *S. helianthus*, significantly segregated their microhabitat use among 3 zones on the anemone body, and exhibited mostly exponential population size structure. We discovered a novel relationship between hermit crabs *Clibanarius tricolor* and *S. helianthus*, in which the crabs cluster around the anemone columns. Field manipulations revealed a surface coating on the crabs that protects them from being stung by the anemones. The patterns described here provide baseline information, against which to assess future changes for conservation management.

Title: Naturalistic pen-based data interaction

Primary Author: Cook, John S

Department: Computer Science and Software Engineering

College: Samuel Ginn College of Engineering

Description: The proliferation of affordable multi-touch devices in the last five years has brought the power of data visualization and interaction to the average consumer. However, development and integration of pen-based input via new "smart stylus" tools has not resulted in data visualization

applications that respond intelligently to markup, enhancing the naturalistic pen-and-paper interaction that these tools are designed to replicate. The aim of this research is to create a system that provides natural pen-based data visualization and manipulation techniques, and to evaluate it for feasibility and effectiveness against its touch-based and "Windows, Icons, Menus, Pointer" counterparts. I have developed a spreadsheet application for the Apple iPad Pro that recognizes the pen gestures which users would naturally use on a paper spreadsheet (such as circling, crossing out, highlighting, etc.) and maps them to their respective operations, as well as provides additional features typically offered by electronic spreadsheets (sorting, computation, etc.). I have designed a user study in which participants will complete a number of gestures in isolation, as well as carry out a sequence of data manipulation tasks using both my application and its leading competitor. The former task will provide data regarding the intuitiveness and usability of each naturalistic gesture, while the latter will provide the same insights regarding the application and interaction scheme as a whole. These tasks will be quantitatively assessed using auto-recorded time stamps, and a questionnaire will provide qualitative feedback

Title: Improving diabetic outcomes through a peer coaching telephone communication intervention in the primary care setting

Primary Author (and presenter): Crane, Adrienne B.

Additional Authors: Hamilton, Cam

Department: Nursing

Description:

There is strong evidence that utilizing telephone peer coaching for follow-up support can greatly improve long-term diabetes management including glycemic control and behavioral modification compliance. The purpose of this project was to evaluate the effects a peer coaching telephone communication intervention can have for the improvement of diabetic health outcomes, including diabetes knowledge, confidence of diabetes self-care practices, and glycemic control, for individuals with suboptimal glycemic control in the primary health care setting. The target population included adults (19-64 years) with type 2 diabetes and suboptimal glycemic control. Following informed consent, participants completed a pre-intervention questionnaire. Charts were reviewed to collect additional data. Participants were contacted by phone every two weeks using a scripted interview for interview consistency. There was a total of 3 phone interviews, the last to complete the post-intervention questionnaire. Descriptive statistics were used to describe the patient population, diabetes knowledge, confidence, and glucoses. The pre-post intervention findings were compared with paired t-tests. X consented to participate (% females), average age of X (sd) years. X% were identified with fair to poor diabetes knowledge and confidence prior to the intervention. X% had routine glucoses above 175mg/dl pre-intervention. X% were identified to have good to excellent diabetes knowledge and confidence post intervention. X% decreased their glucoses below 175mg/dl post-intervention. The mean diabetes knowledge, confidence, and glucose readings improved from pre-intervention (mean, sd) to post-intervention (mean, sd) significantly ($p < 0.05$). The utilization of a peer coaching telephone communication intervention for diabetics with suboptimal glycemic control can improve diabetic health outcomes in the primary care setting.

Title: Gender in leadership in non-profits: Female leadership deficit in nonprofit sector

Primary Author (and presenter): Crayton, Mac-Jane, M.

Department: Political Science

College/School: Liberal Arts

Description:

The nonprofit sector is an important aspect of the work force in the United States and as such, the role of gender is an integral aspect of the sector. Several pieces of literature indicate that female workers make up between 75- 80% of the nonprofit workforce (Preston and Sacks, 2010; Leete, 2006; McInnes 2013). However, very few leadership roles in the sector are allotted to women. The disproportionately low rate of female leaders in the nonprofit sector raises the need to discover why this gap exists in the sector, possibly propose a model that can diminish that gap and increase the number of female leaders in nonprofit organizations. This paper attempts to assess the literature on the role gender plays in nonprofit leadership. This paper explores various literature on the barriers to the rise of female executives in nonprofit sectors, and reviews the literatures on female leadership deficit in the nonprofit sector. Women in top roles in nonprofit organizations, such as an executive director or CEO, are often celebrated as beating the odds. Why is a female dominated industry led predominately by men? Why does the inequality gap still exist in the nonprofit sector? Do women have the same equal opportunity as men in leadership in the nonprofit sector? We have established that female leadership deficit exists in nonprofit sector, but the research question becomes, why? This paper attempts to assess the literature on the role gender plays in nonprofit leadership

Title: Immunostaining, analyzing, and encapsulating endothelial progenitor cells in order to determine appropriate microsphere parameters and blood vessel proliferation due to cell presence.

Primary Author (and presenter): Crowley, Anna C.

Additional Authors: Tian, Yuan; Dr. Winter, Randolph; Dr. Caldwell, Fred; Dr. Seeto, Wen Jun; Dr. Wooldridge, Anne; Dr. Lipke, Elizabeth

Department: Chemical Engineering

College/School: Auburn University

Description:

This study investigated the preparation of endothelial progenitor cell (EPC)-laden microspheres and their effectiveness for use in therapeutic cell delivery in vivo. The body increases blood flow to a wound to induce healing, but often, especially on equine distal limbs, the efficiency of blood flow needs improvement. Neovascularization at sites of injury could shorten healing times as well as improve function of healed tissues.

EPCs isolated from equine blood were expanded and then injected back into the horse. For transportation purposes, microfluidic systems, called microspheres, were developed to encapsulate EPCs. In regards to microsphere parameters, a spherical shape is advantageous for injection and requires a high level of consistency correlating to the syringe orifice's size required for injection and the shear stress created during microsphere production. The circularity and size of the microspheres were analyzed using ImageJ software, and the flow fractions and needle channel sizes were varied to compare the effects of area/size, aspect ratio, and minimum and maximum feret size. By adjusting the parameters of the microfluidic system (e.g. channel diameter, hydrogel flow rate), an optimum size and circularity was achieved. Following injection into the wound, wound and non-wound tissues were stained and analyzed to track blood vessel proliferation due to EPCs present in the tissue sample. Treated and non-treated wounds were compared against non-wounds in order to determine a ratio of blood vessels. The analytical results were compared using software called Visiopharm.

Throughout qualitative data collection and analysis, microsphere parameters have been optimized, and the effectiveness of EPC therapy in equine distal limb wounds has been investigated.

Title: Nicotine exposure enhances the neurotoxic effects in the cerebellum of a rodent model of fetal alcohol spectrum disorder

Primary Author (and presenter): Crump, Bailee-Ryan, Marie

Additional Authors: M. Morgan, D. Bhattacharya, M. Majrashi, E. Dunaway, J. Bloemer, S. Bhattacharya, S. Ramesh, M. Escobar, V. Suppiramaniam, M. Dhanasekaran

Department: Department of Biological Sciences, Department of Drug Discovery and Development

College/School: College and Science and Mathematics, Harrison School of Pharmacy

Description:

The purpose of this study is to evaluate the neurotoxic effects of nicotine exposure in a rodent model of fetal alcohol spectrum disorder (FASD). The cerebellum receives information from the sensory systems and plays an important role in motor control and learning. The cerebellum controls behavior, posture, balance, coordination, and speech. Alcohol is one of the most commonly abused and socially accepted psychoactive substances. Interestingly, nicotine is also consumed regularly during alcohol consumption. Alcohol consumption during pregnancy induces behavioral, biochemical, and neurochemical changes in the fetus resulting in cognitive and motor impairment.

We used a FASD rodent model and exposed rodents to nicotine using a subcutaneous-mini osmotic pump. We then assessed the neurotoxic effects in the cerebellum. We also studied the effects of nicotine and alcohol on various markers associated with oxidative stress, mitochondrial functions, and apoptosis.

Nicotine enhanced oxidative stress by significantly increasing the generation of reactive oxygen species and inducing lipid peroxidation in cerebellum. However, it had no significant effect on the mitochondrial functions. Furthermore, nicotine enhanced the activity of monoamine oxidase. Prenatal nicotine exposure significantly potentiates the neurotoxic effects of alcohol in the cerebellum.

Title: Screening methodologies for the discovery of targeted melanoma therapeutics

Primary Author (and presenter): Cullum, Richard, L.

Additional Authors: Senfeld, Jared; Piazza, John; Neel, Logan; Gupta, Ram; David, Allan; and Riese, David

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Gain-of-function mutations in the ErbB4 receptor tyrosine kinase have been found in a significant fraction of melanoma cell lines that are dependent on ErbB4 for proliferation. However, there is a scarcity of therapeutics for treating these ErbB4-dependent tumors. Consequently, we have developed high-throughput screening (HTS) assays to identify ErbB4 antagonists that may hold promise as targeted melanoma therapeutics. Our approach is based on the observation that the Q43L mutant of the ErbB4 agonist Neuregulin 2beta (NRG2b) functions as a partial agonist at ErbB4. NRG2b/Q43L stimulates ErbB4 tyrosine phosphorylation, fails to stimulate ErbB4-dependent cell proliferation, and competitively antagonizes agonist stimulation of ErbB4-dependent cell proliferation. Therefore, we have developed three HTS assays to identify ErbB4 partial agonists that function as antagonists. A phospho-ErbB4 sandwich ELISA assay identifies molecules that stimulate ErbB4 tyrosine phosphorylation with high sensitivity and fidelity ($Z' > 0.5$). IL3-independence assays in conjunction with MTT assays using a cell line that displays ErbB4-dependent cell proliferation distinguish between molecules that stimulate and fail to stimulate ErbB4-dependent proliferation ($Z' > 0.5$) and identify molecules that antagonize agonist stimulation of ErbB4-dependent proliferation. These assays have been used to identify small molecules that stimulate ErbB4 tyrosine phosphorylation and fail to stimulate ErbB4-dependent proliferation. Efforts to determine whether these hits function as ErbB4 antagonists are underway. ErbB4 partial

agonists that function as antagonists at ErbB4 may hold promise as targeted therapeutics for melanoma and other ErbB4-dependent tumors.

Title: Sleep as a mediator of racial disparities in cardiometabolic disease risk: The Coronary Artery Risk Development in Young Adults (CARDIA) Study

Primary Author (and presenter): Curtis, David, S.

Additional Authors: Fuller-Rowell, Thomas, E.

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Approximately half of the disparity in premature mortality between Black and White adults is due to greater hypertension, diabetes, and stroke risk. The current study tests sleep as a mediator of racial disparities in cardiometabolic (CMB) disease risk in adulthood. A total of 589 CARDIA Study members took part in a sleep sub-study (2003-2005) and had measured CMB risk over a ten-year period (2000-2011; mean age at baseline=40.1; 43.5% Black; 56.5% White; 42.1% male). Sleep efficiency (% of time in bed asleep) and total sleep time were assessed via actigraphy for six total nights in years 3-5. CMB risk was assessed at baseline and ten-year follow-up from seven biomarkers using recommended borderline high (coded as 1) and high (coded as 2) cutpoints: blood pressure, glucose, insulin resistance, waist circumference, triglycerides, HDL-C, and C-reactive protein. Scores were averaged across markers, ranging from 0 to 2 (a score of 1 indicates borderline high average). Using linear path models that adjusted for demographic controls, education, and income, sleep variables were tested as mediators of racial disparities in ten-year changes in CMB risk. Black adults obtained less efficient sleep and less total sleep than Whites (76.5% vs 84.3%; 5.6 vs. 6.4 hours), and Blacks had higher CMB risk at both periods (Mean at Y15: .75 vs. .55; Y25: .94 vs. .67) (p 's < .001). Some evidence for sleep as a mediator of racial disparities in increasing CMB risk was found—namely, 19% and 24% of the racial disparity in increasing CMB risk operated via sleep efficiency and sleep time. In models stratified by sex, however, we found stronger support for sleep efficiency as a mediator of CMB disparities between Black and White females, and for sleep time as a mediator among Black and White males. Differences in sleep likely contribute to greater CMB risk among Black adults as compared to Whites. Sleep may be an important intervention point to reduce racial health disparities.

Title: Dynamics of human capital accumulation, IPR policy, and growth

Primary Author (and presenter): D, Bharat

Additional Authors: Gilad, Sorek

Department: Economics

College/School: College of Liberal Arts

Description:

We study the effect of IPR (Intellectual Property Rights) policy on growth, in a closed overlapping-generations economy, which undergoes transitional development phase of human capital accumulation. We show that the growth-maximizing policy is stage-dependent: in the early development phase, during which innovation cost is high relative to worker productivity, weak IPR protection can expedite economic growth and may be necessary to escape long run stagnation. Weaker IPR protection erodes monopolistic deadweight loss and, thereby, increases aggregate output and saving. However, it also shifts investment away from R&D activity towards the formation of physical capital. We show that the former (positive) effect is dominant during the early development phase. However, as human capital is further accumulated

and labor productivity, correspondingly increases, economic growth is maximized with stronger IPR protection.

Title: Utilization of phone app technology to record log truck movements

Primary Author (and presenter): Daniel, Marissa “Jo”

Additional Authors: Gallagher, Tom and McDonald, Tim

Department: Forestry & Wildlife Sciences

College/School: Agriculture

Description:

Delays incurred by loggers hauling wood from the landing to the mill affect profitability and have the potential to make harvesting some areas unfeasible. Past studies were conducted to determine delay time a driver may have at the mill but very little research has been conducted analyzing the drivers wait time at the landing or the cause of delays a driver may encounter while driving from one location to another. In order to accurately gather information concerning delay times at the mill, the landing and during travel to and from each location a phone app was created that recorded driver location using GPS as well as allow the driver to input the reason for their delays, record their fuel stops, delivery scale tickets and load sheet numbers. The app provided multiple reasons for the driver to choose from for the delay which created a user-friendly program requiring a minimal amount of time. By directly asking the driver the reason for the delay at the exact moment it is occurring, we were able to gather accurate information in real time regarding delays and therefore better able to understand driver dilemmas. Preliminary research was conducted in various states to ensure its ability to work in various environments. Results indicated that turnaround times for drivers averaged approximately 40 minutes in the mill and 31 minutes on the landing. Further data was gathered in the state of Alabama through industry to analyze turnaround times for drivers on the landings and in the mills. A comparison between set-out trucking versus hot loading was also conducted in conjunction however results have not yet been determined for these studies.

Title: Airfoil analysis using smoothed particle hydrodynamics

Primary Author (and presenter): Stubbs, Daniel, C

Additional Authors:

Department: Department of Aerospace Engineering

College/School: Samuel Ginn College of Engineering

Description:

This project develops a method for simulating inflow-outflow type problems with smoothed particle hydrodynamics (SPH). This allows SPH to handle simulations such as the aerodynamic flow around solid bodies. SPH is a computational method for simulating fluid dynamics problems which utilizes a Lagrangian particle-based technique rather than the Eulerian volume-based technique used by traditional computational fluid dynamics (CFD) solvers. Because of this, SPH can remove the mesh generation process entirely, allowing it to handle complex geometries with relative ease. As such, it is of interest to develop a method for handling inflow-outflow within SPH to extend the capabilities of the method beyond the closed domain problems it has traditionally been used for. This study has developed a method which efficiently recycles the particles leaving the domain and reintroduces them into the inlet of the domain resetting the fluid properties as necessary to ensure a clean free-stream flow. Preliminary results show that the inflow-outflow method is working well, but the underlying SPH equations will require further investigation before they are able to predict the aerodynamic flow characteristics to the desired level of accuracy. The results demonstrate that SPH has real potential as an efficient and effective method for simulating inflow-outflow type problems.

Title: Expecting to teach enhances motor learning and information processing during practice

Primary Author (and presenter): Daou, Marcos

Additional Authors: Lohse, Keith and Miller, Matthew

Department: Kinesiology

College/School: Education

Description:

There is some evidence that people learn academic (declarative) information better when studying with the expectation of having to teach, but this has not been demonstrated for perceptual-motor skills, which also rely on declarative information but more heavily on procedural knowledge. To address this possibility, we conducted a series of three experiments wherein participants studied golf instructions and practiced putting with the expectation of having to teach another participant how to putt or the expectation of being tested on their putting. Learning was assessed with delayed posttests (1-day and/or 7-days later), wherein all participants were tested on their putting. The first experiment ($N = 56$) revealed expecting to teach enhanced motor learning, but did not elucidate the mechanisms underlying the effect. The second experiment ($N = 56$) replicated the first experiment's results and revealed expecting to teach increased information processing, as reflected by lengthened motor preparation time preceding practice putts. However, it was still unknown whether this increased motor preparation time *explained* the effect of expecting to teach on motor learning. In the third experiment ($N = 80$) we attempted to answer this question. Specifically, we limited motor preparation time preceding practice putts for half of the participants who were expecting to teach and half of the participants who were expecting to test, in order to see if the expecting to teach advantage for motor learning disappeared for participants whose motor preparation time was limited. Results revealed the effect of expecting to teach on motor learning was eliminated for both participants whose motor preparation time was limited *and* those participants whose motor preparation time was not. However, expecting to teach still yielded a motor learning benefit that was directionally consistent with the first two experiments.

Title: Stethoscope decontamination

Primary Author: Davis, Erin

Advisor: Hamilton, Cam

Department:

College/School: School of Nursing

Description:

Evidence-based guidelines recommend stethoscopes be cleaned after each use to reduce the number of potential bacteria that can be transferred from one patient to another. The purpose of this project was to implement a stethoscope decontamination policy in the emergency department by determining the current cleaning practices of healthcare providers and providing education of the best cleaning practices. Providers' adherence to these recommendations were assessed and measured.

Target population included all providers who utilize stethoscopes. Following informed consent, participants completed a questionnaire based on current stethoscope cleaning practices, were provided current evidence-based education, and re-surveyed two weeks later. Descriptive statistics were used to describe the participant population, effectiveness of education, and adherence to evidence-based guidelines. Comparisons were made between each type of provider to determine which would adhere best to the established guidelines.

X consented to participate. Average age of providers X (sd) yrs. X% were identified as the most likely to continue the current evidence-based practice guidelines and X% were least likely to continue adherence. X% felt that cleaning practices were important to patient safety and X% felt that cleaning guidelines were

not time efficient for the emergency department. Among those who agreed to the importance of cleaning practices the mean scores improved from (mean, sd) to (mean, sd) significantly ($p < 0.05$) Screening for a baseline of healthcare providers' attitudes towards current cleaning practices pre- and post-education is an important measure. Development and implementation of a stethoscope decontamination policy within the emergency department is a key aspect to provider and patient safety. Education of proper cleaning practices is detrimental to changing the attitudes of healthcare providers towards cleaning the stethoscope after each use.

Title: Drug delivery mechanism of sulfathiazole from polyurethane films

Primary Author (and presenter): Davis, Montoia, P

Additional Authors: Barde, Mehul, Rangari, Shivani, Auad, Maria, L

Department: Chemical Engineering

College/School: College of Engineering

Description:

Polyurethane urinary catheters are used in patients for extended periods of time. As a result of a catheter's location and prolonged use, the catheter is vulnerable to a biofilm composed of microorganisms such as *Escherichia coli* and *Candida spp*. A polymer that can prevent the development of this biofilm, without compromising the catheter, would be an ideal solution to this problem. The purpose of this experiment is to develop a polymer that releases an antimicrobial that can prevent the biofilm from forming.

Polyurethane was the material of choice for trials due to its established compatibility with patients.

Sulfathiazole also has a history as a treatment for various infections, including urinary tract infections.

Additionally, sulfathiazole is soluble in water, a necessity for testing drug release concentrations during testing.

Sample films were made by solvent casting. Sulfathiazole and polyurethane were dissolved in a solution of dimethylformamide and tetrahydrofuran, continuously stirred for 24 hours, poured into molds which were placed in an oven at 37°C for 24 hours. The dried films were released from the molds and stored in a desiccator. For the drug release study, a measured portion of the drug-loaded polymer film was immersed in distilled water at 37°C and continuously stirred for 24 hours. Hourly, a 5 mL aliquot was removed and tested with a spectrometer to measure absorbance at 270 nm. The concentrations of the aliquots were calculated from the absorbance values and the calibration curve made with standard aqueous solutions of sulfathiazole at various concentrations.

Drug-loaded polymer films at sulfathiazole concentrations of 0.3 wt/wt% and 1.5 wt/wt% were tested.

Both concentrations exhibited similar release rates and kinetic modeling, indicating sulfathiazole diffusion behaviour from polyurethane is independent of concentration. In conclusion, sulfathiazole is capable of diffusing out of polyurethane and can possibly prevent biofilm formation.

Title: Effects of exercise on dyslipidemia

Primary Author: Dean, Mollie, W.

Secondary Author: Ellison, Kathy Jo

College/ School: School of Nursing

Description:

There is strong evidence that low HDL cholesterol levels contribute to poor outcomes among dyslipidemic patients. Evidence-based guidelines recommend exercise as a means of improving HDL cholesterol levels. The purpose of this project was to implement individualized exercise programs for dyslipidemic patients based on evidence-based standards. Target population included adults (19 +) with

dyslipidemia in an internal medicine clinic. Following informed consent, participants completed an initial interview and received education on the topic. An individualized exercise plan was created according evidence-based guidelines. The physician reviewed the plan to ensure the patient was cleared to participate. A follow up appointment at 4 weeks was made to assess HDL cholesterol level, program adherence, and education retention. Descriptive statistics were used to describe the patient population, exercise regimen, and patient adherence. The pre-post HDL cholesterol levels and days per week that the patients exercised were compared with paired t-tests. Retention of education was assessed qualitatively. X consented to participate (% females, % males), average age of X (sd) yrs, average BMI of X (sd), Patient ethnicity was (% Cauc, % AA, % other). X % adhered to their exercise program, X% retained primary points from the education. Among those who adhered to their program, the mean HDL cholesterol levels and number of days per week of exercise improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). The implementation of an education program and exercise plan in dyslipidemic patients according to evidence based guidelines led to improved outcomes in the realms of education, exercise program adherence, and HDL cholesterol levels. This program was successfully implemented in the internal medicine setting and further implementation of the project is warranted.

Title: Effects of stress current in Josephson Junction devices

Primary Author (and presenter): Denton, Matthew, T

Additional Authors: 2nd Goteti, Uday; 3rd Michael, Hamilton; 4th Ellis, Charles; 5th Sellers, John

Department: Department of Electrical and Computer Engineering

College/School: Auburn University, Samuel Ginn College of Engineering

Description:

Josephson Junction (JJ) devices enable the operation of rapid single flux quantum (RSFQ) computing. RSFQ computing operates using superconducting current, where a superconducting current passed through a JJ induces a magnetic flux. Multiple JJs can be combined to perform logical functions with this flux, and these logical operations comprise the essence of a computer. RSFQ computers are orders of magnitudes faster than classical computers, but they need to be thoroughly studied before being implemented. While the rudimentary operation of JJs has been studied extensively, it is important to study the reliability of JJs before they can be integrated into RSFQ computers suitable for productive use. One such reliability test is a stress test, where the effect of very large amounts of current through the device is studied. The goal of the study is to model the internal breakdown of JJs at high current, based on experimental data.

The effect of room temperature dc (direct current) stress current on Josephson Junction devices was observed. Each device was stressed at room temperature by consecutively applying current ramps with increasing amplitude. The maximum current applied by each ramp varied from five times the critical current, to 600 times the critical current. As the current ramps increased in magnitude, the junctions were found to break down permanently and form internal superconducting quantum point contacts (SQPCs). The SQPCs form due to the internal electrical field induced by the voltage drop across the device in operation, where a larger voltage drop creates more SQPCs. This is expected, and was verified by measuring the conductance of the devices after each stress. The devices were found to have increasing conductance as stress current magnitudes increased, which proves the subsequent formation of SQPCs. Eventually, enough SQPCs formed to break the device and render its logical functions and superconducting properties useless.

Title: *Scutellaria lateriflora* protects against endogenous neurotoxin-induced neurotoxicity

Authors: D. Desai, M. Lohani, M. Ahuja, M. Buabeid, D. Shannon, M. Majrashi, S. Ramesh, E. Fahoury, D. Schwartz, B. W Kemppainen, M. Dhanasekaran.

Department: Department of drug discovery and development

College/School: Auburn University, Auburn, AL

Abstract:

Investigate the neuroprotective properties and mechanisms of *Scutellaria lateriflora*. *Scutellaria lateriflora* (American skullcap), a native plant of North America, has been used by Americans and Europeans to treat neuropsychological disorders. However, the neuroprotective mechanisms of *Scutellaria lateriflora* are not well elucidated. The antioxidant and anti-apoptotic potential of *Scutellaria lateriflora* were evaluated in hydrogen peroxide-induced oxidative stress in differentiated hippocampal H19-7 cells. Furthermore, the effect of *Scutellaria lateriflora* on growth factor and glutamatergic receptor expression was also measured. *Scutellaria lateriflora* extract suppressed caspase-3 expression and scavenged the reactive oxygen species induced by endogenous neurotoxin, hydrogen peroxide. Decreased reactive oxygen species and caspase-3 activity is strongly correlated with the increased cell viability. Additionally, *Scutellaria lateriflora* increased brain-derived neurotrophic factor (BDNF) expression but did not affect CREB phosphorylation and N-methyl-D-aspartate (NR2A & NR2B) receptors expression. The findings indicate that *Scutellaria lateriflora* exhibit neuroprotection by increasing nerve growth factor expression, exhibiting antioxidant and anti-apoptotic effects.

Title: Induced systemic resistance of *Pinus taeda* to *Leptographium terebrantis* and *Grosmannia huntii* by plant growth-promoting rhizobacteria

Primary Author (and Presenter): Devkota, Pratima

Additional Authors: Kloepper, Joseph and Eckhardt, Lori

Department: School of Forestry and Wildlife Sciences

College/ School: Agriculture

Description:

Plant growth-promoting rhizobacteria (PGPR) have been shown to induce the systemic resistance of plant to pathogen infection along with growth promotion. The aim of this study was to understand whether or not PGPR strains can induce systemic resistance of *P. taeda* L. to *Leptographium terebrantis* and *Grosmannia huntii*. Plant growth-promoting rhizobacteria; *Bacillus pumilus* strains (INR7 and SE-34) and *Serratia marcescens* (90-166) and control with no PGPR were included in study. About 100 ml of sterile distilled water with 10^8 colony forming units of these bacteria per milliliter were inoculated to *P. taeda* seedlings by soil drenching. Two weeks following application of rhizobacteria, *L. terebrantis* and *G. huntii* were artificially inoculated. Then dark necrotic tissue around fungal inoculation and seedling biomass were measured eight weeks after the inoculation of fungi. First replicate of study showed that the necrotic tissue was smaller and plant biomass was higher in the seedlings that received *Bacillus pumilus* INR7. Preliminary results suggest that the studied PGPR strains have ability to promote *P. taeda* growth and induce systemic resistance to ophiostomatoid fungi.

Title: Introducing mobile technology to adults with type II diabetic for self-management

Primary Author (and presenter): Dixon, Kenyatta, S.

Additional Authors: Ellison, Kathy J.

College/School: School of Nursing

Description:

Diabetes, especially Type 2, has become one of the most common chronic and deadly diseases in the United States, ranking seventh in deaths. The project's purpose is to encourage and motivate adults with Type 2 Diabetes to become better self-managers of their disease by increasing medication adherence and glycemic control with the free mobile technology. Recent evidence demonstrates using mobile applications improves self-management and clinical outcomes in patients with type 2 diabetes. The

project's participants were adults, 18 and older, with Type 2 Diabetes for over 6 months. Following participant agreement, they completed Diabetes Medication Adherence, the self-management mobile technology Questionnaire, and the baseline fasting glucose and weight. The clinicians reviewed results to guide education on the mobile application, Glucose Buddy. The participants tracked their glucose, weight, diet and physical activity daily for five weeks using the app. Bi-weekly follow ups were made to assess any concerns participants had with the application. At five weeks the fasting glucose, weight, and medication adherence were rechecked. The pre-and post-data were compared with pair t-tests. A total of X agreed to participate (% female) with an average age of X (sd), ethnicity of X% (African American, Asian, Caucasian, Latino, other), and average X years diagnosed with diabetes. X % increased medication adherence, X % increased glycemic control, and X % increased medication adherence. Follow ups indicated that X% adhered to using the Glucose Buddy App. Baseline glucose, weight, and medication adherence significantly improved pre to post project ($p < 0.05$). Glucose Buddy improved medication adherence and glycemic control in adults with Type II diabetes allowing participants to better self-manage their diabetes and prevent risk of complications. The usage of the Glucose Buddy App is achievable at the clinic and further implementation of the project is warranted.

Title: Determination of solute permeabilities and membrane selectivities through copolymer membranes via *in situ* ATR FTIR spectroscopy

Primary Author (and presenter): Dobyms, Breanna, M.

Additional Authors: Beckingham, Bryan, S.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Polymeric membranes are used for a large range of applications, from separations in industry to biomedical applications to the creation of fuel cells. The permeability and selectivity of solutes are very important when choosing a material for a particular membrane application. In this study, we analyze the transport of neutral, aqueous solutions through neutral polymer-based membranes made with varying compositions of poly(allyl glycidyl ether) (PAGE) and poly(propylene oxide) (PPO). Membranes are fabricated from copolymers synthesized using potassium alkoxide initiated anionic ring opening polymerization. By varying molar compositions, the side-chain functionalities are tuned due to the pendent allyl group on PAGE which also serves to allow click-chemistries post-polymerization modification. The copolymer membranes are fully hydrated and placed in a custom-built diffusion cell outfitted with an *in situ* Attenuated-Total-Reflectance Fourier Transform Infrared spectroscopy probe. Solute permeabilities of acetone, isopropanol, and methanol through the membranes are reported as well as calculated binary selectivities. Finally, multicomponent transport experiments are conducted and compared to the single component permeabilities and selectivities.

Title: Metabolic engineering of Bacillus and Clostridium for 2-butanol production

Primary Author (and presenter): Dong, Sheng

Additional Authors: Feng, Jun and Yi, Wang

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

It is well received that the consumption of fossil fuels brings about severe environmental problems including air pollution and greenhouse gas emission. Meanwhile, the conservation of fossil fuels is exhausting due to the over-exploitation. To solve these problems, the development of biofuels from renewable sources is considered as a promising strategy. As a valuable fuel source, biobutanol (the four-C

alcohol with four isomers) produced from renewable carbon sources has several advantages over bioethanol, which has already been commercialized as a gasoline blend, such as higher heating value and lower volatility. Compared to n-butanol or isobutanol which has either natural microbial production pathways or well developed metabolically engineered pathways, the biological production of 2-butanol is less reported. However, 2-butanol is much less toxic to the microbial cells when compared to n-butanol or isobutanol and thus has a great potential to achieve high level of production through microbial fermentation. In this study, we attempt to achieve 2-butanol production through metabolic engineering on *Bacillus subtilis* 168 and *Clostridium acetobutylicum* ATCC 824, both of which can naturally produce acetoin, the important precursor for 2-butanol production. To construct the pathway for 2-butanol synthesis, butanediol dehydrogenase from *Klebsiella pneumoniae* and diol dehydratase from *Lactobacillus brevis* or *Clostridium pasteurianum* have been overexpressed in the hosts. These two enzymes can convert acetoin to meso-2,3-butanediol, and finally to 2-butanol through several metabolic reactions. This study will lay the foundation for achieving high efficient 2-butanol production from low-value renewable carbon sources, and pave the way for developing a potentially enabling bioprocess for bioenergy production in support of the bioeconomy.

Title: Enhancing lake inflow forecasts in the Alabama-Coosa-Tallapoosa (ACT) River Basin using the North American multi-model ensemble

Primary Author: Duan, Yanan

Secondary Authors: Tian, Di

Department: Crop, Soil and Environmental Sciences

College: Agriculture

Description:

Skillful lake inflow forecasts based on climate information are essential for water resources planning and management in a river basin, in particularly during extreme years. In this study, monthly inflow forecasts for reservoir systems in the Alabama-Coosa-Tallapoosa River Basin (ACT) were developed based on the North American Multi-Model Ensemble (NMME) seasonal climate forecast system. We employ NMME monthly precipitation, temperature, and sea surface temperature (SST) forecasts as predictors to develop multiple linear regression models, artificial neural network models, and Vine Copula models for forecasting lake inflows. The NMME precipitation and temperature forecasts are downscaled to each inflow location. The SST regions with significant correlations with lake inflows are identified as predictors for those three types of models. Taking long-term predictor different weights into consideration, Kalman filter and wavelet transformation methods will play a role in weights category. The models are constructed using each NMME forecast member or ensemble of all forecast members to produce probabilistic ensemble inflow forecasts for each month. Rank Probabilistic Skill Score are used to evaluate probabilistic inflow forecasts in a cross-validation manner. The forecast skill for those three types of models during all years and extreme years are compared with each other. The role of SST in inflow forecasts is also investigated. Bias estimation and correction will be spread out based on real-time streamflow observation and stimulation values. Preprocessing in further research will be revolved around bias elimination and regional adaptation to improve inflow forecast effects on other areas with different under-laying surface. We expect that the NMME will demonstrate promising ability that can be translated into operational inflow forecasts through statistical models between the NMME forecasts and local observations.

Title: Cardiovascular disease: Risk factor reduction and prevention in women

Primary author (and presenter): Duke, Morgan P.

Department: School Of Nursing

College/School: Auburn University of Montgomery

Description:

Cardiovascular disease (CVD) remains a primary threat to women's health, but women may lack the educational resources needed to successfully engage in risk factor reduction. Providing educational resources through counseling and printed materials may increase their awareness of how to prevent CVD. The purpose of this project is to determine if early identification of risk factors of CVD, along with establishing baseline knowledge of risk, improves risk factor modification in women at risk. The target population included females (25-75 yrs), with or without identified cardiac risk, in a cardiology office setting. Following literature recommendations, female patients were provided with a Coronary Heart Disease (CHD) Knowledge test to assess baseline knowledge of CVD, followed by an educational briefing and take home pamphlet, and an identical posttest questionnaire. All willing participants completed the pretest questionnaire and received education, along with take-home pamphlet, within one month of the project. Patients completed a follow-up questionnaire 2-4 weeks after the single education session, and returned via mail. Participants received a follow up telephone call after completion of the follow-up questionnaire to assess for improved knowledge of CVD, associated risk factors, and modifiable risk factors such as increased physical activity. The pre-post CHD knowledge tool responses were compared with paired t-tests. X consented to participate, mean age of X (sd) yrs. Participants' scores improved from pre- (mean, sd) to post-test (mean, sd) questionnaires. Follow up indicated an X% increase in the mean level of physical activity from pre- (mean) to post-test (mean). Establishing baseline knowledge along with providing education on CVD and the importance of risk factor reduction lead to improved knowledge on CVD and increased physical activity among females at risk at this cardiology office setting. Further implementation of the project is warranted.

Title: Confluence

Primary Author (and presenter): Jenny Leigh Du Puis

Department: Department of Consumer and Design Science

College/School: College of Human Sciences

Contact: jennyleighdupuis@gmail.com

Description:

The burgeoning field of wearable technology has only just begun to demonstrate serious aesthetic consideration into garments, as primary focus has thus far been on the basics of incorporating technological features into clothing and accessories, allowing the design and "fashion" of a garment or ensemble to fall by the wayside. The inspiration for this particular piece came from a desire to explore methods of incorporating wearable light emitting diode (LED) technology into garments without sacrificing aesthetics for function. Drawing on my professional experience as a circus and theatrical costumer, as well as my training in traditional fashion design and construction methods, I devised a method to successfully incorporate wearable LED technology into a wearable art garment in an aesthetically pleasing way. This has been accomplished by combining LEDs into traditional couture embellishment techniques such as embroidery, beading, and ribbon work. Two separate circuits govern the LEDs, allowing for direct lighting (the LEDs embedded within the embellishment) or indirect lighting (the LEDs hiding within pleating and collar/cuff detailing so as to illuminate the embellishment). Lighting (and, indeed, dramatic presentation) is controlled by the wearer via hidden, easily-accessible switches within the garment.

Title: Study of soil microbial biomass and soil moisture in loblolly pine stand

Primary Author (and presenter): Duwadi, Shrijana

Additional Authors: Carter, Emily; Nadel, Ryan; Sword Sayer, Mary; Feng, Yucheng; and Eckhardt, Lori

Department: Forest Health
College/School: School of Forestry and Wildlife Sciences

Description:

Loblolly pine is the most widely distributed native planted tree in the south-eastern United States. Many studies have suggested that limited soil nitrogen (N) level and drought can contribute to pine decline. The objective of our study was to access microbial biomass carbon to nitrogen ratio (MB-C: N ratio) and soil C: N ratio to determine the decomposition rate of organic matter that results in either the release of N through mineralization or its immobilization. A study was carried out for four consecutive seasons to inspect the seasonal variations of microbial biomass (MB) and soil moisture content (SMC) at the study site located in Eufaula, Alabama, United States. We collected the soil samples in the winter, spring, summer and the fall from fifteen different plots starting from January 2016. After sieving the collected soil samples with 2 mm mesh sieve, microbial biomass carbon (MB-C) and microbial biomass nitrogen (MB-N) at the depth of 0-10 cm were determined by soil fumigation with alcohol-free chloroform (CHCl₃) and extraction with 0.5 molar Potassium Sulfate (K₂SO₄). SMC was determined by keeping the soil samples in the oven at 105°C for 72 hours to get dry weight. We recorded the maximum of 156.427 mg/L MB-C in the spring and the minimum of 18.689 mg/L in the fall; the corresponding MB-N being 14.896 mg/L and 1.778 mg/L in the summer and the fall respectively. There was a significant difference between the MB-C: N ratio and the soil C: N ratio measured during different sampling seasons. In every season, soil moisture in each plot was observed to be lower than the previous season. A maximum SMC of 0.536 w/w and a minimum of 0.008 w/w were recorded in the winter and the fall respectively. MB-C: N ratio wasn't affected by SMC while soil C: N ratio was affected significantly by SMC. Average soil C: N ratio was observed to be less than 24:1, which represents that the plots are undergoing N mineralization and enough N is available for plant uptake.

Title: Biological pathogen of *Heterodera glycines*, *Rotylenchulus reniformis*, and *Meloidogyne incognita*

Primary Author (and presenter): Dyer, David R.

Secondary Authors: Xiang, Ni and Lawrence, Kathy

Department: Entomology and Plant Pathology

College/ School: Agriculture

Description:

Heterodera glycines and *Rotylenchulus reniformis* cultures in our greenhouse have a fungus colonizing the body of the nematodes juveniles. Sporangia form inside the nematodes bodies producing zoospores. We have observed the sporangia forming germination tubes to release the zoospores outside the cuticle of the nematodes. The morphological characteristics indicated that this fungus is a *Catenaria* spp. The objectives of this study were to determine the best isolation medium, the optimum fungal growth temperature, and define the infection rates on the three nematodes. For the first objective an individual *H. glycines* or *R. reniformis* vermiform nematode colonized with *Catenaria* spp. was placed on either 4% BEA (Beef Extract Agar), PDA (Potato Dextrose Agar), PCA (Potato Carrot Agar), OA (Oatmeal Agar), or CMA (Corn Meal Agar) and allowed to grow for 7 days and assessed for fungal growth. To accomplish the second objective isolates of the *Catenaria* spp. were transferred to new 4% BEA plates and incubated at temperatures of 10, 20, 25, 30, 35, and 40°C for 15 days. For the final objective *H. glycines* and *M. incognita* second stage juveniles (J2) and eggs and *R. reniformis* vermiform life stages and eggs, both live and dead were placed in different wells of the 96-well plates. One infective nematode was added to each well to observe the infection rates over a 20-day period.

Title: Effects of ‘green’ stimuli on neurocognitive function: An ERP study

Primary Author (and presenter): Dyke, Ford, B.

Additional Authors: Rhoads, Jence, A., O’Neil, Jennifer, P., and Miller, Matthew, W.

Department: School of Kinesiology

College/School: College of Education

Description:

Attention refers to the allocation of limited neural resources to stimuli. Attention is bifurcated into two characteristically different constructs: involuntary attention and voluntary (directed) attention. Involuntary attention involves the automatic allocation of neural resources to stimuli in a stimulus-driven manner. Conversely, directed attention involves the deliberate allocation of neural resources to stimuli in a goal-driven manner. Directed attention is a limited cognitive resource, susceptible to fatigue. Thus, it is important to explore means by which to facilitate recovery from directed attention fatigue. Attention Restoration Theory (ART) has been proposed as a potential approach. The theory postulates directed attention is likely to replenish if permitted to ‘rest’. One way to allow directed attention to rest is to promote the use of involuntary attention. Previous research suggests viewing images of natural environments captures involuntary attention while simultaneously limiting the need for directed attention. However, directed attention restoration has only been measured at the behavioral level (e.g., improvements on task performance). Therefore, the purpose of this study was to quantify directed attention restoration at the neuronal level, as indexed by electroencephalography (EEG). EEG was recorded while participants completed the Sustained Attention to Response Task (SART). Subsequently, participants assigned to either Restorative or Non-restorative treatment groups viewed images of greenspace or urbanspace, respectively. Post-treatment procedures were identical to pre-treatment procedures. Contrary to evidence in support of ART, results did not reach conventional levels of statistical significance ($ps > .05$). Specifically, EEG data derived from the aforementioned treatment groups did not yield significant differences. Additionally, unreliable outcomes between post-treatment SART performances were discovered. Results did not support ART.

Title: Development of a rainwater harvesting model for broiler farms to estimate on-farm storage needs

Primary Author (and presenter): Edge, Carson, M.

Additional Authors: Davis, Jeremiah; Purswell, Joseph; Batchelor, William; and Simpson, Eugene

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Access to water is critical for poultry production and rainwater harvesting (RWH) may reduce reliance on low-yield and poor water quality wells or municipal water supplies to supplement water consumption and offset rising water costs. Current uses of RWH have been primarily focused on reducing stormwater runoff in urban areas and providing sources of potable and non-potable water to communities around the world. The objective of this research was to develop a RWH model to estimate the long-term cost and benefits of using stored water for a range of storage capacities in 10 different locations across the southeastern United States. Daily bird water consumption was estimated using industry feed intake performance data for multiple genetic strains of broilers. NOAA weather data was used to estimate both harvested rainfall and evaporative cooling water consumption. Estimates of daily water used from RWH and water purchased from other sources were calculated over a 10-year period for storage capacities ranging from 189 m³ (50,000 gal) to 1,136 m³ (300,000 gal) in increments of 95 m³ (25,000 gal). Total water consumption was split into two categories: storage usage and municipal usage. Model results suggest there are positive economic benefits for RWH systems, but there may be limited benefit in excessively large storage capacity, which may limit economic feasibility of RWH systems.

Title: Cognitive and motor abilities in preschool children from low socioeconomic backgrounds
Primary Co-Authors (and presenters): Edwards, Madison A. and Montagner Sassi, Julia
Additional Authors: Johnson, Jerraco; Wadsworth, Danielle; Rudisill, Mary; Pangelinan, Melissa
Department: Kinesiology
College/School: Education

Description:

Many studies have suggested that changes in motor abilities lead to changes in cognition including executive function (Diamond, 2000; Kantomma et al., 2013; Pangelinan et al., 2011; Piek et al., 2008). Several studies have linked poverty and neglect with lower cognitive abilities and learning and academic performance (Suor, Jennifer et al., 2015; Loughan, Ashlee et al., 2012; Berger, Lawrence M., 2009). This study examines changes in cognitive function in low-income pre-school children (i.e., Head Start) resulting from a motor skill intervention taking place this semester. The Head Start program combines parent involvement, health, educational and social services to assist children between the ages of 3 to 5 years old from low income families. The NIH Toolbox Cognitive Battery and Test of Gross Motor Development (TGMD) were administered before the 8-week bi-weekly motor skill intervention, where the children participate in a mastery motivational climate with three different conditions. One condition emphasizes motor skill instruction, another focuses on physical activity and fitness, while the third condition consists of a combination of both. A fourth condition, the control group, only participates in free play. To our knowledge, the majority of studies have examined improvements in motor skill or physical outcomes (e.g., body composition or fitness) resulting from motor skill interventions (Burt et al., 2007; Hayakawa et al., 2011; MacDonald et al., 2012; Ulrich et al., 2011). We will present preliminary results from the baseline assessment to examine the relationship between motor skill ability and cognitive function. Thus, this study will be the first to examine the impact of a motor skill intervention on cognitive function in a high-risk group.

Title: Improved protection against infectious bronchitis virus by including S2 ectodomain in subunit vaccine

Primary Author (and presenter): Eldemery, Fatma, E.
Additional Authors: Joiner, Kellye; Toro, Haroldo; and van Santen, Vicky
Department: Pathobiology
College/School: Veterinary Medicine

Description:

Infectious bronchitis virus (IBV) is an important coronavirus of chickens causing great economic impact worldwide. IBV quickly evolves by point mutations, recombination, and selection processes that result in continuous emergence of new serotypes, which prevents effective vaccination. Thus, new safe and effective vaccines are required. The spike (S) protein is the most variable protein of IBV and the major inducer of neutralizing antibodies. While the S1 subunit mediates viral attachment to host cells, the S2 subunit, which is more conserved among IBV strains, is responsible for membrane fusion. Based on our previous results showing increased binding to chicken tissues of S1+S2 ectodomain compared to S1 alone, we hypothesized that immunization with S1+S2 ectodomain protein confers more effective protection against challenge than immunization with S1 protein alone. We produced IBV Arkansas-type (Ark) strep-tagged soluble trimeric recombinant S1 and S1+S2 proteins from codon-optimized constructs in HEK293T cells. Specific-pathogen-free chickens in groups A and B were primed at 12 days of age with S1 or S1+S2 protein emulsified in Seppic Montanide™ ISA 71 VG adjuvant respectively, then boosted 21 days later. Groups C and D were unimmunized (adjuvant only)/challenged and

unimmunized/unchallenged control groups. Chickens in groups A, B and C were challenged with virulent Ark IBV 21 days after boost. Chickens immunized with recombinant S1+S2 protein showed statistically significantly reduced viral loads and tracheal mucosal thickness, lymphocyte infiltration, deciliation and necrosis 5 days post-challenge compared to chickens immunized with recombinant S1 protein. These results indicate that recombinant S1+S2 ectodomain protein confers better protection against challenge than S1 protein alone, suggesting that the S2 domain has an important role in inducing protective immunity. Thus, including the S2 domain with S1 might be promising for better subunit vaccine strategies.

Title: Encapsulation of patient-derived pluripotent stem cells to study congenital heart disease

Primary Author (and presenter): Ellis, Morgan, E.

Additional Authors: Lipke, Elizabeth

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Heart disease is the leading cause of death in America. Mechanisms for studying arrhythmias in the heart are limited because of the inability to perform experiments on native human heart tissue. However, with advancements in regenerative medicine and the ability to reprogram somatic cells into human induced pluripotent stem cells (hiPSCs), human cardiac tissue models are progressing towards mimicking native physiological function. Building on recent advancements in our research group, we are now able to construct 3D developing human engineered cardiac tissues (3D-dhECTs). Here we examine the ability to extend our platform to create 3D-dhECTs with hiPSCs derived from patients with genetically induced congenital heart disease, specifically Timothy Syndrome (TS), which results in long QT syndrome. HiPSCs were encapsulated in polyethylene glycol-fibrinogen and cultured per the differentiation protocol. Tissues were imaged using phase contrast and fluorescent imaging to measure the tissue area growth. Upon onset of contraction, 10X videos were taken and analyzed using motion tracking software in MATLAB to determine the frequency and velocity of contraction. At late time points, tissues were stained for cardiac markers to visualize sarcomere alignment and gap junctions. Initial TS encapsulations show differences between the control and TS 3D-dhECTs. Onset of spontaneous contraction occurred on Day 9, two days later than the control tissues. The control tissues appeared to become more organized and exhibit synchronous contraction sooner than the TS tissues. The frequency of contraction for the control 3D-dhECTs are higher than that of the TS 3D-dhECTs. This research aims to establish that TS cell lines can be used to model congenital heart disease. With this new 3D human developing cardiac tissue model, further studies can be performed to study various genetic heart diseases and be implemented as a transformative platform for patient and disease-specific drug testing.

Title: In vitro measurements of friction of intact equine articular cartilage against various surfaces

Primary Author (and presenter): Escaro, Sarah, E.

Additional Authors: Hayden, Lyndsey; Willhelm, Gabby; Wilhite, Dewey, R.; Jackson, Robert, L.; and Hanson, Reid

Departments: Clinical Sciences; Animal Science; Mechanical Engineering

College/School: Veterinary Medicine

Description:

Articular cartilage (AC) is one of the main components of a synovial joint that allows both static and dynamic movement to occur in a low friction environment. Specifically, equine AC of both the carpus and stifle joint undergo a cyclical loading motion, which predisposes these joints to osteoarthritis. The

goal of this study was to collect and analyze data for cartilage friction testing in two different equine joints – the carpus and stifle – in hopes to gain a better understanding of natural joint lubrication and the development of pathology in diseased joints. Testing determined the coefficient of friction (COF) of a migrating contact area of various surfaces that was brought into contact with the fixated articular cartilage of either the distal medial radius or the medial femoral condyle. The migrating contact areas used consisted of a custom fixated glass or metal sphere as well as the articular cartilage of the second carpal bone and the lateral femoral condyle submerged in a phosphate buffered saline solution. This method was chosen because it more closely resembles physiological conditions of synovial joints in vivo. Tests were conducted over a 5 minute period as the migrating contact area tracked horizontally along a predetermined course at a set speed. All three migrating surface areas – cartilage, glass, and metal – were tested against opposing carpal or stifle cartilage, respectively, at load forces of 5N and 10N. Significant differences found between load forces and material types in the cartilage-on-cartilage model found in this study can be used to further model studies on joint lubrication and friction that will help clinicians move toward new advances in veterinary orthopedics with future research.

Title: Military families and exposure to domestic violence: An exploratory analysis

Primary Author (and presenter): Evans, Ania

Additional Authors: Mersereau, Bailey; Hlavaty, Kathleen; and Haselschwerdt, Megan, L.

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Exposure to domestic violence (DV) is a pressing public health concern as an estimated 7 to 15.5 million youth are exposed to DV each year and DV exposure is associated with a variety of maladaptive outcomes. Research suggests that active duty military men perpetrate physical DV at a higher rate compared to civilian men, yet, to our knowledge, there are no studies that examine the DV exposure experiences of youth in military families. Furthermore, both the adult military DV literature and youth exposure literature focuses largely on frequency and severity of physical violence, neglecting to examine instances of coercive controlling violence (CCV: physical violence occurring in the context of non-physical abuse tactics aimed at controlling one's partner) in military families. The purpose of this study is to compare DV exposure experiences of young adults who have fathers in the military and civilian fathers. The sample ($n=91$; 71% female) was part of a larger mixed methods study focused on the experiences of young adults exposed to father-perpetrated DV. Data were collected using an online survey. Almost a quarter of the sample has fathers in the military ($n=22$; 24% of sample). In contrast to the existing literature, preliminary findings suggest that there is no significant difference between military and non-military families in exposure to emotional abuse, $t(88) = -1.59, p = ns$, coercive control, $t(55) = -1.59, p = ns$, frequency and severity of violence, $t(87) = .96, p = ns$, or CCV, $t(39) = -.98, p = ns$. This poster presentation will also address differences in exposure experiences of military children by race and other demographic factors. It is possible that exposure experiences differ within military families for example, CCV may manifest differently in military families. Future research should explore if a new measure is needed to capture CCV in military families.

Title: Anti-inflammatory and immunomodulatory activities of *Scutellaria lateriflora*

Authors: Fahoury, Edmund

Additional Authors: M. Lohani, M. Rajpoot, M. Govindarajulu, M. Majrashi, S. Ramesh, M.A. Buabeid, M. Patel, D. Shannon, F. W. van Ginkel, D. Schwartz, V. Suppiramaniam, B.W. Kempainen, M. Dhanasekaran;

Department: Drug Discovery and Development; Auburn University, Auburn, AL

Description:

Pro-inflammatory cytokines stimulate both innate and adaptive mechanisms by activating neutrophils, macrophages and lymphocytes. However, excessive inflammation adversely affects overall health and cause many of the recognized inflammatory diseases worldwide. *Scutellaria lateriflora* is a plant native to North America and contains higher concentrations of chemically active flavonoids than other commonly used species of the plant of genus *Scutellaria*. To date very limited research studies have been done to measure the pharmacological activities of *Scutellaria lateriflora*. The purpose of this study was to determine the immunomodulatory and anti-inflammatory properties of *Scutellaria lateriflora*. Experiments were designed to measure the effects of an alcoholic extract of *Scutellaria lateriflora* on cyclooxygenase-1(COX-1), cyclooxygenase-2 (COX-2), Lipoxygenase (15-LOX) enzyme activities, and immunomodulating T lymphocyte activation and major histocompatibility complex class-II (MHC-II) expression in bovine monocyte-derived dendritic cells (MoDCs). *Scutellaria lateriflora* inhibited inflammatory COX-1, COX-2 and 15 LOX activities but did not affect T cell proliferation, MHC-II expression on MoDCs and pro-inflammatory cytokines production by T cells. Our results indicate anti-inflammatory activities of SLE and therefore potential treatment for various inflammation driven diseases.

Title: The use of honey-impregnated dressings in the treatment of chronic wounds

Primary Author: Faison, Sarah, J.

Additional Authors: Hamilton, Cam

Department: School of Nursing

College/School: Auburn University at Montgomery

Description:

There is strong clinical evidence that the use of honey impregnated dressings in the treatment of chronic wounds leads to faster healing with less infection. The purpose of this project was to compare the effectiveness of honey impregnated dressings with the current practice of using Silvadene cream in the treatment of chronic wounds. The target audience included adults (25-75 yrs.) with chronic wounds who presented for treatment at Mercy Medical Clinic. Following informed consent, participants completed a questionnaire about their overall medical history as well as their wound history. The physician then completed the Bates-Jensen Wound assessment tool to stage the wound. The patient was given education about wound care and received either Medihoney, a medical-grade honey, or Silvadene to dress the wound. Patient's wound was reassessed at subsequent visits using the Bates-Jensen tool and both qualitative and quantitative measurements were obtained. Among patients with chronic wounds, the Bates-Jensen scores between wounds treated with Silvadene and Medihoney were compared with paired t-tests. X consented to participate. X% were treated with Silvadene cream while X% were treated with Medihoney. Patients who used Medihoney showed a mean improvement from pre-(mean sd) to post (mean sd), significance ($p < 0.05$), while patients treated with Silvadene showed a mean improvement from pre (mean sd) to post (mean sd.) with a significance of ($p > 1.2$) when comparing equally staged wounds. The use of honey impregnated dressings in the treatment of chronic wounds significantly decreased healing time and reduced rate of infection when compared to the use of Silvadene cream. If increased use of honey may help eliminate antibiotic resistance from overuse of antibiotics and give patients a natural, cost-effective treatment that offers better outcomes overall, further implementation of this project may be beneficial.

Title: Delay and probability discounting of legal outcomes

Primary Author (and presenter): Falligant, John, M.

Additional Authors: Pence, Sacha, T.

Department: Psychology

College/School: Liberal Arts

Description:

Although the majority of criminal legal cases are resolved by plea bargaining, relatively little research in the area of psychology and behavioral economics has evaluated how contextual factors, such as impulsivity, risk aversion, and sensitivity to immediate outcomes, influences defendants' legal decision making. For youth in the juvenile justice system, the impact of such factors is especially poorly understood. Fortunately, advances in behavioral economics have enabled researchers and clinicians to better understand, describe, and treat individuals' preferences for impulsive or risky decisions and outcomes. Using this delay-and-probability discounting model, the purpose of the current project is to systematically evaluate the degree to which juveniles adjudicated for illegal behavior, and non-delinquent young adults, discount delayed and probabilistic legal and non-legal outcomes. Results from this study will potentially inform best practices for individuals working with juveniles in legal decision-making contexts and add to extant domain-specific discounting literature.

Title: The process of meta-analysis

Primary Author (and presenter): Farr, Rebecca; Selby, Katherine; Shelor, Anna

Department: Rehabilitation and Disabilities Studies/Biological Sciences/School of Kinesiology

College/School: College of Education/College of Science and Mathematics/College of Education

Description:

Abilities Unlimited Summer Camp was a 3-week inclusive program for children/teens with and without disabilities that promoted motor skill development and physical activity levels (July 11-29, 2016). During the camp, participants wore actigraph accelerometers for 24-hours during the camp. Preliminary evidence from 80 participants suggests an interesting but complex relationship between moderate-to-vigorous physical activity (MVPA) and sleep efficiency. We will briefly discuss our preliminary findings.

To better understand our preliminary findings and to determine if a similar pattern of results was previously observed in the literature, we conducted a systematic review of published research to determine the effects of physical activity levels and sleep quality in typically developing children and teens and those with developmental disabilities. To do this, the following databases were queried: Academic Search Premier, MEDLINE, PsycARTICLES, and SPORTDiscus. Articles were included if they contained the following key words: (child* OR youth OR teen*) AND (sleep*) AND (physical activit*). More than 1200 articles underwent title/abstract screening. A total of 330 articles met inclusion for full text review. A total of 166 papers met inclusion, 65 of these studies quantitatively assessed physical activity and sleep and will be included in the meta-analysis, while 101 studies will be included in the qualitative analysis. Data is currently being extracted from the studies for the meta-analysis. We will discuss the process for completing a systematic review and meta-analysis and the difficulties encountered. Taken together, this research approach is a powerful way of summarizing key findings in the literature as well as computing effect sizes for future studies and generating predictions study effects.

Title: Niacin improves gut function and microbiota composition in high-fat diet fed mice

Primary Author (and presenter): Fang, Han

Additional Authors: Graff, Emily, C.; Li, Zhuoyue; Globa, Ludmila; Sorokulova, Iryna B.; and Judd, Robert L.

Department: Anatomy, Physiology and Pharmacology; Pathobiology

College/School: Veterinary Medicine

Description:

High-fat diet (HFD) consumption has been reported to alter the intestinal structure, morphology and the gut microbiota composition, leading to the development of intestinal inflammation, inflammatory bowel disease and colorectal cancer. Niacin, also known as vitamin B3, has been demonstrated to suppress intestinal inflammation and colon cancer through activation of its receptor, HCA2. However, the impact of niacin administration on the gut microbiota is not known. To address this question, 32 three-week-old male B6129SF2/J mice were evenly randomized into four groups: chow/vehicle, chow/niacin, HFD/vehicle, and HFD/niacin. These mice were placed on either a chow or HFD for 20 weeks. In the niacin treatment groups, niacin (360mg/kg/day) was added to their drinking water from week six till the end of the study, when mice were sacrificed and tissues collected. As expected, the HFD fed mice gained more weight than chow fed mice. Surprisingly, niacin treatment suppressed body weight gain by 22.8% in HFD mice, but not chow fed mice. This niacin-induced change in body weight gain was not associated with changes in food or water consumption. However, colon length was significantly increased in HFD/niacin mice. In the gut microbiota, the aerobic/anaerobe ratio was significantly increased with HFD feeding. However, niacin treatment lowered this ratio in both HFD and chow fed mice. In addition, the number of Bifidobacteria, which have anti-inflammatory properties, was significantly increased in HFD/niacin mice. Niacin also significantly lowered haemolytic bacteria and increased Bifidobacteria and Bacteroides in HFD fed mice. In addition to the microbiota, paneth cell number in HFD/niacin mice was significantly increased. On the contrary, the number of goblet cells was decreased by niacin administration. In conclusion, HFD fed mice displayed disrupted gut microbiota and abnormal number of two principal cell types in the intestine, both of which were improved by niacin treatment.

Title: Environmental benefits of care facilities for people with dementia

Primary Author: Fatzinger, Elizabeth Lee

Authors: Koelle, Emily; Phillips, Alex; Utley, Anna

Department: Consumer and Design Sciences

College/School: College of Human Sciences

Description:

This study seeks to determine interior design best practices for creating an optimal living environment for people with dementia. Four main contributing factors will be considered in the current project including the type of care facility, abilities of the nursing staff, impact of lighting, as well as effects of the outdoor environment. Through the use of surveys, interviews and observation, the study will determine how the quality of the designed environment caters towards the mental and physical abilities of people with dementia. The findings of this study will provide suggestions for interior designers seeking to create an environment that supports the optimum quality of life for patients and caregivers alike.

Title: Water Cost Analysis and Future Projections for Water Demand in Auburn, AL

Primary Author (and presenter): Sappington, Helen, C.

Additional Authors: Fields, Trey, D.

Department: Honors College

College/School: Honors College

Description: This research examines the true cost of water in Auburn, Alabama's public water system in comparison with private water providers around the country, while also making future water demand projections for the city. Initial concerns regarding the city's water capacity influenced the goals of this research, which include pinpointing appropriate water demand figures for both 2020 and 2050 and determining public water costs as well as the potential benefits and drawbacks of a public water system today and moving forward. A widespread review of resources and extensive population and financial data collection allowed for inferences to be made regarding the future of water policy in Auburn. Dissection of public and private price points for water proved valuable in establishing clear distinctions between the two services and their abilities to provide an affordable product. A rapidly growing city population served as the foundation for drawing water demand projections for the years 2020 and 2050, noting per capita water demand and the ability of the city's water infrastructure to adequately meet said demand. A SIMIO model was created utilizing current and past water flow data to visually represent the distribution of water across key areas of usage as population and demand increases in the city. The results of these analyses provide valuable information for Auburn officials to employ in sculpting the future of Auburn's water infrastructure and approach to this valuable foundational resource. The findings of this project point towards a need for significant reforms to be made in the city's water distribution system over the next 30 years.

Title: Nutritive quality of Coastal bermudagrass treated with plant growth-promoting rhizobacteria

Primary Author (and presenter): Fike, Connie, L.

Additional Authors: Wagner, Elizabeth; Held, David; Muntifering, Russell; & Holland, Courtney

Department: Animal Sciences

College/School: College of Agriculture

Description:

Plant growth-promoting rhizobacteria (PGPR) are naturally occurring, non-pathogenic soil bacteria that colonize plant roots. Biofertilization with PGPR may enable reductions in nitrogen applications in hay production. The objective of this study was to determine the nutritive quality and biomass yield of Coastal bermudagrass (*Cynodon dactylon*) treated with PGPR in a hay production scenario. Bermudagrass sod was harvested from a field maintained by a commercial hay grower. Sod was rinsed free of native soil and transplanted into 52 pots (0.0929 m²). Each pot was an experimental unit. Pots were arranged into four blocks and assigned a specific treatment using a randomized complete block design. Each block represented a replicate and contained 13 pots including one untreated control. Treatments were arranged in a factorial design with PGPR (Blend 20 from Auburn University), 56 kg/ha of N (full rate), and 28 kg/ha of N (half rate) each applied at different time intervals. Pots were given an initial treatment (d 0). On d 28, 56, 91 and 119, plant height was measured, then forage was harvested to a 5.08 cm stubble height, and biomass calculated. Dry matter, neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent lignin (ADL) concentrations were determined. Data were analyzed using the MANOVA procedure ($P < 0.05$). Individual date \times treatment interactions were analyzed using LSMeans Contrast procedure. Untreated control was similar to PGPR for biomass production, DM, NDF, ADF, and ADL. Full rate of N and PGPR differed in biomass production, but PGPR was similar to half rate of N at some harvest dates. PGPR was similar to the half rate of N for DM, and was similar to full rate of N at some harvest dates. For ADF, NDF and ADL, PGPR was similar to the full rate and half rate of N at some harvest dates. This is one of the first reports on biofertilization of forage bermudagrass under a simulated hay production scenario.

Title: Manufacturing functional engineered cardiac tissue spheroids using a custom microfluidic system

Primary Author (and presenter): Finklea, Ferdous, B.

Additional Authors: Kerscher, Petra; Seeto, Wen; and Lipke, Elizabeth
Department: Chemical Engineering
College/School: Samuel Ginn College of Engineering

Description:

Cardiovascular disease is the leading cause of death in the world; this is in part due to the heart's inability to regenerate. Engineered cardiac tissue offers hope for improvement over the current treatments for the failing heart. Because adult cardiomyocytes (CMs) cannot be cultured *in vitro*, cardiac differentiation of human induced pluripotent stem cells (hiPSCs) is critical to realize this potential. For engineered cardiac tissue to become a viable treatment, the production of the tissue-engineered product must be scalable and able to be manufactured in a clinical grade setting. Building on prior work in our laboratory directly differentiating hiPSCs into CMs in a 3D microenvironment, we present a rapid, scalable, and single-cell handling approach to manufacture functional cardiac tissue spheroids using a novel microfluidic technique. In our system, hiPSCs are combined with a biomaterial, PEG-fibrinogen, and spheroids are formed using a modified oil-and-water microfluidic emulsion technique. This custom device enables rapid fabrication of highly uniform spheroids with high cell density (25 million cells/mL) and a crosslinking time of less than 1 second. Following encapsulation, the cells remain viable and continue to grow within the hydrogel matrix. The spheroids have an elastic modulus of approximately 40 Pa on day 5 of differentiation. Spontaneous contractions initiated on day 8, and spheroids supported high efficiency cardiac differentiation, containing $71.6 \pm 8.4\%$ cardiac troponin T cells. Resulting CMs responded to both a β -adrenergic agonist and antagonist, isoproterenol and propranolol, respectively. The spheroids exhibited a 1:1 capture up to 6.0 Hz when paced. This novel microfluidic technique has been used for the fabrication of functional cardiac tissues and provides tight control over size and circularity of the spheroids, supports high efficiency cardiac differentiation, and has the potential to be leveraged for production in a bioreactor.

Title: Do first year engineering students identify as future engineers? Explorations in occupational identity

Primary Author (and presenter): Finnegan, Vanessa

Additional Authors: Hill, Ashley, C

Department: Educational, Foundations, Leadership, and Technology

College/School: Education

Description:

Late adolescence through emerging adulthood is an extraordinary time for identity development, characterized by exploration and decision-making about one's future possible self (Luyckx et al., 2008; Nurmi, 1991). As young people prepare for adulthood, achieving a sense of self and planning for the future is essential to educational and occupational attainment (Sica et al., 2016). Developing an educational and occupational identity is considered an essential part of one's overall sense of self (Kroger & Marcia, 2011) and research has shown that identity formation is important for commitment to STEM majors (Dryburgh, 1999; Stevens, O'Connor, Garrison, Jocuns, Amos, 2008; Tonso, 2006). Therefore the first year of college enrollment presents a unique opportunity for examining students' identity with their STEM major and commitment to a career in STEM. Recent research showed that science identity salience of undergraduate students developed independently from GPA, suggesting academic achievement was not enough to predict success in STEM majors (Merolla and Serpe, 2013). In consideration of the national spotlight on improving STEM education in the United States, and the existing emphasis on developing STEM enrichment programs (Merolla & Serpe, 2013), psychosocial factors, such as science identity formation, warrant further investigation. Utilizing Luyckx et al.'s (2008) Four Dimensional Model of Identity Formation we are examining identity exploration and commitment of first year engineering students and their aspirations for future careers in STEM. This project is in progress and will provide a

unique perspective for examining the manifestation of an educational and occupational “engineering” identity during late adolescence. Results from this investigation may inform current and/or future STEM programs interested in enriching student success by taking into account students’ identities as engineers at the early stages of matriculation into a STEM degree.

Title: Feeding preferences of malaria vectors in Madagascar

Primary Author (and presenter): Finney, Micaela, S

Additional Authors: Zohdy, Sarah

Department: Wildlife Disease Ecology

College/School: School of Forestry and Wildlife Sciences

Description:

Malaria is one of the top causes of mortality in Madagascar, therefore targeted vector control strategies are necessary to minimize the incidence of disease. In recent years, the numbers of livestock on the island have grown, and cattle now outnumber humans 2:1; however, it is unknown whether malaria vectors are adapting their feeding preferences to include livestock or if this altering landscape is placing pressure on malaria vectors to increase human feeding behavior. To address these questions, we captured malaria mosquitoes (*Anopheles* spp.) across a habitat gradient in southeastern Madagascar to examine whether proximity to livestock pens (cattle and swine) influences the feeding preferences of anthropophilic mosquito vectors of malaria (*Anopheles funestus* and *Anopheles gambiae s.l.*). 583 bloodfed mosquitoes were captured, and a direct enzyme-linked immunosorbent assay (ELISA) was used to test for swine, cattle, chicken, human, and dog blood; and a PCR protocol along with sanger sequencing was used to confirm all other species. We found that 98.4% of mosquitoes captured near livestock pens had livestock blood, while 20% of mosquitoes captured in households had human blood. Of *An. gambiae s.l.* malaria vectors, 24% had human blood and 15% of *An. funestus* had human blood. Overall, our findings indicate that in locations where human-livestock populations are shifting, mosquitoes have adapted their feeding preferences and become opportunistic. In line with the concept of zooprophyllaxis, our results indicate that livestock may be used as a dead-host to ward off malaria infections in malaria endemic nations where livestock are more prevalent than people. However, the increase in livestock bloodmeals potentially increases the risk of mosquito-borne zoonotic infections in humans living near livestock and further studies should be conducted.

Title: Exploratory-boldness behavior of juvenile anemonefish (*Amphiprion ocellaris*) and effects on their social hierarchy.

Primary Author (and presenter): Firing, M., Nicole

Additional Authors: Chadwick, Nanette, E.

Department: Department of Biological Science

College/School: College of Science and Mathematics

Description:

Recently, interest has been increasing in individual variation among fish behavioral types (personalities). Elucidation of the consistency of initial behaviors exhibited by juvenile fish, and their fluidity over time, allows a better understand the changing pressures that influence fish behaviors throughout life stages. These changes may occur due to sex change (switching from female to male, such as occurs in many fish), alteration in competitive pressures, reduced nutritional needs as body growth slow, etc. Behavioral types of juvenile anemonefish *Amphiprion ocellaris* have been under-studied, especially how their behaviors in aquarium settings affect their social hierarchies. This study aims to analyze the boldness-exploratory behaviors of individual juveniles of *A. ocellaris*, within a novel environment before and after

being placed in a social group, and how social hierarchy affects behavior over time. Juveniles were initially exposed to a novel environment randomly with or without a predator model present. Behaviors and latency times were analyzed and categorized as “bold” or “shy.” Individuals were then placed in a social group composed of a bold and shy member. After 3 months, fish were re-trialed using the same apparatus to determine if any behavioral shifts occurred. Results suggests that juvenile *A. ocellaris* exhibit distinct individual behavioral types (personalities) that are affected by their social hierarchy, initial behaviors and body size.

Title: Assessing quality and satisfaction of Meals on Wheels (MOW) program in Lee County, Alabama

Primary Author (and presenter): Forchielli, Nicole R.

Additional Authors: Dr. Yee Ming Lee, PhD, RD, CHE

Department: Nutrition Dietetics and Hospitality Management

College/School: College of Human Sciences

Description:

Meals on Wheels (MOW) program helps senior citizens to cope with hunger, isolation, and loss of independence. This research assessed the nutritional quality and participants’ satisfaction of the meals provided by MOW program in Lee County, Alabama. We obtained the recipes of each menu from the program administrator, calculated the nutritional values using USDA nutrient database and compared that to the Dietary Guidelines for Americans for the elderly. We also created a survey and mailed it to the MOW participants (N=45) in a postage-paid self-addressed envelope to assess their satisfaction with the meals. Each meal consists of a roll, an entrée, and a side. On average, each meal contains 522kcal. Of this amount, 221kcal (43%) of total calories come from carbohydrates, 132kcal (25%) from protein, and 169 kcal (32%) from fat. Twenty-five complete surveys were returned. Most participants lived alone (n=21) and have been in this program for approximately 2 years. Majority of them eat about half of the meal provided. Participants have neutral opinion about the variety (3.4 ± 1.3), temperature (3.2 ± 0.7), and tastiness (3.1 ± 1.2) of the foods. Participants suggested to better season the vegetables and cook them to be softer. Some participants recommended the MOW program to offer more variety of fruits and vegetables and add their “soul food”. Though MOW provides complete meal that is close to the American Dietary Guidelines, because not all foods are eaten, the actual nutrient intakes of the participants might be lower. MOW program should consider these suggestions to increase participant’s food consumption. Disclosure: This project was funded by Undergraduate Research Fellowships and Dr. Fred Kam Undergraduate Research Awards in Nutrition

Title: Surface reconstruction based on plenoptic image with convolution-based iterative algorithm

Primary Author (and presenter): Fu, Yimin

Additional Authors: Reeves, S. J.

Department: Electrical and Computer Engineering

College/School: Samuel Ginn College of Engineering

Description:

Plenoptic camera makes post-refocusing possible by capturing both spatial and directional information of light. A focal stack is generated by stacking up refocused images of the same scene. By adjusting the depth at which each image focuses, it models the light ray around the nominal focal plane of the camera in 3D. The main purpose of this research is to reconstruct the surface by reversing the image blur in the focal stacks. There are many benefits of surface reconstruction from a plenoptic camera. It’s manoeuvrable, cheaper and wouldn’t require an entire camera array. Different from the traditional multi-camera modelling method, object is not required to be fixated making it one of most convenient way to record surface

information in 3D. Furthermore, depth estimation can be achieved by processing the focal stack. There were previous attempts to accomplish this task, including the gradient method, the stereo perspective method and deconvolution. However, there are limitations when implementing those methods, especially in areas that have little image detail. This research proposes an iterative algorithm to more precisely reconstruct the surface of the object, especially in regions that are farther away from areas of detail. In order to implement the iterative algorithm, we also mathematically modelled the process of image blur by a point-spread function (PSF). The PSF describes how the light spreads from each point in the object across the entire focal stack in 3D. The biggest challenge we face is the computationally intensive nature of iterative algorithms, and it is made worse by the sheer amount of data we are dealing with in a 3D space. Various experiments on reducing the computation time have been conducted, and we have discovered the major factor that causes slow convergence in the iterative algorithm. One preliminary workaround algorithm has been developed, but it lacks precision as it requires that the object to be composed of small surfaces. Future research is still needed to address the problem of slow convergence.

Title: Evaluation of the Hippocampal Associated Neurotoxic Effects of Prenatal Alcohol and Nicotine Exposure in Rodents

Primary Author: Fujihashi, Ayaka

Additional Authors: Bhattacharya, Dwipayana; Dunaway, Elizabeth; Bloemer, Jenna; Bhattacharya, Subhrajit; Majrashi, Mohammed, Ramesh, S.; Escobar, Martha; Suppiramaniam, Vishnu; Dhanasekaran, Muralikrishnan

Department: Drug Discovery and Development

School: Harrison School of Pharmacy

Abstract: During pregnancy, smoking (nicotine exposure), in addition to alcohol consumption, is observed. Alcohol (ethanol) and smoking (nicotine) during pregnancy can have substantial neurotoxic effects on the offspring. Therefore, in our study, we used a Sprague Dawley rat model exposed to alcohol (mixed with water) and nicotine (subcutaneous-mini osmotic pump) during gestation. We assessed the effects of alcohol and nicotine exposure on the behavioral and neurological changes. Y-maze was used to study the effect on cognitive impairment. Long-Term potentiation (LTP) and expression of ILK & PSD-95 were studied to correlate the effects with cognition. Significant deficits in spatial memory tasks were observed in the alcohol only treated group as compared to the control. Interestingly, the offspring exposed to prenatal nicotine and alcohol showed significant improvement in the spatial task as compared to the alcohol treatment. However, the improvement in spatial learning deficit is not supported by the LTP in these animals. Alcohol and nicotine exposed animals showed significant deficit in LTP as compared to the control. There was an increase in the hippocampal PSD-95 expression and no change in ILK expression in the alcohol and nicotine treated group as compared to alcohol alone or the control. Thus, nicotine and alcohol exposure during pregnancy may have a mixed and detrimental effect on the central nervous system.

Title: Biomechanical influences of a postural compression garment on scapular positioning

Primary Author (and presenter): Gascon, Sarah, S.

Additional Authors: Gilmer, Gabrielle; Washington, Jessica; Aucoin, Gretchen; Cummins, Ian; Sulser, Tanner; Oliver, Gretchen

Department: Kinesiology

College/School: Education

Description:

Proper posture assists the human body in efficient movement. More specifically, athletes utilize different postures to perform sport specific tasks. A typical postural deficiency is upper crossed syndrome where

individuals display rounded shoulders, scapular protraction, and a forward head. This upper extremity postural impairment has been associated with upper extremity overuse injuries and scapular instability. With the established importance of posture in efficient movement patterns, clothing companies have begun to manufacture apparel geared towards improved posture for enhanced athletic performance. Therefore, the purpose of this study was to examine the postural changes in scapular positional kinematics (protraction/retraction, upward/downward rotation, and anterior/posterior tilt) in three conditions: no shirt (NS), control shirt (CS), and postural compression garment (PG). It was hypothesized that the PG would improve the positioning of the scapula. Twenty-three females (1.68 ± 0.07 m; 67.29 ± 11.25 kg) participated. Kinematic data were collected using an electromagnetic tracking system at a frequency of 100Hz. Participants were asked to stand in a neutral position while data were collected. Results showed significant findings of scapular protraction/retraction ($F(1.20, 26.43) = 5.06, p = 0.03$) and scapular anterior/posterior tilt ($F(1.41, 29.67) = 44.64, p < 0.001$) between conditions. Post hoc analysis revealed increased scapular upward rotation of the PG versus CS and PG versus NS; increased scapular posterior tilt of the PG versus CS, CS versus NS, and PG versus NS. These results imply that for this specific group of active females, PG improved scapular position and ultimately improved static standing posture by increasing scapular upward rotation and scapular posterior tilt. Future research should be directed toward analysing postural compression garments during sports specific tasks among female athletes.

Title: Filipina immigration and identity

Primary Author (or Presenter): Gibbs, Corey, L

Department: Department of Sociology, Anthropology, and Social Work (Anthropology)

College/School: College of Liberal Arts

Description: This research takes a life story or life events approach to understanding the experiences of generations of Filipina-Americans (immigrants and first generation). It focuses primarily around the life stories of a Filipina-American mother and daughter, but will also include interviews with other family members. The purpose is to discover the impact that immigration (of oneself or of one's parent) has on identity, with a focus on Filipina women of one family. The mother, an immigrant, feels a duty to pass down her Filipino culture and heritage to her children. The daughter, having been born in the United States, is taught by her mother about a culture not inherent to her geographical location. Overall, this is a study that unearths how the Filipino culture disseminates across not just thousands of miles but also generations, and how that dissemination involves gender roles as well as the familial bonds between a mother and her daughter.

Applicable anthropological theories can be used to analyze the passing of culture between generations, the obligation to receive it, and the gender dynamics at play in this Filipino American subculture.

My methods of research include interviews, photography, and videos. I am able to understand the person behind the research through interviews, and I am able to use photos and videos to reference specific instances in my research and generate more public interest -- by not having a bland presentation. This research is incredibly important to our current political atmosphere. It focuses on women, immigration, and the dissemination of a non-European culture within the United States.

Title: Applying radio frequency identification tags to improve personnel safety in dredging construction

Primary Author (and presenter): Gilbert, Claire, M.

Additional Authors:

Department: Building Science

College/School: Architecture, Design, and Construction

Description:

The aim of this research is to evaluate the effectiveness of radio frequency identification tags (RFID) technology in providing individual personnel safety monitoring on a dredge. Using passive Radio Frequency Identification (RFID) tags, we will be testing our hypothesis that RFID will create a safer environment on a dredge, and determining which type of RFID tag is the most effective. The first test will compare the two passive RFID tags locating accuracy as workers are boarding the dredge, from the crew boats, to determine which tag provides the more accurate reading. To perform this evaluation, RFID tags will be attached to either the vests or hardhats of the worker and the readers will be mounted at the entrance areas of the dredge. Workers wearing the different types of tags will be monitored as they on-board and off-board the dredge, and this information will serve as a current log of all persons on-board the dredge at a given time. The second test will consist of monitoring restricted access control of the workers wearing the passive RFID tags. With the correct software, certain workers with limited access will be identified and as they try to on-board the dredge, an alert will go off. The graduate student was invited to present their research proposal at the Western Dredging Association Conference on October 26, 2016. Through the presentation, the graduate student was able to explain the objectives and methodology of the proposed research to the leading experts from the largest dredging companies in the United States. By collaborating with the US Army Corp of Engineers and Great Lakes Dredging Company, we believe this study has the opportunity to open the door to better safety practices in the dredging industry. If, in the end, RFI tags do improve the safety of the dredging boat and the personnel on board, this innovative method of utilizing technology may also be applied to other industries, i.e. oil rigs, commercial fishing, and other marine industries.

Title: Longitudinal influences of positive adaptation and sleep on internalizing symptoms in children

Primary Author (and presenter): Gillis, Brian, T.

Additional Authors: Saini, Ekjyot, K. and El-Sheikh, Mona

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Positive adaptation, marked by traits such as optimism and self-worth, is protective against internalizing problems among youth (Costello et al., 2008; Reivich et al., 2013). A growing literature has found that short sleep duration and poor sleep quality are associated with greater risk for depression and anxiety (Bagley & El-Sheikh, 2013; Gregory & Sadeh, 2012). However, few studies have examined these linkages longitudinally or investigated the conjoint influences of positive traits and sleep on internalizing symptoms. The present study examines how positive adaptation in children interacts with sleep to predict internalizing symptoms across time. A community sample of 280 children participated at two time points ($M_{age} = 10.40$ years, $SD = 8.07$ months; 45% female; 37% African American, 63% European American; 34% living at or below the poverty line, 31% lower middle class, 35% middle class). At T1, children reported on their optimism and sleep-wake problems, and actigraphs were used to objectively measure sleep duration, efficiency, and latency. Children reported on their depressive and anxiety symptoms one year later at T2. Path models were fit separately for each positive trait. Building on the literature, initial analyses show direct effects between shorter sleep latency and less internalizing symptoms. A consistent pattern of interaction effects reveal that children had less depressive and anxiety symptoms one year later when they reported greater optimism with shorter latency and fewer sleep-wake problems. Findings indicate that positive adaptation traits and better sleep provide dual protection (Luthar et al., 2000) against internalizing problems during pre-adolescence, prior to when the greatest risk for development of clinical symptomology is observed. Identification of such resiliency factors may facilitate the development of interventions that reduce the risk of internalizing problems for children as they further transition through adolescence.

Title: Influence of Postural Compression Garment on Scapular Muscle Activation

Primary Author (and presenter): Gilmer, Gabrielle, G.

Additional Authors: Gascon, Sarah; Washington, Jessica; Aucoin, Gretchen; Cummins, Ian; Sulser, Tanner; Oliver, Gretchen

Department: Kinesiology

College/School: College of Education

Description:

In the apparel industry, many companies claim that wearing their postural compression garments will not only improve posture but also enhance performance. However, scarce biomechanical data exists to support these claims. Of these postural compression shirts, very few are designed specifically for females. Postural deficiency results in rounded shoulders, scapular protraction, and forward head posture. This postural impairment has been associated with upper extremity overuse injuries, and ultimately results in scapula instability. Postural stability of the scapula is supplied via the upper trapezius (UT), lower trapezius (LT), latissimus dorsi (LD), and serratus anterior (SA). Therefore, the purpose of this study was to investigate the effects of shirt type on scapular stabilizing muscle activations amongst active females. It was hypothesized that a postural compression garment would influence the muscle activations of four scapular stabilizing muscles. Thirty active females (1.68 ± 0.07 m; 67.29 ± 11.25 kg) participated. Muscle activity were collected using a Delsys Bagnol-8-channel electromyography (EMG) system at a rate of 1,000 Hz. EMG data were normalized as a percent of maximum voluntary isometric contraction (MVIC). Scapular muscle activity were collected while the participant was standing in a neutral position during three conditions: no shirt (NS), control shirt (CS), and postural compression shirt (PS). Mann-Whitney U-test was used for statistical analysis. No statistically significant differences were found within the muscle activation between the three different conditions. These results reject the hypothesis and imply shirt type does not affect scapular stabilizing muscle activation during neutral stance for this group of active females. It is recommended that future studies include a dynamic assessment when studying the effect of shirt types on muscle activation.

Title: Effects of pain history on pitching mechanics in collegiate pitchers

Primary Author (and presenter): Gilmer, Gabrielle Grace

Additional Authors: Oliver, Gretchen; Washington, Jessica; Plummer, Hillary; Dugas, Jeffery; Andrews, James

Department: Kinesiology

College/School: Education

Description:

Approximately 370 overuse injuries were reported in collegiate fast-pitch softball players from 2004-2009. However, there are limited data on softball pitching injury rates and their etiologies. The investigation of injury as well as pain history in softball pitchers could divulge information into injury susceptible pitching mechanics. The purpose of this study was to compare pitching mechanics in collegiate pitchers with and without a history of upper extremity pain (UEP). Twenty-nine NCAA Division I collegiate softball pitchers volunteered. Participants were divided into those with a history of UEP ($n=7$; 19.7 ± 1.3 years; 177.7 ± 7.3 cm; 77.0 ± 15.3 kg) and those without UEP ($n=22$; 19.8 ± 2.0 years; 172.3 ± 8.4 cm; 80.0 ± 10.1 kg) within the past six months. History of UEP was deemed if a participant sought out the medical care of their athletic trainer or physician. All kinematic data were collected at 100 Hz via an electromagnetic motion analysis system. Participants were instructed to pitch three screwball pitches at maximum effort for strikes over a regulation distance (43ft) to a catcher. The screwball was chosen for analysis because it was the most popular pitch that those with an UEP history reported throwing. Kinematic variables were averaged for the three trials at the throwing events of top of

backswing (TOB), stride foot contact (FC), and ball release (BR). Kinematic data were analysed using an independent samples t-test ($\alpha \leq 0.05$). Pitchers with UEP were more sideways, versus square, to the catcher at FC, (Mean difference=-13.87°; p=0.05) and BR, (Mean difference= -19.57°; p=0.01). This difference in trunk rotation could possibly result in the pitchers having to throw across their body more than necessary for BR and thus putting the shoulder and elbow in a more injury susceptible position. Positioning sideways versus square to the target at BR may contribute to greater upper extremity kinetics and thus warrants further investigation.

Title: Systematics of the genus *Ummidia*: species delimitation using natural history collections

Primary Author: Godwin, Rebecca L.

Additional Authors: Bond, Jason E.

Department: Biological Sciences

College/School: College of Science and Mathematics

Description:

Araneae, the group containing all spiders, is divided into three main lineages: Mygalomorphae, Mesothelae, and Araneomorphae. Comprising the tarantulas, purse web spiders, trapdoor spiders, and their kin, mygalomorphs have long been a source of intrigue and frustration for many arachnologists. Many groups remain problematic in terms of their systematics. Ctenizidae is one such family. At present, the nine ctenizid genera remain in a state of phylogenetic uncertainty with respect to their placement, though it seems clear that the family is not monophyletic. *Ummidia*, a genus within Ctenizidae, has long been recognized as a taxon in serious need of taxonomic treatment. Currently, *Ummidia* contains 27 described species, 20 of which are found in the New World. Taxonomic work on New World *Ummidia* is sparse outside of original descriptions, the most recent of which are over half a century old. I am in the process of revising the genus *Ummidia* in the Nearctic region. I have done this by examining approximately 700 specimens of *Ummidia* from various collections (AMNH, MCZ, FSCA, CAS, AUMNH). Examination of museum material has seemingly confirmed the undescribed diversity of *Ummidia*, with preliminary estimates of New World species ranging between 50 and 60. This study along with many others conducted utilizing museum collections are indicative of the importance of natural history collections and their usefulness in discovering unknown biodiversity.

Title: Drug testing and immunostaining of in vitro 3-dimensional breast cancer models

Author: Goel, Nidhi

Department: Chemical Engineering

School: Samuel Ginn College of Engineering

Description:

Cancer is currently the second leading cause of death in the US, with breast cancer being specifically prevalent throughout the world. The study of the growth and progression of breast cancer cells within a 3D in vitro microenvironment that closely replicates native tumor tissue is extremely beneficial. It progresses the development of better and more efficient drugs by providing the ability to test drug efficacy on cells cultured in a more physiologically relevant context. This was seen in the production and construction of 3D microspheres that contained mature MCF-7 breast cancer cells and the conduction of biological assays to observe their properties. Stains for viability, oxygen levels, EMT properties, proliferation, and stem cell characteristics allow for the characterization of cancer cells within these engineered tumor tissue microspheres over time. Additionally, response to drug treatment with doxorubicin was evaluated. Lastly, the analysis of the ability to distribute and image these tumor tissue microspheres efficiently and quickly in a 384-well plate without shearing was assessed. This capability is

important for use of these engineered tumor microspheres drug-testing applications. Using equipment from BioTek and fluorescent imaging allowed for the testing of this capability and quantification of tumor tissue microsphere size.

Title: Glucose concentrations in whole blood, serum, and plasma from porcine blood samples.

Primary Author (and presenter): Gohlke, Madison, K

Additional Authors: Brandebourg, Terry, D

Department: Department of Animal Sciences

College/School: Auburn University

Description:

Point-of-care glucometers (POCG) represent an expedient method of measuring blood glucose concentrations but often yield less reliable results than biochemical analyzers, leading to potential misdiagnosis of metabolic disorders. Thus, our objective was to determine the correlation between glucose concentrations in serum, plasma, and whole blood measured by POCG compared to plasma glucose concentrations measured by a biochemical analyzer. Jugular blood samples were collected from 152 Yorkshire swine. Glucose concentrations were measured in whole blood, serum and plasma (in the presence and absence of a glycolytic inhibitor, fluorine) by POCG. Glucose in fluorinated plasma was also measured by biochemical analyzer. Results were compared using Correlation and Bland-Altman analyses. Glucose concentrations in whole blood measured by POCG were highly variable and poorly correlated with plasma glucose concentration measured by biochemical analyzer ($r^2=.34$). However, glucose concentrations in serum and plasma measured by POCG were more strongly correlated with plasma glucose concentration measured by biochemical analyzer (serum, $r^2=.57$; plasma, $r^2=.64$). Plasma glucose concentration measured by POCG in the presence of fluorine correlated strongly with plasma glucose concentration measured by biochemical analyzer ($r^2=.89$). Bland-Altman analysis revealed that mean differences in glucose concentrations determined by biochemical analyzer and by POCG in whole blood, serum, plasma, and fluorinated plasma were 43.5, 33.5, 12.4, and 4.5 mg/dl, respectively. These results indicate that use of a human POCG to measure glucose concentration in fluorinated porcine plasma yields results that are most similar to those produced by a biochemical analyzer, supporting the hypothesis that utilizing the liquid, cell-free fraction of blood when analyzing porcine samples with a POCG can increase reliability of glucose measurements to a degree which could prospectively improve diagnostic accuracy.

Title: Estimating occupancy, density, and productivity of eastern wild turkeys in Alabama

Primary Author (and presenter): Gonnerman, Matthew, B.

Additional Authors: Zenas, Stephen and Grand, James

Department: Wildlife Science

College/School: School of Forestry and Wildlife Science

Description:

An important component of effectively managing wildlife is understanding the size and structure of their populations. The optimal management action can change depending on the current state of a population. Regular monitoring by managers enables them to assess a population's status and reduce uncertainty due to temporal and spatial changes. In the absence of monitoring, managers rely on expert knowledge about populations to make management decisions. Many southern states, including Alabama, manage eastern wild turkey (*Meleagris gallopavo*) using estimates of population size and structure that are based in expert opinion on population density or harvest rate and sex ratio. In the case of Alabama, these estimates are

based on broad land cover class data that lacks precision. Surveys designed to monitor turkey population size and structure would provide better information on which to base management decisions. At this time, few survey methods have been used to estimate the size and structure of turkey populations in the peer-reviewed literature. I will examine the use of occupancy analysis to estimate the distribution, abundance, and structure of wild turkey populations in Alabama. Productivity is an important vital rate of wild turkeys that has been shown to affect changes in population size. To provide a better understanding to managers about the growth of their turkey populations, productivity estimates in the form of poult to hen density ratios will be assessed through occupancy analysis. For all population estimates, changes in habitat will be analyzed to account for variation across spatial scales to increase precision. Finally, I will subsample and reanalyze my data to identify components of the survey design that may influence the precision of estimates.

Title: Tobacco cessation: improving the outcomes

Primary Author (and presenter): Goodson, Amanda C

Department: School of Nursing

College/School: Auburn University

Description:

Tobacco use is a leading cause of preventable death and disease. Evidence shows that although effective treatments for tobacco dependence exist, clinicians do not consistently implement evidence based interventions. This project was conducted to determine whether providing clinicians with education on behavioral support programs for cessation increased referrals to the Tobacco Cessation Program (TCP). A small test of change (STOC) was implemented to meet two main objectives: ensure clinicians are aware of available TCPs, and encourage clinicians to recommend behavioral support in conjunction with pharmacotherapy. Ten participants from one of four teams embedded within the primary care clinic (PCC) were sampled. The population included nurses and providers who volunteered to attend in-services for the education intervention. Pre-intervention registration logs were compared to post-intervention logs and pre and post intervention surveys were administered. Implementation steps included discussing with stakeholders how the project would improve cessation outcomes, eliciting voluntary participation from clinical staff, administering a pre-intervention survey to determine the level of awareness prior to education, providing education regarding evidence based treatment interventions in four weekly in-services, and followed with post-intervention surveys. Surveys were logged in an Excel spreadsheet and imported into the Statistical Package for Social Sciences (SPSS) for evaluation. A descriptive analysis by group and paired sample correlations between status (pre or post intervention) was conducted. The statistical data and registration logs indicated a positive impact resulting from the intervention. Nurses were more likely to refer patients to the TCP than other clinicians. Long term studies for the future should evaluate a larger sample to determine whether inferences from the STOC are generalizable as well as determine how the EBP interventions are valued over time.

Title: The effect of whole body vibration on stress fracture healing

Primary Author (and presenter): Gordon, Sarah J

Additional Authors: Sefton, JoEllen; Goodlett, Michael; Young, Kaelin; McAdam, Jeremy; McGinnis, Kaitlin

Department: School of Kinesiology

College/School: College of Education

Description:

Bone health is dependent on constant stimuli in order to remain healthy and strong. Too much repetitive force weakens the bone and causes microdamage. This weakening can lead to a slower bone turnover rate, which can in turn cause stress fractures. Stress fractures are one of the most prevalent injuries seen amongst athletic and military populations. To date, there are no definitive treatments besides rest and time, which leads to a drain on resources. This study investigates whole body vibration (WBV) as a possible treatment to speed the healing rate of stress fractures as a solution to this problem. WBV works by applying high frequency, low magnitude mechanical loads to weight bearing joints in order to stimulate bone growth activity. While the research on WBV is limited, the data from previous research has proven it to increase bone strength, muscle strength, and flexibility. There is also no known research assessing the effect of WBV on stress fractures in humans, but WBV has proven to be effective on fractures in animal models. For this randomized controlled study, men and women athletes ages 18-35 with a confirmed lower body stress fracture will be enrolled in the study. Each participant with a stress fracture will also have a control matched by age, gender, and sport. These individuals are recruited from Auburn Athletics, and those with stress fractures will be randomly assigned to a WBV treatment group or a standard stress fracture care group. Those assigned to the WBV will undergo vibration therapy 3 times a week until return to play is determined by a licensed physician. Each session will last a total of 20 minutes with 1 minute on and 1 minute of rest, totalling 10 minutes of WBV. Each participant, no matter what group, will complete sleep and medication logs, as well as come in for blood draws before starting, 2 weeks after the initial visit, 2 weeks after this, at return to play, and 2 weeks post return to play. IGF-1, P1NP, and serum CTX levels will be checked in the blood samples. They will also undergo peripheral quantitative computerized tomography (pQCT) scans before the study, 2 weeks in, and at return to play. There have been some challenges faced in this study that have not allowed for data results yet, as the pQCT machine has not yet been approved for use by the state of Alabama. Originally, it was set to be approved at the start of last fall, but it is still being processed and has caused a delay in the study. This delay has led to no data results at this time, but the literature proves this treatment method to be an effective possibility for future stress fracture healing.

Title: Provider communication and education for reduction of antibiotics in upper respiratory infections (URI)

Primary Author: Gorman, Loren, M

Department: School of Nursing

College/School: Auburn University

Description:

Primary patient-provider communication can increase patient knowledge of antibiotic use for URI's. Evidence-based recommendations for URI's include use of clinical guidelines and effective communication techniques. The purpose of this project was to implement effective provider communication techniques to increase patient knowledge and decrease inappropriate antibiotic prescription rates for URI's.

Target population included adults (18-50 yrs) who visited their primary care provider for URI symptoms. Following informed consent, participants completed a self-assessment questionnaire on appointment expectations in regards to medication. The providers had clinical guidelines for antibiotic prescribing during appointment for reference. Providers asked patient expectation at beginning of appointment and performed a running dialog, to educate patient on antibiotic needs. After the appointment, the patient completed a validated Communication Assessment Tool-Resident to assess the providers' education and communication skills along with a self-assessment questionnaire on patient expectations about medication. Descriptive statistics were used to describe the patient population, medication expectations, provider communication, and medication prescribed. Among patients with minimum antibiotic education at baseline, the pre-post appointment expectation questionnaire responses were compared with paired t-tests.

X consented to participate (% females/males), average age of X (sd) yrs. X% were identified with improved antibiotic knowledge, X % were treated with antibiotics, X% were treated with other medications, and X% had high provider communication scores. Among those with URI symptoms, the mean appointment expectation scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$)

Communication techniques to educate patients and decrease antibiotic prescription rates are achievable in this setting and further implementation of the project is warranted.

Title: Analyzing the economic impact of growth variability on the channel-blue hybrid catfish production

Primary Author (and presenter): Gosh, Kamal

Additional Authors: Dunham, Rex, A.; Hanson, Terry; Chatakondi, Nagaraj; Drescher, David; Robinson, Dalton; Bugg, William; and Backenstose, Nathan

Department: Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

The production cost of hybrid catfish farming (channel catfish, *Ictalurus punctatus*, female x blue catfish, *I. furcatus*, male) has been increasing due to the rising of the input costs, and credit constraints, which is likely to be solved through yield intensification. Hybrid catfish production is a prime example of such intensification, but it has witnessed, to some minor extent, a growth variability problem. Analyzing the economic impact of such problem is critical in order to understand the fish producers' profitability as the fish processors' demand certain size fish. Based on this context, two comparative economic scenarios were developed by using the standard enterprise budget analysis approach for single batch, multiple batch and split-pond production systems. Preliminary results from scenario analysis suggest that the breakeven price above variable cost is in the range of \$1.73/kg to \$2.03/kg if the fish processor pays at the rate of \$2.62/kg for the preferred size food fish (0.45-1.81 kg), but pays 50% less than the above rate (\$1.31/kg) for the undersized (<0.44kg) and oversized fish (>1.82 kg) to the fish producer (Scenario: 'A'). This breakeven price above variable cost may increase further (\$ 3.19/kg) if the processor pays at the rate of \$2.62/kg only for the preferred size food fish, but pays zero for undersized and oversized fish (Scenario: 'B'). Moreover, the income above variable costs is positive and significant for scenario 'A' but it is likely to be marginal for scenario 'B' situation. The incomes above variable and total costs are largely, but inversely dependent on the coefficient of variation (CV) (%) for growth. Earlier preliminary analysis on growth variability of hybrid catfish showed that CV (%) was in the expected range of 12-56%. Split pond system appears to be the most profitable and stable enterprise in compared to single and multiple batch production systems.

Title: Superconducting logic families based on quantum phase-slip junctions

Primary Author (and presenter): Goteti, Uday, S.

Additional Authors: Hamilton, Michael

Department: Electrical and Computer Engineering

College/School: Samuel Ginn College of Engineering

Description:

Superconducting electronics are identified as significantly faster and extremely low energy consuming alternative to traditional CMOS based electronics. Currently, all the superconducting logic circuits are based on a device called Josephson junction. In this poster, we introduce two new logic family concepts, supported by SPICE circuit simulations and numerical calculations, based on a relatively new device called quantum phase-slip junction, which is a dual to a Josephson junction. These logic families employ

quanta of charge and flux i.e. the smallest possible units of charge (charge of 2 electrons) and magnetic flux (fluxon/flux quantum) as the basic logic elements. The establishment of these logic families involved development of a numerical SPICE model for quantum phase-slip junction, determining its mode of operation and designing appropriate circuits suitable for various logic operations. Some example logic circuits of each of the two logic families, to sufficiently validate the implementation of higher level circuits will be presented. Based on available physics models, calculations are made to determine the physical design parameters of the device for future practical implementation. Calculations are shown to demonstrate that these logic families can operate with significantly lower energy dissipation compared to Josephson junction based logic circuits, with zero static power dissipation.

Title: Myers-Briggs type indicator dichotomies as a predictor of hearing aid benefit in adult users

Primary Author (and presenter): Gould, Dianna, T.

Additional Authors: Jones, Alisha, L.

Department: Communication Disorders

College/School: College of Liberal Arts

Description:

This study will be conducted as a follow up to Cox et al.'s (1999) study entitled "Personality and the Subject Assessment of Hearing Aids". In that study, Cox et al. found that the trait of extroversion was highly correlated with overall reported hearing aid satisfaction. With this in mind, this follow up study aims to explore perceived hearing aid satisfaction across all four Myer-Briggs Type Indicator dichotomies. The Abbreviated Profile of Hearing Aid Benefit (APHAB) will be administered along with the MBTI. Additionally, measures of age and gender will be considered in the data analysis and discussion of this study due to previous research showing the effects of both on self-reported outcomes. The study aims to explore the relationship of personality across all four dimensions on the MBTI to hearing aid benefit as measured by the APHAB. All participants in this study must be at least a month from the purchase date of their hearing aids. Participants must be at least 18 years of age. Because the goal is to gain a large sample size among adult hearing aid users, gender, hearing aid use status, and hearing loss are not factored into subject selection. The target sample size is 30-50 adult subjects within their original warranties that have been wearing amplification for at least one month. The data collected will include not only the measures of satisfaction and MBTI type, but also patient reported amount of daily use, length as a hearing aid user, and amount of hearing impairment. Results indicate significant trends in self-perceived hearing aid satisfaction across personality dichotomies. This is important for hearing healthcare professionals in fitting amplification; having patient-specific predictors of satisfaction can allow for counselling and fitting strategies to be customized more appropriately, which will maximize clinician time and overall client reports of satisfaction.

Title: Novel PPAR-gamma agonist improve pathology and memory deficits in a 3xTg-Ad mouse model of Alzheimer's disease.

Primary Author (and presenter): Govindarajulu, Manoj

Additional Authors: Bloemer Jenna, Alhowail Ahmad, Das Priyanka, Adamek Danielle, Briggs Wynne, Lynd Tyler, Suppiramaniam Vishnu, Amin Raj Dhanasekaran Muralikrishnan, Clark Randall

Description:

Epidemiological and research evidence suggest a possible shared pathophysiology between type 2 diabetes mellitus (T2DM) and Alzheimer's disease (AD) and this association is also termed as 'type 3 diabetes'. Thiazolidinediones (TZDs) are insulin sensitizing peroxisomal proliferator activating receptor gamma (PPAR γ) agonists and have been recognized as promising agents for memory deficits in patients with AD.

Although currently available PPAR γ agonists show promise for improving memory deficits in AD, poor blood brain barrier permeability results in inadequate bio-availability in the brain requiring high dosing with chronic time frames that are associated with increased incidences of adverse events including cardiac diseases like myocardial infarction and heart failure. This research is based on the development of novel selective PPAR γ modulators with high blood brain barrier permeability and less incidence of adverse effects.

We hypothesize that our lead compound (Compound 9) a PPAR γ modulator, improves cognitive deficits and pathologies associated from Alzheimer's disease better than current TZDs (pioglitazone) in a triple transgenic 3x Tg-AD mouse model. Triple transgenic 3xTg-AD and C57BL/6J mice were utilized. Six month age group represents advanced stage of AD and the mice were treated for 4 weeks. Behavioral analysis was done using novel-object recognition, Y-maze and contextual fear conditioning tests. Long-term potentiation (LTP) theta-burst protocol was utilized to measure hippocampal field potentials in Schaffer collateral pathway in the hippocampus.

Our data indicate that Compound 9 and Pio improve cognitive deficits in Y maze, novel-object recognition and contextual fear conditioning. In addition these mice restored memory deficits in transgenic mice similar to control group in electrophysiological studies.

We plan to conduct further biochemical and electrophysiological studies to determine and validate the nature of synaptic deficits and pharmacokinetic studies to test the brain bioavailability of compound 9 compared to pioglitazone.

Title: How stream restoration affects in-stream ecological metabolic activity

Primary Author (and presenter): Granger, Craig, E

Department: Department of Biosystems Engineering

College/School: Samuel Ginn College of Engineering

The purpose of this project is to collect initial data to which will measure the baseline conditions of the in-stream ecological function of the stream by measuring the stream metabolism. A two-point data collection method will be used by deploying a dissolved oxygen logger at the upstream and downstream ends of the restored reach. This data will be used to calculate ecosystem metabolism metrics of net primary production and community respiration.

To keep the dissolved oxygen loggers stationary, two four foot long rebar segments were hammered into the thalweg of the stream at the upstream and downstream ends of the reach. Two inch PVC was attached vertically to the rebar by steel wire to serve as protection for the loggers from debris. Quarter inch holes were drilled into the PVC to allow for natural flow through the pipe. The loggers were programmed to take measurements every 15 minutes for three continuous days. 40 mL water samples were collected weekly from the thalweg of the stream to measure concentrations of Nitrate, Phosphate, and Ammonia. Nutrients were measured using a spectrometer.

Graphical analysis showed higher concentrations of dissolved oxygen at the upstream end of the reach in comparison to the downstream end. Nutrient concentrations for nitrate, phosphate, and ammonia were averaged for the summer and calculated to be 2.84, 0.31, and 0.08, respectively. Further testing will need to be run in order to make conclusions on the effects of restoration on stream metabolism.

Title: Economic value of recreational fishing on reservoir and tailrace sections of Millers Ferry Reservoir, Alabama

Primary Author (and presenter): Gratz, Steven M.

Additional Authors: Sammons, Steve M. and Hanson, Terry R.

Department: Fisheries, Aquaculture, and Aquatic Sciences

College/School: Agriculture

Description:

Recreational fishing creates a large source of income within the state of Alabama through both direct sales for local communities and taxes. Knowing how much and where anglers spend money fishing specific destinations allows fisheries managers to better understand the economic impact of these fisheries to the local economy. This economic impact was evaluated for Millers Ferry Reservoir, which was split into six sections covering 157.1 km of the Alabama River, using a stratified, non-uniform probability sampling design. Instantaneous counts (N=188), on-site roving creel surveys (N=729), and follow-up telephone interviews (N=506) were conducted to obtain fishing effort and expenditure data from January to December 2015. Data were then extrapolated to estimate total fishing effort on the reservoir at $164,145 \pm 36,184$ hours. Recreational boat anglers were responsible for 89% of the effort while the remaining effort was from shore anglers for a total of 23,156 and 4,589 trip days, respectively. Recreational anglers who visited Millers Ferry Reservoir spent \$2.5 million on their trips for resources (fuel, lodging, food, tournament fees, etc.). Fuel for boats and vehicles (\$1.0 million) and food (\$0.5 million) were the sources of the majority of the expenditures. Anglers targeting bass *Micropterus* spp. spent \$1.7 million on their trips with most of the effort concentrated in the sections directly above the dam. Fisheries managers can use these economic impact estimates to better understand a fishery and improve the opportunities for recreational anglers.

Title: Effectiveness of *My Quest*, an intervention using text messaging to improve dietary and physical activity behaviors and promote weight loss in low-income women in Alabama

Primary Author (and presenter): Griffin, Jamie B.

Additional Authors: Struempfer, Barb; Funderburk, Katie; Parmer, Sondra; Tran, Cecilia; Wadsworth, Danielle

Department: Nutrition, Dietetics and Hospitality Management

College/School: Human Sciences

Description:

My Quest was a 12-week text messaging initiative to evaluate predictors and behaviors known to improve weight loss/management. *My Quest* was developed using Social Cognitive Theory focusing on personal, behavioral and environmental factors. Scales and pedometers were provided for self-monitoring. Recruitment took place in 80% of Alabama counties; data collection occurred through text message response/online surveys from April to July 2016. Participants (n=104) were low-income, predominately minority, overweight/ obese women in mainly rural communities. Short texts (n=2-3/day) provided health tips and goal setting prompts. Text prompts required participant feedback on weekly body weight self-monitoring. Participants also received a weekly eNewsletter. Dependent variables were body weight, self-efficacy, goal setting, self-monitoring and behavioral and environmental factors. Independent variable was intervention (pre-post). Analyses were conducted using McNemar test (dichotomous data), paired t-test (continuous data) or Wilcoxon Signed Rank Test (categorical/ordinal data). From pre- to post-assessment, females significantly (P<.05) reduced body weight, improved food environment and increased self-efficacy, dietary and physical activity goal setting, dietary and physical activity behaviors. In conclusion, a low-cost, nutrition education intervention delivered through text messaging can improve dietary and physical activity behaviors and promote weight loss in low-income, minority women.

Title: Evaluation of nitrogen delivery methods for stocker cattle grazing annual ryegrass

Primary Author (and presenter): Gunter, Phillip, A.

Additional Authors: Peacock, Robert; Muntiferung, Russell; and Mullenix, Mary

Department: Animal Sciences

College/School: College of Agriculture

Description:

A 140-d grazing experiment was conducted to evaluate efficacy of replacing N fertilizer with either interseeded legumes or protein supplementation for stocker cattle grazing annual ryegrass (*Lolium multiflorum*). Ninety steers (initial body weight, 225 ± 10 kg) were assigned to the following N-delivery methods, with or without monensin fed in a free-choice mineral supplement: ryegrass fertilized with 112 kg N/ha (NFERT); ryegrass interseeded with crimson clover (CC, *Trifolium incarnatum*); ryegrass interseeded with arrowleaf clover (AC, *Trifolium vesiculosum*); ryegrass plus dried distillers grains plus solubles (DDGS) supplemented at 0.65% BW daily; and ryegrass plus whole cottonseed (WCS) supplemented at 0.65% BW daily. Steers were weighed every 28 d, and forage mass (FM) was measured concurrently using the destructive harvest/disk meter double-sampling method. Each of thirty 0.81-ha paddocks was stocked initially with 3 steers, and stocking density was adjusted using put-and-take steers based on changes in FM and steer BW in order to maintain a forage allowance (FA) of 1 kg DM/kg steer BW. Grazing was discontinued on May 11, 2016. Data were analysed by PROC MIXED for a completely randomized design with pasture ($n = 3/\text{treatment}$) as the experimental unit. Average daily gain (ADG; kg/d) of DDGS-supplemented cattle was greater than ($P = 0.10$) CC and AC, and tended ($P = 0.11$) to be greater than NFERT and WCS. Stocking density (steers/ha) was greater ($P = 0.005$) for NFERT, DDGS and WCS than CC and AC. Grazing days/ha for NFERT, DDGS and WCS were greater ($P < 0.01$) than CC and AC. Total gain (kg/ha) tended ($P = 0.14$) to be greater for DDGS-supplemented cattle than NFERT, CC and AC, but not WCS. Results are interpreted to mean that annual ryegrass pasture supplemented with either DDGS or WCS supported ADG, stocking densities, grazing days/ha and total gain/ha that were similar to or greater than annual ryegrass amended with N fertilizer or interseeded with annual legumes.

Title: Barrier layers to protect Nb superconductivity in thin film superconducting flexible cables

Authors: Vaibhav Gupta*, John A. Sellers*, Charles D. Ellis*, Bhargav Yelamanchili*, Simin Zou*, George A. Hernandez*, Rujun Bai*, Yang Cao*, David B. Tuckerman** and Michael C. Hamilton*

* Department of Electrical and Computer Engineering, Auburn University, Auburn, AL

** Microsoft Research, Redmond, WA

Description:

We have investigated multiple material stack-ups to protect Nb-based superconducting thin film flexible cables. We show that curing polymers above a certain temperature on top of a Nb layer can adversely affect the superconducting properties including critical transition temperature (T_c) and critical current (I_c). A nominal Nb thickness of 250nm, is used in this work. Multiple barrier materials have been explored: metals such as Al, Cr and Ta, alternative polymer layers such as Asahi Glass AL-X2010. Metal barrier layers may be viable options for potential use in superconducting flexible cables for high frequency use, provided they do not unduly degrade the high frequency signal propagation due to microwave skin effects or proximity effects. Dielectric materials may be viable options if they exhibit sufficiently low loss at the intended operating temperatures and frequencies. The polyimide used in this work is Dupont PI-2611 from HD Microsystems. We used nominal curing temperatures of 350°C for PI-2611 and 190°C for AL-X2010. DC electrical characterization of patterned film test structures were carried out using a closed-cycle cryostat to determine T_c and I_c for the samples. Results of these experiments are expected to provide insight into possible materials stack-ups for robust, multi-layer superconducting flexible cables that can find use in future cryogenic electronics systems.

Title: Three-dimensional engineered prostatic tumor model for in vitro recapitulation of the native tumor microenvironment

Primary Author (and presenter): Habbit, Nicole, L.

Additional Authors: Hassani, Iman; Anbiah, Benjamin; and Lipke, Elizabeth, A

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Prostate cancer presents a high incidence rate in American men with approximately 1 in 7 being diagnosed during his lifetime. Anti-prostate cancer therapeutic and oncolytic agent research efforts currently utilize the PC-3 cell line initiated from a bone metastasis of a grade IV prostatic adenocarcinoma in three-dimensional (3D) cultures. To ensure adequate translation to clinical application, the tissue engineered tumors must recapitulate the native tumor microenvironment (TME) and thus the mechanical and physiological characteristics found *in vivo*. Non-uniformities in the native TME present a unique challenge when designing biomimetic models due to spatial and temporal heterogeneities in tumor cell growth and microarchitecture. This study reports the co-encapsulation of PC3 cells and fibroblasts in a biosynthetic poly(ethylene glycol)-fibrinogen (PF) hydrogel scaffold and the resultant degree of correlation to native prostate tumors. PC-3 cells *in vitro* are maintained long term with high viability in 3D culture and demonstrate cell-type morphological changes over time. Through the addition of poly(ethylene glycol) diacrylate (PEGDA) the hydrogel matrix is modulated to recapitulate the mechanical stiffness of *in vivo* prostatic carcinomas. As PEGDA concentrations are altered, resulting changes in Young's moduli are quantified. This engineered tumor stiffness property is also found to vary with respect to culture time. The effects of modulated stiffness on PC-3 cell proliferation and 3D morphology within the hydrogel construct are investigated. The engineered tumor model physical and physiological characteristics are evaluated in comparison to those of the native tumor and optimized for maximal correlation. Overall, the ability to modulate the biomimetic prostatic tumor model facilitates optimal recapitulation of the TME and demonstrates a potential for use in effective and translatable anti-cancer therapeutic development.

Title: Metal nanoparticles obtained from olfactory and respiratory epithelia enhance olfactory responses to odorants.

Primary Author (and presenter): Hagerty, Samantha, L.

Additional Authors: Singletary, Melissa; Pustovyy, Oleg; Globa, Ludmila; Sorokulova, Iryna; Morrison, Edward; and Vodyanoy, Vitaly

Department: Anatomy, Physiology, and Pharmacology

College/School: Veterinary Medicine

Description:

Isolation of metal nanoparticles from the blood of vertebrate species initiated investigations of their role in the olfactory system. A series of *in vitro* and *in vivo* studies using engineered nanoparticles have demonstrated a dose-dependent, specific, and reversible effect at both cellular and cognitive levels of physiology. Among the non-ionic metals, only zinc facilitated dramatically enhanced olfactory responses to odorant stimulation. If zinc nanoparticles act during initial olfactory transduction events, they must be endogenously present in the olfactory epithelium (OE). The present work aims to determine if OE contains zinc nanoparticles capable of enhancing olfactory responses to odorant stimulation analogous to engineered nanoparticles. Nanoparticles were both engineered using high-voltage discharge and extracted from surgically removed OE and respiratory epithelia (RE). They were then mixed with standard odorant solution and presented to OE for EOG recordings. Resulting mean peak voltage values showed that nanoparticle suspensions obtained from OE and RE both significantly enhanced responses to odorant stimulation, slightly less than lab engineered zinc nanoparticles. A calibration curve was calculated to estimate the concentration of zinc nanoparticles, specifically, within the extracts and in the endogenous tissues. Concentrations of zinc nanoparticles in OE and RE extracts were calculated to be ~5.3 pM and ~2.7 pM, respectively. Concentrations of zinc nanoparticles in OE and RE were calculated to be ~10.3

nM and ~7.9 nM, respectively. To support these estimations, endogenously collected filtrate must next be analyzed and physically characterized using electron microscopy, X-ray spectroscopy, and atomic force microscopy. By confirming the presence and functionality of endogenous zinc nanoparticles in the OE, we will be able to further characterize their fundamental role and mechanism in the initial transduction events. Supported by NIST 70NANB14H324.

Title: Factors influencing fire ant prevalence and nest predation on grassland birds in a fire-mediated ecosystem

Primary Author (and presenter): Haines, Angelina, M.

Additional Authors: Gitzen, Robert; Lepczyk, Christopher; Terhune II, Theron; Sisson, Clay, D.

Department: Forestry and Wildlife Sciences

College/School: Agriculture

Description:

In the longleaf pine ecosystem (*Pinus palustris*) of the southeastern US, prescribed fire is necessary to restore and maintain habitat for grassland birds, the majority of which have experienced steep population declines in the last few decades. Red imported fire ants (RIFA, *Solenopsis invicta*) are an invasive species whose density may increase in response to disturbances (e.g., fire). This is of concern because over 60 bird species that require fire-maintained grasslands are vulnerable to RIFA nest predation, such as the federally endangered red-cockaded woodpecker (*Picoides borealis*) and northern bobwhite quail (NOBO, *Colinus virginianus*). RIFA nest predation rates on NOBO vary across similarly managed longleaf pine areas, indicating that other environmental factors may influence RIFA nest predation beyond fire disturbance. Our objectives are to explicitly quantify what influences RIFA mound density and forager abundance, and therefore NOBO nest predation. To do this, we are conducting visual surveys for RIFA mounds and pitfall trapping to collect RIFA foragers to determine if their numbers are influenced by time since burn, groundcover type, soil type, and interactions of these variables on nine properties in Georgia and Florida. Quantifying these relationships will help managers make science-based decisions related to RIFA nest predation. Our work fills a gap in understanding how RIFA invasions and predation may be related to restoration and disturbance. Answering these research questions will also elucidate basic biological invasion problems and guide management efforts targeted towards native species in fire-mediated landscapes, benefiting stakeholders, native populations, and ecosystem health.

Title: Controlling Size and Surface Properties of PLGA Nanoparticles for Vaccine Delivery System

Primary Author (and presenter): Hall, David, Aaron

Additional Authors: Sangle, Prachi P; David, Allan E

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

PLGA (Poly lactic-co-glycolic acid) is a negatively charged copolymer of lactic and glycolic acid that is widely known for its biomedical applications. It is biocompatible, biodegradable and FDA approved for its use in therapeutic devices. PLGA has hydrophobic and hydrophilic properties that can be readily be controlled by changing the ratio of lactic acid to glycolic acid. This ratio has an effect on the overall crystallinity, polydispersity index and hydrophobicity of the particles. It has been previously seen that the

size of PLGA nanoparticles has had a significant effect on the loading efficiency and release profile. The nanoparticles were synthesized using 50% lactic acid and 50% glycolic acid blend. Using the 50:50 ratio, optimizes the crystallinity (mechanical strength) and the hydrophobicity (the rate of hydrophobic interactions) of the particle. The nanoparticles are produced using solvent evaporation method in an oil-in-water emulsion. The particles were characterized using Dynamic Light Scattering (DLS) (for size and surface charge) and scanning electron microscope (SEM) (for size and surface morphology). We got a size distribution of 250 nm to 450 nm by changing various parameters like concentration of polymer, water to oil ratio etc. Lysozyme will be used as model enzyme and encapsulated in PLGA to determine release profile from the nanoparticles. By changing the size and surface morphology of the PLGA nanoparticle, the release profile can be changed to imitate a delayed controlled release. This delayed release can be exploited to replace the need of subsequent vaccine shots, reducing the dependence on patient compliance for vaccine success.

Title: Fall prevention in the elderly 65 years of age and older in the long term care setting

Primary Author: Hamlett, LaKisha, N.

Secondary Author: Ellison, Kathy Jo

College/School: School of Nursing

Description:

There is strong evidence that a walking program contributes to the improvement of mobility, gait, endurance, strength and balance. Evidence-based guidelines recommend routine physical activity as an essential component of healthy and successful aging to maintain functional abilities. The purpose of this project was to implement a walking program to prevent the incidence of falls and decrease Morse fall scores. Target population included elderly adults 65 years of age and older residing in a long term care setting with a MFS of 45 or above and uses an assistive device for ambulation. Following guardians' permission, participants' fall history was assessed and baseline MFS was completed for each participant. The walking program requires participants' to ambulate five days a week for fifteen minutes. Descriptive statistics were used to describe patient population, dementia diagnosis, MFS, type of assistive device, ethnicity and sex. Participants' pre-post fall rate, pre-post MFS, gait and balance scores were compared with paired t-tests. X agreed to participate (X% males), average age of X (sd) years. X% were identified with a Morse fall score of 45 or above. Follow up indicated X% improved with participation. Among those with MFS of 45 or above, the mean fall rates and MFS improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$) Falls were prevented with the implementation of a daily walking program. Walking as an exercise improves gait and balance in the elderly 65 years of age and older residing in a LTC setting. Further implementation of the project is warranted.

Title: Challenging plaster's intrinsic properties through analog and digital modeling

Primary Author (and presenter): Hamrick, Rachel C

Department: Landscape Architecture

College/School: College of Architecture, Design & Construction/Architecture, Planning, & Landscape Architecture

Description:

This project challenges the intrinsic properties of a material—plaster—in order to discover new formal and processual inspiration that could be used to influence future iterations. Efforts focused on eliciting qualities of “erosion” not considered inherent to plaster. Over 40 iterations were completed; each pour meant exploring color and texture, and re-examining technique, dimensions, and materials. Later versions involved revisions in consistency, form, mark-making techniques, color, and composition. Final versions—

more difficult, since certain characteristics, like color, were unavailable during this phase—were digitally hybridized, remixed, and amplified. Ultimately, it was determined that the selected and distilled principles of erosion could be cultivated in plaster (even though one may not consider stability through chaos as intrinsic to this medium) and then be transferred into a new medium with different cultural and physical meaning. The models exist as moments of disintegration evidenced through the juxtaposition of stability and chaos. Each exhibits decay and transformation—two key qualities of erosion. By exploring form, texture, rhythm, juxtaposition, and complexity, “erosion” is made evident in both the plaster and digital models as revelation through transformation, disruption, and inconsistency.

Title: Soy protein substitution in phenol formaldehyde adhesive used in oriented strand board

Primary Author (and presenter): Hand, William, G.

Additional Authors: Via, Brian; Banerjee, Sujit; and Cheng, Qingzheng

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

We are developing a method to substitute soy protein in the adhesive, phenol formaldehyde (PF), which is used in the production of oriented strand board (OSB). Soy flour has been used as an adhesive in the past. It was deemed not practical due to the water absorptivity being high thereby decreasing wet strength (WS) and increasing thickness (TS) swell in OSB. By substituting small amounts of soy flour (5-10%) in PF, WS and TS as well as other properties of OSB can stay within industrial tolerances. This study observes the effects of flexural strength, flexural modulus, TS, and water absorption of OSB constructed with the adhesive mixture. Modifications to the OSB included three parameters: % soy flour (0%, 5%, 7%, 10%, 14%, and 21% soy flour/PF dry wt%/wt%), board density (30, 35, and 40 lbs/ft³), and adhesive loading (4%, 6%, and 8% adhesive dry wt%/wood dry wt%). In some instances, the substitution of soy flour into PF has shown an increase in flexural strength with varying board densities. It was shown that soy flour substitution met and sometimes exceeded the same flexural strength of 100% PF at lower densities. The cheaper soy flour can offset the higher priced PF. The soy/PF boards can also be made at lower densities to meet the same flexural strength requirements of boards made with 100% PF at higher densities lowering the cost of wood strands. Also, soy substitution decreases formaldehyde, which is a known carcinogen, off-gassing from OSB with PF adhesive.

Title: Characterization and self-assembly of Janus nanoparticles

Primary Author (and presenter): Hanley, Alan

Additional Authors: David, Allan E.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description: Janus nanoparticles, due to their ability to self-assemble, have been of interest to researchers for over 30 years. Janus nanoparticles are defined by regions of differing properties on the nanoparticle surface. By changing the materials on the Janus nanoparticle surfaces, we can alter the characteristics of the self-assembled structures. In our research, we have synthesized Janus nanoparticles using multiple nanoparticle core materials as well as different surface modifying compounds. We have been able to develop self-assembled spherical structures of both hydrophobic and hydrophilic nature. Using characterization methods including Dynamic Light Scattering, Fluorescent Spectroscopy, and Transmission Electron Microscope imaging, we have been able to examine the surfaces of these nanoparticles and study the self-assembled structures that they create. Moving forward, we will continue to alter the surface compounds of Janus nanoparticles to explore new self-assembled structures, paying

special attention to attempting to develop a self-assembled monolayer. We will also investigate the impact that surface compounds have on the size of the self-assembled spherical structures and the size ratios of the opposing regions on the Janus nanoparticle surface.

Title: The effects of pH on aqueous cellulose nanocrystal dispersions' rheology and phase behavior

Primary Author (and presenter): Hansford, Andre

Additional Authors: Davis, Virginia

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Cellulose nanocrystals (CNC) have garnered attention in recent years for their renewability, outstanding mechanical properties, and tailorable surface chemistry. The sulfuric acid hydrolysis of agricultural and forest product waste results in CNC which easily disperse in water at sufficient concentrations to enable chiral nematic (cholesteric) liquid crystalline phase formation. Processing liquid crystalline dispersions is increasingly recognized as the simplest and most cost effective way to produce large area coatings, films, and fibers of aligned nanomaterials. However, the ionic strength, and pH, of CNC dispersions depends on concentration. This causes the dispersions' low shear viscosity to increase with concentration instead of going through the expected minimum at the transition to a single phase liquid crystal. Similar behavior has also been observed for other charged rod-like nanomaterials including halloysite and chitin. To better understand the origin of this behavior, ten CNC dispersions ranging in concentration from 1.25 to 7.15 vol% were all titrated to the pH of 5.75 using 0.01 M HCl solution. The viscosity modulus and loss modulus of these dispersions were measured using an Anton Paar MCR 301 rotational rheometer. The liquid crystalline phase behavior was also characterized using a Nikon 80i cross polarized microscope. The results showed that at constant pH, the rheological behavior was more consistent with that expected for rod-like macromolecule dispersions and there was a shift in the phase boundaries. These results advance fundamental understanding of the rheology and phase behavior of charged nanomaterial and can aid in reducing the viscosity of CNC dispersions prior to processing.

Title: Pediatricians role and knowledge of universal newborn hearing screening, diagnosis, and protocols

Primary Author (and presenter): Hanson, Meaghan, K.

Additional Authors: Jones, Alisha L.

Department: Communication Disorders

College/School: Liberal Arts

Description:

Pediatricians are defined as a child's medical home and are key players in early hearing detection and intervention programs, as well as universal newborn hearing screening programs (UNHSPs). Physician's role as healthcare providers are to be advocates for their patients, including being cognizant of hearing protocols established by the Joint Committee on Infant Hearing (JCIH). This study goes into greater detail of the importance of the relationship between providers and presents a survey completed by pediatricians assessing their knowledge in regards to hearing health care and universal newborn hearing screening protocols. A thirty-seven question survey was developed and adapted from Danhauer and Johnson (2006) and Colozza and Anastasio (2009). Thirteen surveys were completed by practicing pediatricians. Overall, the physicians were knowledgeable in regards to hearing protocols and had positive responses in regards to the audiologist's role. They viewed the UNHSPs as important as well as their role in the program as essential. Though most physicians were knowledgeable in regards to the process and protocols of said programs, half of the participants still reported wanting additional information. Education and

communication between disciplines is vital to streamline health care and provide the best service to our littlest patients.

Title: Pyridine containing soft donor ligands for molecular recognition of uranyl: Nuclear contamination detection via color change

Primary Author (and presenter): Hardy, Emily E.

Additional Authors: Wyss, Kevin M. and Gorden, Anne E. V.

Department: Chemistry and Biochemistry

College/School: College of Science and Mathematics

Description:

Nuclear power production continues to be a viable alternative to more conventional fossil fuel power production to meet the energy needs of the United States while reducing our carbon footprint. The environmental impact of spent nuclear fuel generation and storage as well as the possibility of release events reduces the popularity and acceptance of nuclear power by the general public. To help address these concerns, materials that can quickly detect or extract actinides in the presence of lanthanides and other contaminants are needed. A colorimetric sensor, a molecule that exhibits a specific colour change in the presence of a certain contaminant, would be ideal as they can provide on-site detection and can be operated without extensive training. A mixed oxygen and nitrogen donor system containing imine and pyridyl nitrogen donors has been developed for the molecular recognition of the contaminant uranyl (UO_2^{2+}), the most common oxidation state of uranium in ground water. This ligand, 2,6-bis[1-[(2-hydroxynaphthyl)imino]ethyl]pyridine], contains a penta-coordinate binding environment perfectly suited for the equatorial binding preference of the uranyl, plutonyl and neptunyl cations. Here, the synthesis and characterization – solution and solid-state – of the ligand system as well as the molecular recognition of uranyl and other common contaminants are discussed.

Title: Nonpharmacological strategies versus opioid treatment of non-cancer chronic pain

Primary Author: Harlacher, Melissa B.

Secondary Author: Ellison, Kathy J.

College/ School: School of Nursing

Description:

Opioids are commonly used in treating chronic pain, despite evidence they not the most effective treatment strategy. The purpose of this project is to explore nonpharmacological treatment strategies in treating non-cancer chronic pain in adults, and to determine if these strategies are effective in providing increased pain control when used alongside opioid analgesics. Patient pain levels, Quality of Life Scale cores, and daily opioid dose were assessed.

Target population included adults (50+) suffering from non-cancer chronic pain lasting greater than three months. Participants were identified at office visits within the primary care setting, consent was obtained, and initial daily opiate equivalent dosages, pain scale ratings, and Quality of Life Scale scores were recorded. Physical or movement therapies were prescribed to enhance participants' current treatment plan of opioids alone. After 4-6 weeks, opioid use as opiate equivalent dosage, pain scale ratings, and Quality of Life Scale scores were reassessed. Descriptive statistics were used to describe the patient population, treatment modalities, and patient adherence. The pre-post pain scale ratings, Quality of Life Scale scores, and daily opioid dosages were compared with paired t-tests.

X consented to participate (% males), average age of X (sd) yrs., X % were treated with physical therapy, X% were treated with home exercise, X% were treated with other nonpharmacological modalities, and X% were treated with a combination of nonpharmacological treatment modalities. Follow-up indicated

that X% adhered to treatment. The mean pain scale ratings, Quality of Life Scale scores, and daily opioid dosage improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$).

Nonpharmacological interventions significantly decreased pain scale ratings, improved Quality of Life scale scores, and decreased the daily dosage of opioids used to treat non-cancer chronic pain. Long-term implementation of the project is warranted, and further exploration of the impact of specific nonpharmacological treatment strategies in treating non-cancer chronic pain would be useful in identifying which of these strategies are the most beneficial.

Title: The effect of contact and disability recognition on qualification ratings

Primary Author (and presenter): Harrell, Crystal

Additional Authors: Bubb, Robert

Department: Sociology; Human Development and Family Studies

College/School: College of Liberal Arts; College of Human Sciences

Description:

Despite legislative intervention, persons with disabilities (PWD) still experience discrimination. As a result, PWD occupy an inferior place in American society and remain disadvantaged vocationally in comparison to persons without disabilities (PWOD). Employment statistics remain stubborn to change and continue to be a critical focus among civil rights activists, lawmakers, and researchers (National Council on Disability, 2013). One possible explanation for the lack in progress may be due to human resource (HR) decision makers' level of contact with PWD and whether they reportedly recognize an applicant with a disability as having a disability. The following study investigates if the amount of contact with PWD predicts evaluation ratings for applicants with and without Down syndrome. Two equally qualified, but fictitious job applicants were evaluated on qualifications and recommendations for hire by a sample of 54 participants with self-reported HR experience. The findings suggest that the amount of contact with PWD predicts qualification ratings, and interacts with disability recognition to predict recommendations. Those participants with low contact and who fail to recognize an applicant's obvious disability status rate PWD significantly lower than PWOD. Disability recognition is also important to HR decision evaluations. Some disabilities are highly visible to observers, whereas others are much less apparent (Stone & Colella, 1996). Research has consistently shown that when a disability is apparent, able-bodied people become anxious, avoid eye contact, and react unfavourably toward the disabled person (e.g., Comer & Piliavin, 1972). The findings of the current study correspond with social psychology research that suggests increased contact with protected classes leads to reduced stereotyping (Pettigrew & Tropp, 2006). Training programs emphasizing more contact with PWD as a part of awareness interventions may be warranted.

Title: Reconstructing post-emancipation communities through the preservation of African American cemeteries.

Primary Author (and presenter): Harrell, Crystal

Additional Authors: Bubb, Robert; Swenson, Charles; Harrison, Eddie

Department: Sociology; Human Development and Family Studies

College/School: College of Liberal Arts; College of Human Sciences

Description:

Emancipation and the Reconstruction Act are often viewed as gifts given to grateful, submissive, and passive slaves, rather than catalysts for active agents responsible for their own liberation and success (Jones, 2016). The Reconstruction Era provided opportunities such as land and business ownership, government and political positions, and education to African Americans who, just a few years prior, were nameless properties on non-population schedules. Their accomplishments are etched in stone in many local African

American cemeteries and printed on forgotten documents found in newspapers, population schedules, and county courthouses. The goal of the current project is to document the ordinary and extraordinary lives of those living in early African American communities. Researchers from Auburn University collaborated with Mount Rose Missionary Baptist Church to highlight five individuals to represent a snapshot of the Camptown community in Brenham, Texas. After gaining recognition as a historic site, newspapers from the time period and location, as well as, deed, civil, and probate records were searched. The artifacts obtained were then organized into qualitative narratives. The fascinating life sketches of Wiley Hubert, Louisa Mangram, Mary Escoe, Sam Love, and Robert Sloan were selected for the current presentation. These five individual narratives intertwine to represent the close-knit African American community in Camptown and just a few of the lawmen, politicians, educators, clergy, landowners, entrepreneurs, carpenters, and veterans who shaped the community following the Civil War. The findings of the project reinforce the competing narrative that early African Americans were accomplished agents within their communities despite opposition from Black Codes, Jim Crow Laws, violence, and intimidation. It is hoped that the current research effort will lead to many inspirational narratives of those interned at other historic African American cemeteries.

Title: Contraction analysis of human induced pluripotent stem cell derived cardiomyocytes

Primary Author (and presenter): Harris, Bryana, N P

Additional Authors: Ellis, Morgan; Lipke, Elizabeth

Department: Chemical Engineering

College/School: College of Engineering

Description:

Heart disease is the leading cause of death worldwide. Currently, there is technology being used to study mechanisms of the heart, and to address the issues of heart disease, that involve mouse and porcine models. While animal models are useful, they do not accurately portray the native heart tissue. Our research group has developed a one-step encapsulation technique that uses human induced pluripotent stem cells (hiPSCs) and a poly (ethylene glycol) fibrinogen (PEG-FB) solution to create 3D human engineered cardiac tissues (3D-hECTs). From this previous research comes the motivation to not only perform the encapsulation technique but to examine the different aspects of creating mature, contracting 3D-hECTs. One of those aspects is measuring the functionality of the cardiomyocytes by analyzing the contractility of the cells. For this analysis, we used a video-based method to assess the contractility of these cells. The contractions of the cardiomyocytes were visualized using phase contrast microscopy and videos of the tissue contraction were recorded. Using a MATLAB program, the beats per minute and the contraction and relaxation velocities were quantified. To accomplish this goal, many details had to be specified before we could accurately process the contraction videos. These parameters include the size and length of the video taken, the area of interest, and the specification of the contraction and relaxation peaks. Using this method of analysis allows us to compare the contractility of cardiomyocyte tissues over time in culture and assess differences between tissues composed of hiPSCs from different patients, including those with cardiovascular diseases. This method of video based analysis provides a way to characterize the functionality of stem cell-derived cardiac tissues while maintaining sample integrity.

Title: Treatment of chronic pain using targeted nanoparticles

Primary Author (and presenter): Harris, Chelsea, M.

Additional Authors: Choi, Young Suk; Suppiramaniam, Vishnu; and David, Allan

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Pain affects every person during their lifetime, but chronic, severe pain is an often undertreated and poorly managed medical condition. 100 million Americans suffer from chronic pain, many times more than the number of cancer and heart disease patients combined. Additionally, pain results in over \$300 billion in health care costs each year. Although pain is a significant public health issue, the current treatment methods are often unsuccessful. Opioids are most commonly used for pain management, and although they are the most potent and successful form of treatment, they come with the risk of increased pain sensations and addiction with chronic use. Other options such as non-steroidal anti-inflammatory drugs (NSAIDs) are often not strong enough to fully alleviate the pain. We propose to use silica nanoparticles (NPs) to target select receptors in mature neurons of the peripheral nervous system as a novel method of pain treatment. These NPs will be functionalized with an analogue of the naturally occurring agonist of these receptors so that in their presence, the binding of the NPs will result in a blocking of the pain response. The level of binding and interaction that these NPs have with active neurons will be analyzed through a variety of techniques including cell viability assays, long term potentiation and depression recordings, and a novel technique developed by the Suppiramaniam laboratory which uses biochemically active isolated synapses. It is anticipated that the binding of the analogue to the receptors will enhance channel activity and inhibit pain signals. Because the NPs target the nervous system specifically, this treatment method comes with a much lower risk of addiction and other harmful side effects. If this can be achieved, this technique stands to drastically reduce the current required opioid dosage for chronic pain management, thereby lowering the chances of opioid addiction and ultimately changing the way pain is treated.

Title: Optimization of solid and mesoporous silica nanoparticles for drug delivery

Primary Author (and presenter): Harris, Patrick R.

Additional Authors: Kelly, Alexander L.; David, Allan E.

Department: Department of Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Silica nanoparticles (SNPs) have attracted considerable attention regarding their use in nanomedicine. Their well-established surface chemistry permits the attachment of many different types of drug molecules, polymer coatings and targeting ligands. SNPs are also useful due to their innate biocompatibility. A procedure has been developed, via the modification of the Stöber synthesis method, to successfully synthesize and functionalize solid SNPs with appreciable size control and monodispersity. Analysis of the size, size distribution and surface characteristics was conducted using dynamic light scattering (DLS) and TEM. The modulation of reagent concentrations was shown to have a significant effect on the size and monodispersity of the particles – particularly between 80-500 nm while varying water concentration. An optimum silica precursor, tetraethylorthosilicate (TEOS), reagent concentration was found to prevent polydisperse seeding of solid SNP and pre-dilution of TEOS with ethanol further increased monodispersity.

Inherently, these solid silica nanoparticles are limited in their drug loading capacity by their surface area. This has led us to investigate an alternative drug delivery carrier, mesoporous silica nanoparticles (MSNPs). The increased surface area of MSNPs along with their inherent porous matrix allow for increased encapsulation capacity of small drug molecules. Adaptations of procedures from literature are being combined with our developed understanding of solid silica nanoparticle synthesis to successfully produce MSNPs. The current focus of this work is creating particles with a diameter of 100-200 nm. Characterization being conducted includes DLS, TEM and Brunauer–Emmett–Teller analysis to determine nanoparticle size and surface characteristics. A fluorescent molecule, calcein, will be loaded within the particle and its release rate measured over time via spectrophotometry to demonstrate this particle's viability as a drug delivery platform.

Title: A code to retrieve the three-dimensional photoelectron emission from a two-dimensional image

Primary Author (and presenter): Geoffrey R. Harrison

Additional Authors: Brock Hidle, John Vaughan, Joseph Bahder, and Guillaume M. Laurent

Department: Physics

College/School: College of Sciences and Mathematics

Description:

I will present a computational routine to reconstruct the three-dimensional photoelectron emission from the two-dimensional image recorded by a position sensitive detector. The code is used in combination with a Velocity Map Imaging (VMI) spectrometer which is a technique for extracting angular and energy information from a two-dimensional projection of photoionized particles (electrons or ions). The specific approach I use to reconstruct the 3D emission is a version of the Basex method adapted to fit a polar coordinate system called the pBasex method. The polar coordinate system is a more natural fit to the problem since it exhibits the same symmetries as the photon-matter interaction that generated the electrons. The pBasex method has three major advantages over other methods. First it is faster than most other methods. Second it allows for better energy and angular resolution, and thirdly it concentrates the background noise into the often-ignored central region of the image. Here, I will present a first version of the code.

Title: Kudzu bug (*Megacopta cribaria* F.) populations and incidence of the entomopathogenic *Beauveria* sp. in Alabama soybean (*Glycine max* L.)

Primary Author (and presenter): Harry, Brittany, D.

Additional Authors: 2nd Jacobson, Alana

Department: Entomology and Plant Pathology

College/School: College of Agriculture/ Auburn University

Description:

First sighted in Georgia in 2009, *Megacopta cribaria*, the kudzu bug, has become a pest of legume crops and is now present in every county of Alabama. The kudzu bug completes 2 generations per year with a life cycle consisting of eggs, 5 nymphal instars, and an adult stage that is also the overwintering stage in the second generation. Kudzu bug has a narrow host range and feeds only on legumes including economically important crops like soybean, which was valued at \$167 million dollars in 2016 in Alabama. Kudzu bug infestations require 1-2 pesticide applications to manage populations; alternative methods and biological control agents are still under investigation. Beginning in 2014, a naturally occurring soil fungus, *Beauveria bassiana* was observed to infect and kill up to 90% of kudzu bugs in Alabama. The experiments reported here were conducted to examine the impact of this fungus on kudzu bug populations in 2015 (August), and 2016 (July – September). In 2015, a field study was conducted at the Prattville Agricultural Research Unit to examine whether fungicides commonly used for disease management in soybean fields would decrease the efficacy of *B. bassiana* to infect kudzu bugs. Soybean plots in 2015 consisted of small plots that were naturally or artificially (sprayed) inoculated with *B. bassiana* and treated with and without three commonly used fungicide classes that were not observed to decrease the incidence of *B. bassiana* in this trial. In addition, kudzu bug numbers and *B. bassiana* incidence were also monitored in small plot soybean fields in Auburn, AL. In 2016, small plots of soybeans were established in Prattville, Brewton, Headland, and Auburn, AL to monitor kudzu bug populations and the natural incidence of *B. bassiana*. Results from these field trials will be presented along with kudzu bug population numbers and incidence of *B. bassiana* during this two-year period.

Title: The relationship between decision making behavior and the work-life interface

Primary Author (and presenter): Hartman, Paige

Additional Authors: Michel, Jesse, S. and Franco-Watkins, Ana

Department: Psychology

College/School: Liberal Arts

Description:

Research on decision making behavior and organizational variables examined together has been sparse in the literature. In the present study, we aim to answer this call for greater examination of the relationships between decision making behavior and organizational behaviors by examining the relationship between maximizing and satisficing, the two most commonly employed decision making behaviors, with work-life conflict and work-life enrichment. Based on work-life and decision making theories, it was hypothesized that people with higher tendencies to maximize in their decision making would have higher levels of work-life conflict and those with higher tendencies to satisfice in their decision making would have higher levels of work-life enrichment. Two samples, a snowball sample and a convenience sample, were used to test these relationships through correlation and regression analyses. Regression and correlation results from the two samples support that maximizing decision making behavior is related to work-life conflict, and satisficing decision making behavior is related to work-life enrichment. Results were consistent across two different sources (snowball sampling and Amazon's Mechanical Turk), and interpretation and importance of these results are discussed. This research helps connect decision making and work-life research, and illuminates why employees may experience differing levels of work-life enrichment and work-life conflict.

Title: Relations between scripted secure base attachment representations and social competence, temperament, and executive function

Primary Author (and presenter): Hartwick, Olivia, I.

Additional Authors: Vaughn, B; Lu, Ting; Krzysik, Lisa; and El-Sheikh, Mona

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Attachment relationships are co-constructed between the child and attachment figures over the early years. These early relationships become internalized as "working models" of the attachment relationship, and subsequently support the construction of internal models of self, the self-in relation to others, and the world more generally. Waters and Sroufe (1983) suggested that these internal models constitute the link between relationships inside and outside of the family, and that attachment security was the precursor of "competence" in childhood peer groups. A core element of attachment working models is a "script" concerning the nature of secure-base relationships that can be assessed from attachment relevant narratives elicited in the course of children's stories based on doll play prompts (Waters et al., 1998). In this study, we examined relations between secure-base script scores from child narratives obtained from the Attachment Story Completion Task, (ASCT) and a set of social functioning tasks, executive function tasks, personality/temperament ratings by teachers, and tests of intelligence. Secure-base script scores from one hundred and thirty-nine preschool children (72 boys, 67 younger) in a university directed early learning program were assessed. Preliminary correlations show that the attachment script scores are positively and significantly associated with child sex (girls were favored), teacher ratings of peer acceptance, temperament scales indicative of higher effortful control (attention focus, inhibitory control, low intensity pleasure), teacher perceptions of closeness to the child, executive functioning tasks, receptive vocabulary, observation measures of social competence and self-esteem, and with positive

sociometric choices from peers. These preliminary results indicate that attachment representations are foundational to children's adaptive functioning and competencies achieved during early childhood.

Title: Comparative studies of Ru-doped ZSM-5 and activated carbon for hydrogen production by thermocatalytic decomposition of methane

Primary Author (and presenter): Harun, Khalida, B.

Additional Authors: Adhikari, Sushil and Wang, Zhouhong

Department: Biosystems Engineering

College/School: College of Engineering

Description:

Energy crisis is one of the major concern in today's world. Hydrogen (H₂) can be utilized as a promising green alternative of fossil fuel. Among the various possible ways to produce H₂ from methane (CH₄), thermocatalytic decomposition provides several benefits those include but not limited to 1) provides more straightforward path 2) eliminates CO_x production 3) reduces production costs etc. In present study, four different catalysts (Zeolite Socony Mobil-5 (ZSM-5), 3% Ruthenium (Ru) doped ZSM-5, activated carbon (AC) and 3%Ru doped AC) were used to decompose methane at 800°C and atmospheric pressure in a fixed bed reactor. X-ray powder diffraction (XRD), Temperature Programmed Reduction (TPR), Brunauer-Emmett-Teller (BET) analysis, Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Spectroscopy (EDS) analysis were performed to characterize the catalysts. From reaction results, it is evident that 3%Ru enhanced activity of ZSM-5 and AC. Pure ZSM-5 gave 21% conversion after 8 hrs of reaction whereas 3%Ru-ZSM-5 catalyst gave 40.5% conversion after same amount of reaction time. On the other hand, AC showed better conversion than 3%Ru-ZSM-5 catalyst. Only AC gave 53% conversion after 8 hrs of reaction. 3% loading of Ru on AC increased its conversion to 72% after the same reaction time. Nature of carbon produced in these reactions were also investigated by scanning and transmission electron microscope.

Title: Efficiency of pectin supplement in root colonization and plant growth-promotion of soybean plants by *Bacillus velezensis*

Primary Author (and presenter): Hassan, Mohammad, K.

Secondary Authors: Shantharaj, Deepak²; Williams, Malachi; Liles, Mark; and Kloepper, Joseph

Departments: Entomology and Plant Pathology; Department of Biological Sciences

College/ School: Agriculture; College of Sciences and Mathematics

Description:

A greenhouse experiment was conducted to determine if the use of soil amendments with pectin enhanced traits related to growth promotion by the plant growth-promoting rhizobacteria strains *B. velezensis* rifR AP193 and AP143 on soybean. The overall hypothesis was that amendment of soil with the complex carbohydrate pectin enhances *B. velezensis*-mediated plant growth promotion. The experimental design included soybean seeds planted in field soil that contained *B. velezensis* strains with or without 0.1% pectin supplement, along with a water control. After 28 days, the plants were harvested and analyzed for significant treatment effects. The data indicate that *B. velezensis* rifR strains together with pectin supplement significantly enhanced soybean plant growth (shoot and root length) in greenhouse conditions. Dry shoot and root weights of *B. velezensis* rifR strains with pectin supplement were not significantly different compared to *B. velezensis* rifR strains without pectin supplement. *B. velezensis* rifR strains with pectin amendments significantly increased root nodulation of soybean by native *Bradyrhizobium japonicum*.

Title: Three-dimensional tissue-engineered models of patient-derived colorectal cancer

Primary Author (and presenter): Hassani, Iman

Additional Authors: Anbiah, Benjamin; Ahmed, Bulbul; Greene, Michael W.; and Lipke, Elizabeth A.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Colorectal cancer (CRC) is the second most common cause of cancer-related deaths in the United States. To investigate the drug responsiveness and tumor progression, two-dimensional (2D) and three-dimensional (3D) *in vitro* models have been established using standard cancer cell lines. However, 2D models are unable to replicate physiological complexities of native tissues. In this study, we have developed a 3D engineered tissue using patient-derived xenograft (PDX) tumor cells. There are two main advantages in our model; 1) PDX tumor cells are patient specific and better reflect the phenotype of human tumors compared to cancer cell lines, and 2) 3D culture better mimics native tissue microenvironment in terms of physiological context and dimensionality. Briefly, PDX tumors have been established through patient tumor cell implantation in SCID mice and subsequently propagated *in vivo*. The tumors were then extracted from the mice, dissociated, and the cells were encapsulated within a biosynthetic protein-coupled polymer, polyethylene glycol-fibrinogen (PEG-Fb), to create the 3D engineered CRC model. Colony diameter and viability of the PDX-CRC cells within the engineered tissues were assessed over 29 days and compared with *in vivo* culture. Mechanical stiffness of the engineered tissues was measured and compared with core, midpoint, and periphery of the extracted tumor mass from mice. Our PDX-CRC engineered models supported the growth and viability of the CRC cells and the colony diameter correlates with *in vivo* tumor growth over time. Furthermore, we showed that the stiffness of *in vivo* tumor mass can be achieved in our 3D models by modulation of PEG-Fb. Our established platform can potentially be extended to PDX tumors for other types of cancer and can be used in the future to develop patient-specific therapeutics and treatment strategies to mitigate aggravated CRC.

Title: Recruiting community pharmacies in intervention research: Participation decisions and lessons learned

Primary Author (and presenter): Hastings, Tessa, J.

Additional Authors: McFarland, Stuart, J.; Hohmann, Lindsey, A.; Garza, Kimberly, B.; Huston, Sally, A.; Ha, David; and Westrick, Salisa, C.

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

Alabama community pharmacists in nine counties were selected for recruitment in a 6-month randomized controlled trial to improve immunization activities for non-seasonal vaccines. This study described the recruitment process, participation decisions, and lessons learned. In the selected counties, 571 pharmacies were identified by the Hayes' Directory for recruiting a target sample of 32 pharmacies. Recruitment was conducted by three researchers from March-June 2016 using a telephone script. Pharmacies were eligible if they had provided either herpes zoster or pneumococcal vaccinations in the past 12 months and were able to identify a pharmacist and technician for study participation. Participation decisions were coded using the American Association for Public Opinion Research final disposition codes as guidance. At least 517 calls were made to 251 pharmacies; 46.6% of pharmacies were eligible, 36.3% ineligible, and 17.1% unknown. Of the eligible pharmacies, 36 (14.3%) were enrolled. The remaining were interested but not enrolled (15.9%), corporate-level refusal (8.4%), pharmacist-level refusal (6.8%), or difficult to reach (1.2%). Of those ineligible, 25.9% were due to lack of providing vaccines in the past year, non-working number (8.0%) or no longer in business (2.4%). A total of 320 chain pharmacies were not contacted due to previously identified corporate-level refusal. Successful recruitment of chain pharmacies was through a combination "top-down" and "bottom-up" approach. Individual pharmacies

were approached and if interested, decision maker contacted, identifying individuals at the site-level already committed. The results show recruiting community pharmacies in intervention research is challenging. Researchers must overcome a number of barriers, namely obtaining corporate or decision-maker approval. Establishing pharmacy practice-based research networks may overcome these initial barriers and allow for streamlined pharmacy-based research.

Title: Effects of intensity and spacing of problem behavior on levels of treatment integrity

Primary Author (and presenter): Haygood, Sarah, B.

Additional Authors: Pence, Sacha

Department: Psychology

College/School: Liberal Arts

Description:

Children who engage in problem behavior (e.g., aggression, screaming, self-injurious behavior) can be extremely disruptive, especially in a school setting. This problematic behavior can inhibit the learning of that individual or any of the other individuals in the same classroom. A behavior intervention plan can be developed to reduce the problem behavior and increase appropriate behavior. The Individuals with Disabilities Education Act (2004) requires that individuals who engage in problem behavior that is disruptive to learning for that individual or other students have a functional behavior assessment completed. Following the completion of the functional behavior assessment, a behavior intervention plan (BIP) must be developed. However, for behavior plans to be successful, behavior-change agents must implement the procedures with high levels of integrity. The purpose of this study is to systematically evaluate two variables (intensity of the problem behavior and the spacing of the problem behavior) that may result in decreased levels of treatment integrity when implementing behavior intervention plans. Prior to the study, the participants will be randomly assigned to a BIP that uses either differential reinforcement of alternative behavior (DRA), differential reinforcement of other behavior (DRO), or time-based reinforcement. After being assigned to a reinforcement procedure, the participants will be assigned to the intensity manipulation or the irregular spacing manipulation. During the test condition, the intensity or the spacing of the problem behavior will be manipulated. The test condition will be compared to a control procedure that includes regular intensity and regularly spaced problem behavior. It is hypothesized that levels of treatment integrity will be lower in the increased intensity and irregular spacing conditions when compared to the control condition.

Title: Nanodiamond plasmonic biosensor for ultrasensitive, real-time cytokine detection

Primary Author (and presenter): He, Jiacheng

Additional Authors: Yang, Wen; Gu, Zhengyang; and Chen, Pengyu

Department: Materials Engineering

College/School: Samuel Ginn College of Engineering

Description:

Label-free, nanoparticle-based plasmonic optical biosensing, along with the recent advances in device miniaturization and microarray integration, has emerged as a promising approach for rapid, multiplexed biomolecular analysis. However, limited sensitivity prevents the wide use of such integrated label-free nanoplasmonic biosensors in clinical and life science applications where low-abundance biomolecule detection is needed. Here, we present an ultrasensitive nanoplasmonic biosensor utilizing aptamer functioned gold nanodiamonds (AuNDs) for rapid, label-free analysis of low-abundance protein biomarkers. Specifically, aptamer functioned AuNDs are parallelly patterned on glass substrates using a 3D-stage controlled micro-brush printing technique. By scanning the scattering light intensity drift across

the sensing spots upon target analyte binding under dark field microscopy, high-throughput, ultrasensitive, real-time detection of cytokines can be achieved. Both our simulation and experimental results suggest that such high sensitive can be attributed to the unique nanostructure of NDs with sharp edges, providing strongly enhanced localized electric fields. In addition, the aptamer folding after capturing specific cytokines results in a near-surface (within 10 nm of the AuND surface) refractive index change, which further improves the sensor sensitivity. The developed AuND biosensor presents the first critical step towards the application of nanoplasmonic biosensing technology to immune status monitoring guided by low-abundance cytokine measurement.

Title: 3D-printed molds to provide shape variability in hydrogel scaffolds for engineered human cardiac tissues

Primary Author (and presenter): Head, Sara, E.

Additional Authors: Kaczmarek, Jennifer; Lipke, Elizabeth

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description: For engineered tissues to be functionally relevant, they must accurately mimic native tissues. Biomaterials are used in tissue engineering to provide not only 3D structure but also a physiologically relevant microenvironment that facilitates cell growth and interaction. Cell interactions are significantly impacted by cell orientation and geometry, particularly in cardiac tissues where electrical propagation is critical to tissue function. I hypothesized that the geometry of hydrogels used to form engineered tissues affects cell interactions, thus effecting tissue function. The past procedure to dictate the shape of 3D tissues was the use of polydimethylsiloxane (PDMS) molds with negative space created using a die cut. However, this die-cut method limits geometric variability based on the availability of dies. Here I present a method of creating PDMS molds using 3D-printed casts, providing a potentially limitless variety of tissue geometries.

Casts were designed using SolidWorks software and 3D printed using acrylonitrile butadiene styrene filament. The casts consist of a round well with rectangular raised areas to provide negative space in the final PDMS mold. In the raised areas, the length to width ratio was varied to create tissues of diverse geometries, depth was kept constant based on known limits for nutrient diffusion through tissue thickness, and the total volume was kept constant based on desired cell density. PDMS pre-polymer was poured into the cast and cured for 1 h at 70°C. To form 3D cardiac tissues, liquid poly(ethylene glycol)-fibrinogen precursor was combined with human induced pluripotent stem cells (hiPSCs), pipetted into a PDMS mold, and crosslinked using visible light for 40 s. Encapsulated hiPSCs were then differentiated to form contracting cardiac tissues. Contracting tissues maintain the original shape and length to width ratio provided by the 3D printed cast, showing that this method can be used to generate a multitude of tissue geometries.

Title: The Impact of Interior Design on Assisted Living Residents with Alzheimer's Disease

Primary Author (and presenter): Heapy, Mary R

Additional Authors: Foose, Lizelle; Russian, Kayla; Walley, Madison

Department: Interior Design

College/School: College of Human Sciences

Description:

The impact of interior design on assisted living residents with Alzheimer's disease.

To design a senior care community that offers residents a healthy and holistic built environment that positively impacts both unimpaired senior residents and adults with Alzheimer's disease, as well as caretaker health, well-being, and longevity.

(1) Eliminate the negative stigmas surrounding assisted care and other forms of senior living. (2) Create a usable, functional space for those affected by Alzheimer's disease that minimizes confusion and frustration. (3) Establish a positive workplace environment that caretakers find appealing and healthy. (4) Minimize potential negative impacts of the built environment on the health and well-being of the residents and caretakers. (5) Increase resident's and caretaker's access to nature and the community.

The proposed senior care facility and community will offer residents and caretakers a healthy, happy, and comfortable space to live and work each day. The design will utilize supportive technology to monitor residents so caretaker presence is less noticeable, while allowing them to maintain their privacy and independence. It will also include versatile nursing stations and easily-movable furniture in resident rooms to allow the patient's room and care can change to fit them. Other features include ample use of windows to maximize natural lighting, relaxing break rooms for staff comfort, and utilizing a radial urban community plan to minimize confusion while maximizing resident independence.

Title: Peripherally restricted viral mimic impairs learning and memory in a fear conditioning paradigm

Primary Author (and presenter): Heslin, Ryan Thomas

Additional Authors: Hunsberger, Holly; Setti, Sharay; Jeminiwa, Bamidele; Reed, Miranda

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

A body of clinical evidence has demonstrated that viral infections in the periphery exacerbate neurodegenerative conditions, e.g., Alzheimer's Disease (AD). We have recently demonstrated that challenge with a viral mimic, polyinosinic-polycytidylic acid (PIC), induces a robust hippocampal hyperexcitability. Because hippocampal hyperexcitability correlates with cognitive impairment and predicts development of AD and viral infections are a risk factor for AD, we next examined whether PIC challenge would induce deficits in hippocampus-dependent memory in contextual fear conditioning. Immediately following a contextual fear conditioning training session (2s, 0.7mA shock), mice were administered a single injection of either PIC (12 mg/kg) or saline. Twenty-four hours later, mice were returned to the training context for 180s. PIC-challenged mice displayed significantly diminished freezing behavior, relative to the saline-treated controls, during the testing phase. Identifying the mediators of these deficits may spur the development of therapeutic strategies to prevent infection-related exacerbations in patients afflicted with neurodegenerative diseases.

Title: Development of Frequency Resolved Optical Gating (FROG) Technique for Characterization of Femtosecond Pulses

Primary Author (and presenter): Hidle, Brock J

Additional Authors: Vaughan, John; Harrison, Geoffrey; Bahder, Joseph; Laurent, Guillaume

Department: Chemistry- Biochemistry

College/School: College of Science and Mathematics

Description:

The main goal of my research project as an undergraduate research fellow was to (1) characterize the temporal profile of a pulsed femtosecond laser pulses and (2) to participate in the development of various optical systems, specifically focusing on interference patterns and phase change between two interfering paths. To characterize the laser in the time domain, I used the Frequency resolved optical gating technique. Simultaneously, the interferometry setup was completed and tested by measuring the interference pattern. Upon the furthering of complexity in optic manipulation, similar techniques were taken into the effort to generate the first attosecond pulse of light, the first of its kind in the state of Alabama. The importance of this attosecond generation is a tremendous stride forward in this lab's research stepping stones and will be the backbone to many research topics for the foreseeable future. It was formed through very intricate work and detail, which involved setting up many optics and a gas cell for the laser to pass through generating attosecond time signatures. The results of these experiments have extreme value and will be used to make measurements on electron dynamics in atoms.

Title: Establishing the neuroprotective effects of *Hibiscus sabdariffa*

Primary Author (and presenter): Hightower, Harrison, G.

Additional Authors: Shalgum, A.; Alasmari, A.; Govindarajulu, M.; Majrashi, M.; Ramesh, S.; Collier, W.E.; Griffin, G.; Amin, R.; Katz, M.; Buabeid, M.; Suppiramaniam, V.; Bradford, C.; Dhanasekaran, M.

Department: Department of drug discovery and development; Auburn University, Auburn, AL

College/School: Harrison School of Pharmacy

Description:

Specific Aim: Establish the neuroprotective effects of *Hibiscus sabdariffa*.

Background: The World Health Organization and the National Institute of Mental Health (United States) states that neurodegenerative diseases leads to significant loss of regular activity of the patients, their family and the caretakers leading to a huge economic loss. Neurodegenerative diseases essentially occur due to genetic alterations, vascular diseases and exposure to exogenous and endogenous neurotoxins. Hypertension is known to increase the risk of neuronal loss. Therefore, antihypertensives can be a safe and novel therapeutic approach to reduce neurodegeneration. Hence in this study we evaluated the neuroprotective effects and the possible mechanisms of action of *Hibiscus sabdariffa* (roselle) against the endogenous neurotoxin.

Experimental Design: The neuroprotective effects of *Hibiscus sabdariffa* were evaluated using SH-SY5Y cells. The neuroprotective effects were evaluated by assessing the cell viability, oxidative stress (glutathione content, catalase activity, reactive oxygen species generation, lipid peroxidation), mitochondrial functions and apoptosis.

Results: *Hibiscus sabdariffa* (roselle) contains nutraceuticals that can potentially exhibit antioxidant effects and enhance the mitochondrial functions. *Hibiscus sabdariffa* exhibited antioxidant and antiapoptotic effects and significantly attenuated the neurotoxicity of hydrogen peroxide.

Conclusion: *Hibiscus sabdariffa* extract may be used prophylactically to reduce the risk for neurodegenerative diseases. Furthermore, antihypertensive drugs with neuroprotective effects can be an alternative approach to reduce the risk of various neurodegenerative disorders.

Title: Understanding the link between internalizing problems and risky decisions: An fMRI pilot study

Primary Author (and presenter): Hinten, Brittany, R.

Additional Authors: Kimmel, Loren; Kaeppler, Alex; McConnell, Leanna; Hinnant, Ben
Department: Human Development and Family Studies
College/School: College of Human Sciences

Description:

Depression and anxiety are among the most common psychiatric disorders reported during adolescence. Prior research suggests both disorders may relate to altered neural reward processing in the ventral striatum (VS). Given the well-documented link between altered reward processing and risk-taking behavior among adolescents, particularly in the presence of peers, there is a clear need for research examining the ways anxiety or depression may influence risky decision-making. This study extends previous research by examining the relationships between risky decision making and reports of anxiety or depression, and considers VS activity as a potential moderator of these relationships.

Ten adolescents completed questionnaires assessing self-reported anxiety and depression, as well as a computerized driving game while undergoing fMRI to assess risky decision-making and corresponding neural activity. During the driving task, participants were asked to make decisions about whether to “stop” or “go” through a series of intersections. The driving task included two experimental manipulations, one in which participants were told they were being observed by a same-aged, same-sex peer, and another in which a performance-based incentive was provided as a reward for specific trials.

Preliminary analyses revealed that child-reported anxiety and depression were not directly related to the amount of risky decision-making exhibited by adolescents across experimental conditions; however, parent-reports of adolescent internalizing problems, anxiety, and depression were all negatively associated with adolescent’s risky-decision making. However, the mechanism of action for these effects is unknown, and additional moderation analyses are forthcoming.

Title: Differentiating domestic violence exposure experiences in a young adult sample

Primary Author (and presenter): Hlavaty, Kathleen

Additional Authors: Haselschwerdt, Megan L.; and Evans, Ania

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

An estimated 7 to 15.5 million youth are exposed to domestic violence (DV) each year, yet our understanding of DV exposure is limited due to inconsistencies in how we define and measure DV. Few exposure researchers have examined the role of coercive control (i.e., nonphysical abuse and control tactics)—a salient construct in the adult literature. A recent qualitative study examined the role of coercive control in DV exposure with the goal of differentiating between exposure to coercive controlling violence (CCV) versus situational couple violence (SCV). Building upon these findings, the current study sought to quantitatively assess whether researchers can differentiate between CCV and SCV to replicate findings regarding differential DV exposure experiences with a sample of DV-exposed young adults. Participants ($N = 91$; 71% female) were a part of a larger mixed methods study focused on the experiences of young adults exposed to father-perpetrated DV. Using the Psychological Maltreatment of Women Inventory (PMWI), young adults were categorized into CCV ($n = 28$) or SCV ($n = 64$) based on scores suggested by previous research. Young adults exposed to CCV reported exposure to more severe and frequent physical violence, $t(41) = -4.94, p < .001$, a greater number of exposure experiences (e.g., witnessing), $t(90) = -4.72, p < .001$, and over a greater number of developmental periods, $t(90) = -3.04, p < .01$. They also reported more harsh and abusive parenting (e.g., child abuse and maltreatment, $t(89) = -4.89, p < .001$). Results suggest that the PMWI can be used to differentiate between CCV and SCV for DV-exposed young adults. The present study successfully replicated recent qualitative findings, such that young adults’ DV exposure experiences varied by type of DV, suggesting that the PMWI is a useful

measure for making distinctions between types of DV. Future research should utilize the PMWI to explore how CCV versus SCV may be associated with differing outcomes over time.

Title: Controlling the ion distribution in electroactive polymers for more dynamic actuation response.

Primary Author (and presenter): Hofer, Ethan B.

Additional Authors: Bass, Patrick; Liu, Jiachen; Cai, Yancen; Cheng, Zhongyang

Department: Materials Engineering, Department of Mechanical Engineering

College/School: Samuel Ginn College of Engineering

Description:

This project is designed to control the distribution of ions in electroactive polymers (EAPs), i.e. artificial muscles. EAPs exhibit a bending actuation when exposed to an electric field. This actuation is dependent on the distribution of ions in the polymer matrix, making control of the ion distribution the key to optimizing EAP performance. As EAPs are light-weight, require a low electric stimulus, and have a large actuation, these polymers have the potential to be used in a wide variety of applications.

In this research, EAPs were created using a solution casting process of polyvinylidene fluoride (PVDF) copolymer with a cobalt perchlorate salt. A magnetic field was introduced during the casting process, leading to the creation of polymers with an actuation response that is completely different from other EAPs. Based on the electric and optic properties of the polymer films as well as thermal analysis, it was discovered that the polymer matrix can form two different phases during the casting process. Because a second phase was determined to be detrimental to the actuation response, different processes were studied to eliminate one of the phases. Methods such as increasing and decreasing the air flow during the casting process as well as dampening the mechanical vibration of the furnace in which the polymers were cast were examined. Additionally, post-casting surface treatments were done to determine their effects upon the performance of the EAPs. Because some treatments appeared to enhance the polymers' actuation while others appeared to harm their actuation, further research in this area is currently being performed.

Title: A theoretical analysis of community pharmacists' motivations for participating in Certified Aging Resource Educated Specialist (C.A.R.E.S.) training

Primary Author (and presenter): Hohmann, Lindsey, A.

Additional Authors: Hastings, Tessa, J.; McFarland, Stuart, J.; and Westrick, Salisa, C.

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

The C.A.R.E.S. Pharmacy Network supplies community pharmacists with training and resources to help low-income Medicare patients afford their medications. The purpose of this study was to evaluate factors motivating community pharmacists' participation in C.A.R.E.S. training based on Kennedy and Fiss' (2009) Motivations for Adopting Innovation Model. The C.A.R.E.S. training provides 3 online home-study continuing education hours for pharmacists and technicians. Motivations for participating in the training were measured using an 11-item instrument with response categories ranging from 1=not at all to 7=highly important. Motivation factors were conceptualized as: economic gains vs. losses and social gains vs. losses; as well as opportunity vs. threat framing or technical efficacy vs. social legitimacy. Scores were summed to create a total score for each scale, and internal consistency of each theoretical construct was measured using Cronbach's alpha. Fifty-five community pharmacists completed the survey, the majority of whom were female (61.8%) and employed in an independent pharmacy (63.6%).

Complying with a professional manager or decision-maker's request was the lowest-rated motivation item, while the highest-rated was improving patient satisfaction. Social losses were the lowest-rated theoretical factor motivating adoption, while social gains were the highest ($p < 0.0001$). Furthermore, opportunity framing was more highly rated than threat framing ($p < 0.0001$), while social legitimacy was rated higher than technical efficacy ($p = 0.01$). Internal consistency was moderate or high for all theoretical factors (Cronbach's alpha 0.68-0.93) except economic gains (Cronbach's alpha=0.31). Community pharmacists were most motivated to participate in C.A.R.E.S. training by social gains, opportunity framing, and social legitimacy. This is a useful instrument for assessing pharmacists' motivations, and may be applied to other healthcare providers to assess adoption motivations.

Title: Association of sedative hypnotics and fall risk in community-dwelling older adults with chronic conditions: A systematic literature review

Primary Author (and presenter): Hohmann, Natalie, S.

Additional Authors: Garza, Kimberly B; Qian, Jingjing; and Hansen, Richard

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

The objective of this review was to assess the risk of falling, fall-related fractures, and fall-related hospital admissions in community-dwelling older adults with chronic conditions who are prescribed sedative hypnotics. PubMed, PsychInfo, CINAHL, and ClinicalTrials.gov were searched using keywords such as "sedative hypnotic," "fall-risk," and "older adult." Criteria for article inclusion were: 1) English-language; 2) peer-reviewed; 3) published between 1980-2016; 4) experimental or quasi-experimental study designs; 5) adults ≥ 65 years of age; 6) adults with a chronic condition that increases baseline risk of falling (diabetes, heart disease, atrial fibrillation, hypertension, osteoporosis, depression, cancer); 7) adults with a fall from the same level in the community setting; and 8) adults prescribed 1 or more benzodiazepine(s) or z-hypnotic(s) indicated for insomnia (triazolam, temazepam, flurazepam, zolpidem, (es)zopiclone, zaleplon). Exclusions were verified by a second independent investigator. Quality assessment utilized the Mixed Methods Appraisal Tool (MMAT). After full-text review, 5 articles were retained. Studies used cross-sectional or single-group longitudinal designs, with MMAT quality scores of 50%-75% and sample sizes ranging from 124-1,062. Only one study assessed fracture risk and no studies assessed healthcare utilization. The risk of falls was inconsistent across studies and population subgroups. For example, benzodiazepines increased the odds of falling by 18 times (OR: 18.22, 95% CI 2.71-122.38) in older adults with atrial fibrillation. However, sedative hypnotics did not statistically significantly increase odds of falling in older adults with stroke (OR: 2.3, 95% CI 0.76-6.76). Increased risk of falling attributable to use of sedative hypnotics in older adults may vary based on underlying chronic conditions. Further studies should investigate contributors to fall risk in older adults with specific types of chronic conditions.

Title: Body size perceptions: Implications for racial disparities in BMI

Primary Author (and presenter): Aldana, Isabella; Homandberg, Lydia K.

Additional Authors: Curtis, David; Fuller-Rowell, Thomas

Department: Human Development and Family Studies

College/School: College of Human Sciences

Description:

Studies have demonstrated cultural and racial differences in beliefs about health and attractive body sizes, but few studies have examined the association between body image perceptions (BIP) and BMI.

The present study examined differences in healthy/attractive BIP between Black/African American (AA) and White/European American (EA) college students, and the degree to which BIP explain racial differences in BMI.

Data come from a sample of 97 students aged 21-27 years (29 EA females, 23 AA females, 28 EA males, 17 AA males) from a predominantly white University in the Midwest. BMI was directly assessed, and participants rated the healthiest and most attractive body images on a scale depicting nine racially ambiguous body sizes of increasing adiposity. Hypotheses were tested using linear regression techniques.

AA females rated a larger body size as more attractive/healthier than did EA females ($p=.053$), with a race difference of .60 SD units, and AA females also had greater BMI than EA females ($B=3.77$, $SE=1.94$, $p=0.58$). We found a significant association between healthy/attractive BIP and BMI ($B=3.30$, $SE=0.94$, $p=.001$), and the racial gap in BMI was attenuated by 51.7% when adjusting for BIP. No race differences were found in BMI for males, and BIP was not associated with BMI. Furthermore, race differences in BIP among males were in the same direction as among females but were not statistically significant (race difference=.44 SD units; $p=.16$).

Our findings illustrate that perceptions of healthy/attractive body size vary between AA and EA females, and such differences could have implications for racial differences in BMI. Evidence among males in racial differences in BIP and how these are associated with BMI was inconclusive. Overall, these results suggest that additional longitudinal research is needed to study ideal BIP as risk factors for the development of obesity and associated racial disparities.

Title: Water “You Doing?” Comparing the intergovernmental responses to the *Gold King Mine and TVA Coal Ash Spills*.

Primary Author (and presenter): Howard, Taylor, M.

Additional Authors: May, Andrew; Jones, Cassidee; Fisk, Dr. Jonathan; Good, A.J.; Nelson, Steven

Department: Political Science

College/School: College of Liberal Arts

Description:

Ranging from spills in West Virginia and increasing demands in the arid West, the politics of water are becoming increasingly fierce. When disaster strikes, ‘water’ politics often become even more complicated as disasters often quickly occupy space on public agendas, involve a myriad of actors, and multiple public sector agencies. This research examines the intergovernmental policy arrangements and conflicts governing the responses to the Tennessee Valley Authority’s Coal Ash Spill and the Environmental Protection Agency’s Gold King Mine spill. Cleanup efforts at the Gold Mine spill have contributed to ongoing lawsuits and conflict while the TVA disaster mitigation has been significantly less contentious. Using data drawn from primary and secondary source documents, we assess what factors may explain the differing levels of conflict.

Title: Using danmaku in online lecture videos: An exploratory study

Primary Author (and presenter): Huang, Mingyu

Additional Authors: Lin, Xi and Cordie, Leslie

Department: Educational Foundations, Leadership, and Technology

College/School: Education

Description:

Danmaku is a Japanese term for barrage and could be considered “bullet strafe” in the English language. It is a real-time, horizontal, text-based display, and this commentary uses subtitles widely used in Animation, Comic, and Game (ACG) videos in Asian countries, especially Japan and China (Wu & Ito, 2014). Previous studies discovered that the use of danmaku allows users to communicate and collaborate with others when watching ACG videos and the shared experience often leads to a strong perceived social presence and a sense of virtual community (Zhao & Tang, 2016). However, little is known about using danmaku in online video-based lectures. As a result, the aim of this exploratory study is to investigate the use of danmaku in online lecture videos. An inductive content analysis of danmaku from 16 online lecture videos was used for this study. Data were collected from Bilibili.tv, a video-sharing website based in China. Results revealed that there are several types of danmaku in online learning videos. The most popular type is to share reflections with other learners. Some reflections are irrelevant to the course content, such as talking about the speakers’ dress, accent, where the online class took place, and the history of the university. The rest of the reflections are highly relevant to the course content, including sharing supplementary knowledge and raising questions. The second type is for entertainment purposes, some of which highly confirm that students followed the course very well. It is expected that danmaku could serve as an effective way to enhance learners’ interaction, course entertainment, and their learning experience while participating in online video-based lectures.

Title: Implementing housing design and construction for communities in Panama

Primary Author (and presenter): Huffines, Trenton, N.

Additional Authors:

Department: Building Science

College/School: Architecture, Design, and Construction

Description:

Most of the modern world has limited understanding of what encompasses basic human needs. The readily available resources that even the poorest of Americans are afforded are in stark contrast to the limitations faced by the majority of the underdeveloped world. Modern conveniences such as plumbing and electricity are deemed as an absolute necessity to the American population, yet to the undeveloped world, simply having a sturdy roof or enclosed room is a high commodity. A number of Auburn University Master of Building Construction students have been involved in works aimed at supporting the underdeveloped rest of the world. In relevance to this discussion, a project has begun that focuses on providing a sustainable housing solution to the Gnobe people in Panama. The basic concept has been designed that allows a team of laborers to construct a modest house in the span of about a week. The basic design of the structure utilizes a concrete slab, steel tube framing supported by shallow concrete footings, a pitched metal roof, and the flexibility to utilize mixed materials for the walls. Capstone level research has previously been completed on the development of this structure, focusing on appropriate design, cultural sensitivity, sustainability, ventilation and cooling, rain collection, aesthetic design development, computer aided modelling and simulation, and construction documents. Building on the research by other Auburn University Masters of Building Construction students in this area, my focus during this study is as follows: further refine the design details of these structures, implement a “kit of parts” for construction crews to utilize, and construct a prototype of this structure to be used for training mission teams.

Title: University senior living facility

Primary Author (and presenter): Hughes, Hayley, S.

Additional Authors: Harrison, Grace; Walden, Katelyn; and Yates, Terri

Department: Consumer and Design Sciences: Interior Design

College/School: College of Human Sciences

Description:

The number of people diagnosed with Alzheimer's disease in the United States is rapidly growing (Cipriani, 2014). In addition, the "baby boomer" generation is reaching retirement. With this information comes a growing need for retirement communities. In the past, retirement facilities have been designed with a higher focus on practicality of housing patients and staff. Although some modern facilities now offer higher end design and amenities, many are not affordable to the general population. It is also difficult to find suitable staff for retirement homes as this line of work is demanding and does not receive many benefits (Shultz, R., PhD, 2005). This project aims to design with the user in mind by focusing on individual quality of life, staff morale, patient wayfinding, and the integration of biophilic design. Upon completion, success of the project will be tested through a series of surveys, observation of staff and patient circulation, and personal interviews of both staff and patients.

References:

Cipriani, G., Danti, S., Lucetti, C., Nuti, A., (2014). Wandering and dementia. *Psychogeriatrics: The Official Journal of the Japanese Psychogeriatric Society*, vol. 14 (2), 135-142. Retrieved from <http://onlinelibrary.wiley.com/wo11/doi/10.1111/psyg.12044/full>

Shultz, R., PhD (Ed.). (2005). Attitudes, Stress, and Satisfaction of Staff Who Care for Residents With Dementia. *The Gerontological Society of America*, 45(1), 96-105. Retrieved February 06, 2017, from https://www.alz.org/national/documents/grnt_096_105.pdf

Title: Proactive preparation to prevent PTSD in paramedics

Primary author (and presenter): Hughey, Tracie, C

Secondary author: Ellison, Kathy Jo

Department:

College/ School: Nursing

Description:

Many paramedics develop PTSD over a cumulative career. EMS PTSD is equivalent to that of combat soldiers, yet little is done to help them prepare or cope. Literature suggested preliminary education could prevent and facilitate better coping of PTSD. The purpose of the study is to determine if paramedics are prepared to cope with traumatic calls after receiving proactive education regarding PTSD, better coping skills, and resiliency information. The largest EMT services in Central Alabama were the target population with a total of approximately 900 ambulance personnel. A pre-test-post-test experimental design will be utilized. Each service will receive a pre-evaluation regarding PTSD, resiliency, and coping skills. The setting is the experimental group's ambulance service locations. The experimental group will receive education regarding these topics. After education of the one service, both services will be given a post-evaluation. Evaluation tools include DSM-5 PTSD criteria DCL, Conner-Davidson Resiliency scale,

and Satisfaction with Life Scale. Education will then be given to the control group after data analysis is complete. X number of ambulance personnel consented to participate (% male, female, different EMT levels, average number of years in career). Knowledge of PTSD symptoms, empowerment of ability to improve resiliency, and life coping skill knowledge improved from pre-(mean, sd) to post (mean, sd) significant($p < 0.05$). Independent sample tests were completed on multiple variables. Preliminary education was shown to increase the medics knowledge and belief that coping will be better regarding traumatic calls due to better information on symptoms, coping skills, and awareness of resiliency. This suggest that education for paramedic students and yearly continued education for professional medics is beneficial.

Title: Thermoregulatory patterns of non-native *Anolis sagrei* in a novel thermal environment

Primary Author (and presenter): Hulbert, Austin, C

Additional Authors: Hall, Josh; Mitchell, Tim; Warner, Dan

Department: Department of Biological Sciences

College/School: Auburn University

Description:

The northward spread of non-native reptiles is often limited by low minimum temperatures as latitude increases. Man-made structures, however, create novel thermal environments that maintain higher temperatures than surrounding natural areas. These structures may provide a suitable habitat for non-native reptiles, allowing them to extend their range. A population of Cuban brown anoles, *Anolis sagrei*, have been occupying a series of greenhouses in Auburn, Alabama, since at least 2006. The greenhouses are farther north than most other main populations of brown anoles in Florida, but temperatures can exceed 45°C on the inside during the summer months (a temperature near or above the critical thermal maximum for many reptiles). We set out to collect data on the thermoregulatory behavior of these lizards both inside and outside the greenhouses during summer months. We placed iButton data loggers on varying substrates to collect temperatures. We also conducted visual surveys by walking transects and recording lizard sightings inside and around the greenhouses. Preliminary results suggest that anole behavior is uncharacteristically crepuscular; they are more active inside the greenhouses during the cooler morning and evening hours. Instead of traveling outside during mid-day when temperatures are the warmest, they appear to be utilizing a variety of substrates to thermoregulate. During the winter months, similar data will be collected to discover how this population survives as outside temperatures drop much lower than they would experience in the lower latitudes of their non-native range.

Title: Residual lignin and its effect on the rheological properties cellulose nanofibrils suspensions

Primary Author (and presenter): Iglesias, Maria C.

Additional Authors: Peresin, Maria S. and Frazier, Chip*

Department: Forestry and Wildlife Sciences

College/School: Agriculture; *Sustainable Biomaterials, Virginia Tech

Description:

Although the removal of lignin and heteropolysaccharides by chemical treatment of lignocellulosics had proven to yield more flexible fibres, the presence of residual lignin in raw materials for the production of nanofibrillated cellulose (CNF) might hold several advantages such as higher yields with reduced costs (lower energy consumption in manufacture process) and potential improvement in barrier properties in the case of films. Also, in composite applications, chemical similarity between lignin and hydrophobic polymeric matrices might be beneficial in terms of compatibilization, thus enhancing thermo-mechanical

response of the materials. The presence of lignin in nanocellulose suspensions significantly reduced the dewatering time in wet nanopaper manufacture, and resulted in nanopaper mechanical properties comparable to those reported in the literature from fully bleached CNF. Lignin increased the water contact angle of the nanopapers and reduced their water absorption capacity and surface energy, which was determined for the dispersive, acidic and basic contributions. Additionally, residual lignin impact the porosity and pore size distribution of the CNF nanopapers, which correlated with obtained oxygen and water vapor barrier properties. In this paper, the effect of lignin content on the rheological of nanocellulose dispersions will be addressed.

Primary Author (and presenter): Jayawardena, Asanka

Additional Authors: Schoenek, Benjamin; Ahyi, Claude; Isaacs-Smith, Tamara; and Dhar, Sarit

Department: Physics

College/School: College of Sciences and Mathematics

Description:

Competence limits of conventional semiconductor materials have resulted in the necessity for exploration of novel materials for next generation electronics. In this regard, 4H- Silicon carbide (4H-SiC) is a promising single crystal material due to its attractive electronic properties. While conventional 4H-SiC metal-oxide-semiconductor field-effect transistors (MOSFETs) are now commercially available, trench MOSFET is a fascinating device design which can potentially improve device performance and reduce device cost. Trench formation in 4H-SiC requires reactive ion etching (RIE). RIE involves the sputtering of the target material with energetic reactive ions. In SiC, it has been reported that RIE introduces undesirable surface roughness and electronic defects, which causes degradation of device performances. In this work, first, we developed a baseline etching recipe to achieve a low surface roughness surface using capacitance coupled plasma RIE process with a fluorine based process gas. Next, we have studied the electrical properties of planar MOS capacitors fabricated on Si-face 4H-SiC epitaxial layers, with and without RIE. Atomic force microscope (AFM) images revealed that almost atomically flat surfaces (RMS roughness= 0.3 nm) were obtained following etching with our developed recipe. Simultaneous high-low capacitance-voltage measurements and current-voltage measurements at room temperature suggests that the effects induced by RIE is negligible. Furthermore, constant capacitance deep level transient spectroscopy also confirmed this observation independently. These results are inconsistent with previous reported results due to the optimization of the etching and post-etching processes in this work. These results suggest that surface smoothing processes such as etching in an H₂ environment at elevated temperatures not be necessary after RIE for trench MOSFET fabrication.

Title: Water quality and design of split-pond aquaculture

Primary Author (and presenter): Jescovitch, Lauren, N.

Additional Authors: Boyd, Claude E.

Department: School of Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

Split ponds have a fish cell and a waste cell, approximately 20% water surface area and 80% water surface area respectively, in which water recirculates to improve water quality as a more intensive management system than traditional ponds. This is a continuation of a study that focuses on the possible benefits of using mechanical aeration in the waste-treatment section of the split-pond culture system. Work was conducted on a commercial catfish farm in west Alabama. The farm currently has eight split-ponds, each with a fish-holding section of about 8,000 m². Two, 10-hp floating, electric paddlewheel

aerators were placed in the waste treatment section of each of four ponds; while four ponds – the controls – had un-aerated waste treatment cells. Water samples were collected biweekly at the inflow and outflow of the waste-treatment cells; once the water became cooler in the fall and winter, the samples were collected monthly. Analyses that were gathered include: pH, dissolved oxygen (DO), temperature, secchi disk visibility, Chlorophyll *a*, total ammonia nitrogen, nitrite-nitrogen, nitrate-nitrogen, total nitrogen, soluble and insoluble nitrogen, total phosphorus, soluble reactive phosphorus, chemical oxygen demand (total and soluble), biological oxygen demand, acidification, water circulation, aeration hours, and sediment carbon/nitrogen concentration. Year 1 (2014) produced no significant results. Year 2 (2015) produced differences between control and aerated ponds for secchi disk visibility, total ammonia nitrogen, total nitrogen, chemical oxygen demand (soluble and total) and DO. Year 3 (2016) produced differences between control and additional aerated ponds for total ammonia nitrogen, total phosphorus, and soluble chemical oxygen demand. Data for all three years will be presented and interpreted.

Title: Association mapping of SSR markers to sweet, bitter, and roasted peanut sensory attributes in cultivated peanut

Primary Author (and presenter): Jiang, Tao

Department: Crop, Soil and Environmental Sciences

College/School: Agriculture

Description:

Certain roasted peanut quality sensory attributes are very important breeding objectives for peanut manufactory and consumers. Currently the only means of measuring these traits is the use of a trained sensory panel. This is a costly and time-consuming process. It is desirable, from a cost, time and sample size perspective, to find DNA- marker and the trait association for the implementation of marker-assisted selection (MAS) in a breeding program. One hundred and four accessions of the U.S. mini core collection are used for sweet, bitter and roasted peanut sensory attributes analysis including tocopherols, fatty acids and sugars. One hundred and thirty-three SSR (Simple Sequence Repeats) markers were applied for genotyping the panel of 104 peanut genotypes. Association mapping analysis indicated that the four markers (pPGPseq5D5, GM2745, GM2723, GM1867) are associated with sensory attributes, while five makers (GM1609, Ah32, pPGPseq2C11, XIP297, Ah3) associated with tocopherols, three makers (GM2690, GM2774, GM2791) associated with fatty acids and two markers (GM2690, GM1609) associated with sugars, respectively. These SSR markers are consistently associated with corresponding traits by four models: Q model, PCA model, Q+K model, and PCA+K model and resulting in a high R². It is noteworthy that GM1609 and GM2690 are common markers for two traits. These highly associated markers would be used for the development of flavor-desirable and nutrient-rich cultivars in peanut breeding programs after further validation of the markers.

Title: Study of the role of two alcohol dehydrogenase enzymes on bio-butanol production in *Clostridium beijerinckii*

Primary Author (and presenter): Jiménez-Bonilla, Pablo

Additional Authors: Zhang, Jie and Wang, Yi

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Butanol is a safer and more energetic biofuel than ethanol; it is also used as a solvent and precursor of many industrial chemicals such as coatings, plastics, and fibers. The world market size of biobutanol is expected to reach \$17.78 billion by 2022, exemplifying the current importance of the research on this topic. The

traditional butanol production from petrochemical process requires high energy inputs and generates various environmental pollutants. Bio-butanol is obtained from renewable feedstock such as starch, lignocellulosic material, sugars or agro-industrial wastes by means of fermentation. The best known biobutanol solventogenic microorganisms are bacteria from *Clostridium* genus. *Clostridium beijerinckii* NCIMB 8052 strain has great potentials for biobutanol production because of its broad substrate range stable genetics, and high tolerance to solvents. However, as a Gram-positive, anaerobic bacterium, it is hard to be genetically engineered, thus hampering the systematic understanding of the physiology of the strain and further strain genetic improvement. Recently, our group has successfully applied the cutting-edge CRISPR-Cas9 genome editing technique for metabolic engineering on *C. beijerinckii*. For biobutanol (and ethanol) production, the alcohol dehydrogenase are the key enzyme to catalyse the reaction. In this study, for the first time, through gene deletion with CRISPR-Cas9, we evaluated the contribution of two key alcohol dehydrogenase enzymes for the biobutanol production in *C. beijerinckii*. The understanding of the role of these enzymes for biobutanol production will provide essential references for the metabolic improvement on this strain. This is also an example demonstrating the powerfulness of the revolutionary CRISPR-Cas9 technique for biotechnology application.

Title: Improving spectral diagnosis of erosion during plasma material interaction to assess the potential of fusion energy as a future energy source

Primary Author (and presenter): Johnson, Curtis, A.

Additional Authors: Ennis, David and Loch, Stuart

Department: Physics

College/School: College of Sciences and Mathematics

Description:

The ability to minimize erosion of material into existing fusion plasma science experiments will play a critical role in determining the potential of nuclear fusion as a future energy source. Nuclear fusion is the process of combining light atoms into heavier atoms during which significant amounts of energy can be released. Fusion reactions occur in the interior of stars where tremendous gravitation forces compress hot plasmas resulting in the release of energy. On earth, fusion can be achieved by confining hot ionized atoms with magnetic fields. The fusion reaction has the potential to provide a clean, safe and virtually limitless energy source for humankind. The environment for fusion reactions to occur requires plasma much hotter than anything naturally existing on earth (billions of °C). The interaction of hot plasmas with terrestrial materials presents unique physics and engineering challenges. New reactor relevant experiments plan to incorporate high-Z metals such as Molybdenum (Mo) and Tungsten (W) to withstand the plasma interactions. While high-Z metals are less likely to erode in the presence of plasma, they can radiate away significant amounts of energy if transported into the plasma core. Erosion due to plasma interaction can be diagnosed using spectral line emission together with atomic physics coefficients. Low charge states of Mo and W are predicted to radiate most strongly at ultraviolet (UV) wavelengths, leading to the selection of UV spectrometers (200-400 nm). Measurements are presented from UV spectrometers installed at Auburn University on the Compact Toroidal Hybrid experiment and the DIII-D tokamak in CA viewing W sources interacting with hot plasmas. Strong W and Mo lines are identified, many of which have not been previously observed in fusion relevant plasmas. New candidate lines for diagnosing erosion will be discussed and compared to currently used emission lines.

Title: Mastery motivational climate: Examining the relationship between time spent and number of visits at skill stations with changes in skill scores

Primary Author (and presenter): Johnson, Jerraco, L.

Additional Authors: Hastie, Peter and Rudisill, Mary

Department: Kinesiology
College/School: Education

Description:

Mastery motivational climates (MMC) studies have reported that giving students chances to become self-directed can significantly increase skill attainment. However, none of these studies have examined the actual process of what leads to improved skills. The aim of this study was to determine if the number of visits and total amount of time spent practicing at skill stations were correlated with improvements in that specific skill in a MMC. Eleven preschoolers attended biweekly 30-minute MMC sessions over a ten-week period. Each time a child visited a station this attendance was recorded, as was the duration of that visit. Changes in pre-post TGMD-2 scores were also calculated for seven skills; running, jumping, overhand throwing, kicking, catching, dribbling, and rolling. Bivariate correlations were then calculated between the number of visits, time spent practicing, and change in pre and post skill score, per child. Of the seven skills, only the number of visits children had dribbling ($p = .042$) and total time spent at the dribbling station ($p = .014$) were significantly correlated with the change in pre-post dribbling score. Nearly 30% of the variance was shared between the number of dribbling visits and change in dribbling score, which is a moderately reliable prediction ($r = -.543$). Children who had less visits dribbling were more likely to have a greater decrease in dribbling score at post-test. About 43% of the variance was shared between the amount of time children spent dribbling and change in dribbling score, which is a moderately reliable prediction ($r = -.656$). Children with less time dribbling were more likely to have a greater decrease in dribbling score at post-test. Although significant correlations were only found for the dribbling skill, we must continue to examine children's behavior during MMC interventions to determine what factors lead to improved skill attainment. Replications of this study are needed with a larger cohort and older children.

Title: Influence of high and low autonomy-supportive climates on physical activity in children with and without developmental disability

Primary Author (and presenter): Johnson, Jerraco, L.

Additional Authors: Miedema, Benjamin; Rudisill, Mary E.; Buchanan, Alice; Pangelinan, Melissa; Converse, Brooke; Irwin, Megan; and Bridges, Claire

Department: Kinesiology

College/School: Education

Description: Participation in moderate to vigorous physical activity (MVPA) during childhood has been linked with numerous health outcomes in children, and may even help offset risks of secondary impairments due to lower physical activity levels in individuals with disabilities. The aim of this study was to determine the efficacy of fully-inclusive motor skill interventions employing either an autonomy-supportive climate or direct-instruction (low autonomy) on MVPA in both typically developing (TD) and children with developmental disabilities (DD). Children ($n = 32$; TD = 18, DD = 14) ages 5-9 attended daily 60-minute motor skills sessions during a summer camp program. Participants attended a total of six sessions; three sessions of which the instructor delivered the lesson using an autonomy-supportive climate and three days in direct instruction. Physical activity levels were objectively measured by using accelerometers. Linear mixed effects models revealed that although children with disabilities exhibited less time spent in MVPA, compared to their typically-developing peers ($p = 0.002$), for all children, there was an increase in percent time spent in MVPA during the autonomy-supported climate compared to the direct-instruction climate ($p = 0.0256$). Although previous studies have found that autonomy-supported climates improve motor competence in children with disabilities, this is the first study to quantitatively assess the efficacy of autonomy-supportive climates on physical activity levels in children with and without developmental disabilities participating together. These results are particularly relevant to practitioners and clinicians that aim to improve the health of children with developmental disabilities who

are at a greater risk for secondary impairments due to lower levels of physical activity. Future studies should examine the effectiveness of autonomy-supportive climate interventions on physical activity levels of children with DD over a longer duration of time.

Title: Effects of the cannabinoid-1 receptor agonist WIN 55,212-2 on reversal learning in adolescent mice

Primary Author (and presenter): Johnson, Katelyn, R

Additional Authors: Boomhower, Steven, R.; Newland, M., Christopher

Department: Department of Psychology

College/School: College of Liberal Arts

Description:

Marijuana, a psychoactive drug that activates cannabinoid-1 (CB1) receptors in the brain, is the most prevalently abused illicit drug among American adolescents and young adults. However, the long-term consequences of adolescent exposure to cannabinoids on the brain and behavior remain poorly understood. In both humans and nonhumans, adolescence is characterized by the maturation of the endocannabinoid neurotransmitter system in the prefrontal cortex and striatum. This brain region is densely packed with cannabinoid-1 (CB1) receptors, and as cannabinoid drugs become more readily accessible in the population, it is important to understand their long-term cognitive and behavioral effects. Some rodent studies suggest the adolescent brain (and prefrontal cortex, in particular) may be particularly vulnerable to WIN55, 212-2, a drug that selectively activates CB1 receptors. The current study investigated the effects of chronic WIN 55,212-2 exposure during adolescence on spatial discrimination reversals in mice. Twenty-four male C57BL/6 mice were equally and randomly assigned to two exposure groups (n = 12 in each): WIN 55,212-2 or vehicle control. Injections of WIN 55,212-2 (i.p.; 3.0 mg/kg/day) and vehicle were administered for twenty-one days from postnatal day 28 to 49. Thirty days after exposure (in adulthood), the mice were trained on a spatial-discrimination-reversal (SDR) task in operant chambers. The SDR task is a robust behavioral procedure that establishes a contingency in which the spatial location of a response (e.g., a right lever press) results in reinforcement. Results showed there was no difference in errors to criterion or omissions to criterion following a reversal, suggesting activation of CB1 receptors at this dose does not impair reversal learning. Whether or not WIN 55-induced deficits impair other behavior will require further investigation.

Title: Carcass aging as a potential solution for tough meat quality issue in modern broilers

Primary Author (and presenter): Johnson, Meredith, L.

Additional Authors: Smith, Avery; Bauermeister, Laura; and Morey, Amit

Department: Poultry Science

College/School: Agriculture

Description:

Fast-growing big broilers breast muscle often exhibits wooden breast and white striping myopathies causing meat quality issues such as high cook loss, tough texture, and lower marinade retention. Toughness of the meat and subsequent meat quality issues can also be due to unresolved rigor mortis and slow rate of post-mortem proteolysis. The objective of this study was to investigate the effects of extended deboning times and storage on the quality of broiler breast meat. Broiler breast fillets (total n=810) obtained from a local poultry processor included freshly deboned (2-3 h post slaughter) wooden and normal breast butterfly fillets from broilers >8 lbs, breast fillets from medium sized birds (6-8 lbs) as well as fillets deboned at extended post-slaughter times (16, 20 and 24 h). Fillets deboned at extended times (n=90/treatment) were stored at 4°C overnight. The left-side of the butterfly breast fillet was

analyzed for color, cook loss, and drip loss. Texture of cooked fillets was measured using the Blunt Meullenet-Owens Razor Shear (B-MORS) method. Statistical differences between the freshly deboned, extended deboned, and stored fillets were determined using ANOVA with Tukey's LSD at $P < 0.05$. Data indicated that the wooden breast fillets had a higher cook loss than normal fillets and the ones from medium sized broilers. Texture (peak force and area) of the fillets from all the extended debone times was lower compared to the freshly deboned (2-3 h post-slaughter) breast fillets indicating tender fillets due to proteolysis. Results from the study can be used by the poultry companies to reduce the breast meat texture issues from fast-growing big broilers.

Title: Increasing venous thromboembolism through education

Primary Author: Jones, Brandi

Secondary Author: Hamilton, Cam

College/ School: School of Nursing

Description:

Venous thromboembolism (VTE) occurrence is a largely preventable hospital-acquired complication. Evidence supports the use of compression devices as the best practice for mechanical prophylaxis along with education of nurses on VTE prophylaxis to improve outcomes. The purpose of this project is to assess if educating nurses on VTE prophylaxis will increase their knowledge and frequency of utilizing mechanical VTE prophylaxis. Nurses ($n = X$) on the Cardiac Step Down Unit of East Alabama Medical Center were asked to complete a questionnaire, using a Likert scale, regarding their knowledge of, comfort with and practice of mechanical VTE prophylaxis before attending an education session on VTE prophylaxis. After informed consent, nurses were engaged in an education session about VTE prophylaxis and four weeks following the session completed the same questionnaire to determine if education affected nurses' knowledge and frequency of application of mechanical VTE prophylaxis. Descriptive data was gathered to describe the participants' demographic data. Pre-and post-questionnaire answers were compared with paired t-tests. X consented to participate, $X\%$ female, average age of X (sd) years, X average years of nursing experience (sd) and X average education ($X\%$ Associate degree, $X\%$ Bachelor degree). Knowledge increased from pre (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Frequency increased from pre (mean, sd) to post (mean, sd) significantly ($p < 0.05$). This project supports education on VTE prophylaxis to increase nurses' knowledge and frequency of mechanical VTE prophylaxis use in this hospital setting. It is recommended to continue with the education of all nurses on the appropriate use of mechanical prophylaxis to prevent VTE complications in hospitalized patients.

Title: Pain Management in the Elderly: An Alternative Approach

Primary Author: Jones, Felisha; Ellison, Kathy Jo

Department: Nursing

College/School: Auburn Nursing & Auburn Montgomery Nursing

Description:

There is strong evidence that lack of exercise in the elderly can cause or worsen pain levels leading to decreased physical functioning, quality of life, and overdependence on pain medications. Evidence – based guidelines recommend regular low impact physical activity for the elderly. The purpose of this project was to implement a low impact exercise program in conjunction with prescribed opioid medication to reduce pain levels and improve physical functioning. Patients' pain levels, opioid pain medication and physical functioning were assessed. Target population included elderly patients residing in long term care (LTC) environment age 65 years or older with a numeric pain score of three or greater and prescribed an opioid for pain management. Patients completed an initial pain management and

functional assessment. Following a doctor's permission to exercise, an exercise program was initiated. Patients exercised on recumbent NuStep bike for 30 minutes performing active range of motion of upper and lower extremities. Descriptive statistics were used to describe the patient population, pain scores, opioid medication, and mobility levels. Patients' pre- post pain management and functional assessment responses were compared with paired t-test. (X) agreed to participate (% males), average age of X [sd] yrs. X% were identified with pain scores greater than three per numeric pain scale, x% were prescribed opioid pain medication. Follow-up indicated that x% improved with participation. Among those with pain symptoms, the mean pain scores improved from pre (mean, sd) to post (mean, sd), significantly [$p < 0.05$]. Low impact exercise improved pain levels, physical functioning, and decreased opioid medication use. Participation was found to be beneficial for elderly in LTC environment and further implementation of the project is warranted.

Title: Physiological and life history variation associated with reproductive performance across species of lab mice

Primary Author (and presenter): Josefson, Chloe C.

Additional Authors: Hood, Wendy R.

Department: Biological Sciences

College/School: College of Sciences and Mathematics

Description:

Artificial selection has been used to increase the expression of desirable traits in the lab mouse. Associated with this procedure, hundreds of well-characterized phenotypic variants (strains) are now available for use in research. Although these strains are typically used in biomedical research models, we propose that data from lab mice can be used to identify pleiotropic traits that contribute to life-history variation. We used the publicly available Mouse Phenome Database by the Jackson Laboratory to investigate correlations among life-history traits and between life-history and physiological variables in adult female mice. We used variables related to reproductive performance in a principal component analysis, which resulted in two principal components (breeding frequency and reproductive performance) that describe the variance in reproductive traits. Scores from this analysis were then regressed against physiological and life-history traits (lifespan, metabolism, and mean serum IGF-1) in non-reproductive adult females. Interestingly, we found no significant correlation between reproductive performance and lifespan or variables associated with metabolic rate as we had initially hypothesized. However, our analysis of physiological variables did support the hypothesis that IGF-1 may contribute to variation in reproductive performance. Together, these results help understand what drives individual variation in life-history, as well as the phenotypic and physiological correlates that accompany this variation.

Title: Preparation of slow release encapsulated pesticide/fertilizer

Primary author (and presenter): Joshi, Prutha, P.¹

Secondary authors: Auad, Maria, L.¹; Held, David, W.²; and Howe, Julia, A.³

Department: ¹Chemical Engineering; ²Entomology and Plant Pathology; ³Crop, Soil and Environmental Sciences

College/ School: Samuel Ginn College of Engineering

Description:

Encapsulated fertilizers and pesticides are one key approach to slow the release of nutrients for long-term feeding and protection of plants, while simultaneously reducing economic costs and environmental problems. The use of hybrid systems (fertilizers and pesticides) for drug encapsulation in organic based agriculture has been a growing field of interest. In this approach, nutrients are released in controlled rates

using super absorbent polymers (SAPs) resulting in a sustained feeding of the plants. As a result, one application of the encapsulated hybrid system can provide the necessary nutrients/protection for a plant that would ordinarily take multiple applications. This work focuses on the manufacturing and characterization of SAP micro beads based on alginate (ALG) for the encapsulation of bacterium *Bacillus thuringiensis* (B.t) as bio-pesticide and nitrogen and phosphorus rich soil fertilizers (fish emulsion, KNO_3 and K_2HPO_4). During the project, different formulations were prepared using 15% wt B.t, fish emulsion, nitrogen and phosphorus. The microbeads were prepared by wet-extrusion technique using alginate (ALG) as the SAP and calcium chloride (CaCl_2) as gelling agent. The resulting beads were characterized in terms of size, morphology and water uptake. The results showed that the prepared microbeads have narrow size distributions ranging from 1.2 to 2.1 mm, high water uptake (1200% to 3200%). Finally, N, K and P elemental analysis and pesticide capacity were performed.

Title: Identification of phase I & phase II metabolites of maca

Primary author (Presenter): Jung, Da, S.

Co-authors: Rantso, Thankhoe; Calderon, Angela, I.

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

In today's society, maca is a common active ingredient in the botanical dietary supplements for their effects in variety of health issues including cancer. Because most of the previous studies on this subject focused on proving the anticancer effects, such as suppressing human cancer cells and treating inflammatory processes, of the compounds, the information on metabolism of the bioactive compounds is limited. The metabolism of bioactive maca constituents is necessary in order to assess their effects on either bioactivity or potential for botanical-drug interaction in phase I and phase 2 metabolic reactions. This study aims to identify phase I and II metabolites of the bioactive constituents of the maca extracts and test the metabolites in further studies such as induction and inhibition of CYP3A4 or their interactions with anticancer drugs. First, dichloromethane, methanol, and acidic methanol maca extracts were incubated in a Parallel Artificial Membrane Permeability Assay plate with phosphate buffer to determine the intestinal passive absorption or diffusion of the compounds. Both donor and acceptor sides containing permeant compounds were collected and incubated with human liver microsomes with NADPH and UDPGA for phase I and phase II metabolism respectively. The reaction was stopped with acetonitrile, and sample was centrifuged to obtain the supernatant for LC-MS analysis. The produced maca metabolites in phase 1 and phase 2 metabolic reactions were compared to the metabolites previously reported in the literatures. Among the known metabolites for maca constituents, a total of twenty-five metabolites were confirmed and consisted of twenty hydrolyzed or oxidized phase I metabolites and five phase II glucuronides. The findings demonstrated that metabolism of bioactive constituents of maca yielded more phase I metabolites than phase II metabolites.

Title: Understanding the effect of catalytic pyrolysis bio-oil produced using CaO during hydrotreatment

Primary Author: K C, Sanjeev

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Fast pyrolysis is a key pathway to obtain bio-oil from biomass and its conversion to different fuel range which will reduce dependency on fossil fuels and is also environmental friendly. However, bio oil produced from this process are unstable, acidic, highly viscous and have high oxygen content which

makes it unsuitable as a replacement for fossil fuel. A significant approach for better bio-oil properties is through in-situ catalytic pyrolysis and CaO has shown good results. Bio-oil produced from catalytic pyrolysis followed by hydrodeoxygenation is assumed to be one of the key step for biofuels production. In this study, two different types of bio-oil were produced using fast pyrolysis method from poplar with quartz sand and CaO as bedding material respectively. Bio mass was heated at about 500° C in a reactor and cooled in condenser train to be collected at electro static precipitator. Hydrotreatment of bio-oil was done using Pt/C and ZSM5-30 catalyst. Hydrotreatment experiment was carried out in 450mL parr reactor conducted at 350° C for 4 hr in presence of 700 psi of hydrogen. The upgraded oil was characterized for its various properties and a comparative study was done between these two upgraded bio-oils.

Title: SURGE: integrating edible plants in urban landscapes

Primary Author (and presenter): Kaaur, Jaspuneet

Faculty Advisor: Ms. Valerie Friedmann

Department: Landscape Architecture

College/School: College of Architecture, Design, and Construction

Description:

An increasing concern about city centres and associated degradation of built environment encourages designers to delve into creative solutions for our changing landscapes. Using design as a medium this project serves as a model that explores the potential of urban farming in building healthier communities through optimum utilization of abandoned properties.

The project considers redeveloping a vacant lot on the continuum of Chattahoochee river walk on one side and a major street in downtown Columbus on the other. Site visits and a study conducted through Geographical Information Systems revealed the presence of numerous vacant lots and under used parking lots in and around Columbus. Further, demographic analysis projected an increase in the 65-year age cohort and a sizeable increase in the population with less than a high school diploma. Analysis at the regional scale of food deserts and food service clusters made it viable to examine an intervention that addresses the communities projected demographic changes and proposes viable utilization of abandoned lots by employing urban farming as a design strategy.

The design explores the paradigm of productive landscapes and tries to integrate functionality into city living. Since the site is small, the project doesn't aim to achieve food security but to present a model in the urban context that can be replicated at other abandoned sites which could help achieve food integrity. Primarily, the design introduces edible plants in a public space and provides focus for wider community awareness, education and adoption of food integrity values in a park setting. Further, it aims to equip people with farming/gardening techniques so that communities can organize themselves and benefit socially, economically, and environmentally. Putting these values into practice helps sustain wider urban and regional environments and make them more resilient.

Title: Direct production of human engineered cardiac tissues by pluripotent stem cell encapsulation in gelatin methacryloyl

Primary Author: Kaczmarek, Jennifer A.

Additional Authors: Head, Sara; Kerscher, Petra; Lipke, Elizabeth

Department: Chemical Engineering

College/School: College of Engineering

Description: The ultimate goal in cardiac tissue engineering is the production of functional and reproducible 3D human cardiac tissues using human induced pluripotent stem cells (hiPSCs). However, the current models available for use do not accurately replicate human systems for investigative research. Thus, the objective of this study was to create functional 3D cardiac tissues by directly encapsulating and differentiating hiPSCs using a novel photocrosslinkable hydrogel, methacrylated gelatin (GelMA), which is mechanically robust and biologically responsive, properly supporting hiPSC survival and differentiation into cardiomyocytes (CMs).

GelMA was synthesized by reacting methacrylic anhydride and gelatin for 2 hours, followed by dialysis and freeze-drying. Lyophilized GelMA was re-dissolved into PBS and combined with photoinitiators to form a GelMA precursor solution. Dissociated hiPSCs were combined with this precursor solution, pipetted into a circular polydimethylsiloxane mold, and photocrosslinked using visible light for 40 seconds, forming circular 3D tissues. Encapsulated hiPSCs were maintained in their pluripotent state for three days followed by the initiation of cardiac differentiation.

Overall it was seen that GelMA could be successfully synthesized with a methacrylation degree of 22% and that this material could then be used to create 3D cardiac tissues. These tissues were then seen to spontaneously contract and would express temporally appropriate functional genes and cellular structures. These tissues have the potential to be used as a biomimetic *in vitro* model that would be highly biomimetic for the future investigation of the impact of drugs on developing cardiomyocytes. The results show that GelMA is able to successfully form cell-laden tissues. By using this material for both the encapsulation and differentiation, we are able to have only a single cellhandling step while still producing CMs in a way that is beneficial for their function and viability.

Title: Change in the lipid transport capacity of the liver and blood during reproduction in rats

Primary Author (and presenter): Kallenberg, Marie Christine K

Additional Authors: Yufeng Zhang, Hayden W. Hyatt, Andreas N. Kavazis and Wendy R. Hood

Department: Biological Sciences

College/School: College of Sciences and Mathematics

Description:

To support the high energetic demands of reproduction, female mammals display plasticity in many physiological processes, such as the lipid transport system. Lipids support the energy demands of females during reproduction, and energy and structural demands of the developing offspring via the placenta in utero or milk during the suckling period. We hypothesized that key proteins supporting lipid transport and mobilization in reproductive females will increase during pregnancy and lactation, but drop to non-reproductive levels shortly after reproduction has ended. We compared the relative protein levels of liver-type cytosolic fatty acid transporter (L-FABPc), plasma membrane fatty acid transporter (FABPpm), fatty acid translocase (FAT/CD36) in the liver, a key site of lipid storage and synthesis, and free fatty acid transporter albumin and triglyceride transporter (represented by apolipoprotein B (apoB)) levels in serum in reproductive Sprague-Dawley rats during late pregnancy, peak-lactation, and 1-week post-lactation as well as in non-reproductive rats. We found that all lipid transporter levels were greater in pregnant rats compared to non-reproductive rats. Lactating rats also showed higher levels of FAT/CD36 and FABPpm than their controls. Moreover, all fat transporters dropped back to their non-reproductive levels during post-lactation except for FAT/CD36. These results indicate that fat transport capacities of liver cells and blood are elevated during late gestation. During lactation, other lipid sources together with liver could be responsible for the increasing lipid demand between lactation and gestation. These data supported the plasticity of lipid transport capacities in liver and blood during reproductive stages.

Title: Carotenoid Accumulation in Peel and Pulp Tissues of Genomically Diverse Banana Cultivars in Southeastern United States

Primary Author (and presenter): Kargar, Mahnaz

Additional Authors: Woods, Floyd.; Wall, Marisa.; Fonsah, Greg; Kessler, Raymond; Shetty, Kalidas; Jolly, Curtis; Jeganathan, Ramesh.

Department: Department of Horticulture

College/School: College of Agriculture

Description:

Banana (*Musa* spp.) is the fourth most important fruit crop globally with respect to human nutrition. High carotenoid concentrations in foods is associated with reduced incidence of non-communicable chronic disease, including certain cancers, cardiovascular disease, and diabetes. There is a critical need for identification, determination and selection of carotenoid enriched banana cultivars adaptable to Southeastern United States. Additionally, stage of maturity may have a profound influence on bioactive compounds in banana fruit. However, there is limited information concerning the effect of maturity on total carotenoid content of diverse banana cultivars adaptable to Southeastern U.S. Therefore, collaborative research efforts between AL, FL, GA, HI and ND was initiated to accomplish stated objective in order to establish local niche market. Five cold hardy banana cultivars varying in genotype, 'FHIA' (AAAB), 'Hua Mua' (AAB), 'Kandarian' (ABB), 'Saba' (ABB) and 'Williams' (AAA), were harvested at full three quarter stage of maturity and room ripened at 20°C and 95% RH. Fruit samples analysed and compared in peel and pulp total carotenoid content at four different fruit ripening stages (mature green, transition, ripe and over ripe). There was significant ($P \leq 0.05$) cultivar by maturity stage interaction for peel and pulp total carotenoid content. In general, total carotenoid content was lower in peel when compared to pulp fruit tissue. The total carotenoid content in peel ranged from 91.8 µg/100gfw to 932.8 µg/100gfw in cultivars FHIA and Hua Mua and in pulp ranged from 144 µg/100gfw to 1908 µg/100gfw in cultivars Kandarian and Hua Mua respectively. Preliminary results from this study illustrate the importance of proper cultivar and maturity selection of banana cultivars adaptable to Southeastern United States, for potential local niche market and health enhancement of diverse populations.

Title: The lack of skilled labor and vocational education

Primary Author: Keel, Benjamin M

Department: Environmental Design

College/School: College of Architecture, Design, and Construction

Description:

This research focuses on the issues involving decline of vocational education and social stigma attached to it; both of which are the driving forces behind the decline in skilled labor. Many schools are currently focused on STEM (science, technology, engineering, and math) education and standardized testing. While this type of education is intrinsic to a well-rounded student, it is often taken so far as to limit the student's ability to explore different trade based professions. Skilled laborers have been a mainstay in society since pre-industrial times. The blacksmiths and cobblers of the 16th century have evolved into the machinists and welders of the modern era. One major issue with skilled labor is that it requires extensive education in a very specific skillset, which has led to a large decline in these trades. Many people might not see this as a huge issue, but in reality it has the potential to change aspects of everyday life. Plumbers, electricians, and mechanics are vital trades that keep society running smoothly; while welders and machinists are necessary in constructing the planes, trains, trucks, and ships that carry Amazon orders to your doorstep. Social stigmas are the second driving force behind this issue. Most people associate the phrase "blue collar" to trade based professions, which carries with it the connotation of hard manual labor and lower

standards of education. This leads many people to believe that it is difficult to be successful in these lines of work. In reality, the people in these professions have the same potential to be successful as a person with a four year degree.

Title: Nanoparticle supported membranes for drug delivery

Primary Author (and presenter): Kelly, Alexander L. ¹

Additional Authors: Arnold, Robert D. ² and David, Allan E. ¹

Department: Chemical Engineering¹; Drug Discovery and Development²

College/School: Samuel Ginn College of Engineering¹; Harrison School of Pharmacy²

Description:

The drug delivery field has long pursued the use of individual nanoparticle systems in the treatment of terminal illnesses. Significant success has been achieved with liposomal formulations of traditional therapeutics. Solid nanoparticles such as silica, gold and iron oxide have shown mild clinical success. Both of these types of nanoparticle systems, liposomes and solid nanoparticles, have many of their own advantages and disadvantages. Liposomes are plagued by their inability to provide sustained release of therapeutics but are lauded for their long circulation half-lives and biocompatibility. Solid nanoparticles have demonstrated an ability to provide tailorable drug release profiles but typically have low circulation half-lives. This work focuses on the production of a composite particle that encompasses the advantageous properties of both traditional nanoparticle systems while simultaneously addressing their pitfalls. Supported lipid bilayers have been extensively explored on two-dimensional planar surfaces. Recent advances have enabled the production of supported bilayers on nanoparticle surfaces. These membranes are often the most basic of supported membrane types, which involve fusion of the membrane with the surface of the nanoparticle. This type of supported membrane is simplistic and lacks some of the fundamental properties of liposomes, such as a fluid membrane, that have been implicated in their clinical success. This work aims to produce a nanoparticle supported membrane that retains the unique characteristics of liposomes that make it one of the most highly utilized drug delivery systems. A methodology to achieve this goal has been investigated and preliminary results suggest a successful approach has been established. Material synthesis, conjugation and characterization techniques have been developed. This work lays the foundation for producing novel lipid-nanoparticle composites that have numerous applications in drug delivery.

Title: Evaluation of enzyme-loaded nano-polymerosome treatment on neurodegenerative GM1 gangliosidosis

Primary Author (and presenter): Kelly, Jessica M.

Additional Authors: Martin, Douglas R. and Byrne, Mark E.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Delivery of therapeutics to the brain through non-invasive administration is a difficult task due to the blood-brain barrier (BBB), which prevents the transport of 98% of therapeutics. In GM1 gangliosidosis, patients are missing β -galactosidase (β gal), an enzyme necessary for cellular digestion, with major central nervous system (CNS) manifestation. GM1 gangliosidosis is fatal in infancy with no clinically available treatment. We are designing and characterizing the first nanoparticle-mediated treatment of GM1 gangliosidosis using self-assembled polymerosomes due to their high physiological stability and tunable release for IV enzyme delivery. When coupled with apolipoprotein, delivery through the BBB and to the lysosome of neural cells will occur, treating patients without invasive surgery. Polymerosomes formed

using poly(ethylene glycol)-b- poly(lactic acid) (PEGPLA) can encapsulate, protect, and deliver the lysosomal enzyme, β gal, under low-pH conditions. PEGPLA polymersomes form via solvent injection with an average diameter of 145 ± 21 nm. PEGPLA polymersomes encapsulate β gal at $72.0 \pm 12.2\%$ efficiency and demonstrate simultaneous encapsulation and ligand attachment at $86.7 \pm 11.6\%$ efficiency. Amine-reactive PEG facilitated the attachment of CF 350 Amine, a blue fluorescent ligand, for fluorescent imaging, and apolipoprotein E (ApoE), a target to the LDLR family of receptors, for BBB delivery, to the polymersome surface. In vitro, PEGPLA polymersomes demonstrate limited release in physiologic environment, pH 7.4, with a burst release upon membrane poration in lysosomal environment, pH 4.8. Cellular studies, using GM1 gangliosidosis-diseased fibroblasts, confirm that β gal-loaded polymersomes increase enzyme activity to normal levels with doses as low as 0.7 mg/cm². Results are promising towards the goal of creating the first clinical treatment for GM1 gangliosidosis, using a combination of enzyme replacement therapy and nanotechnology methods to cross the BBB.

Title: Perceptions of mental illness in college students

Primary Author (and presenter): Kelner, Will

Additional Authors: Alexander, Apryl

Department: Psychology

College/School: College of Liberal Arts

Description:

Although the prevalence of mental illness in the U.S. continues to increase, those diagnosed with mental illness remain negatively stigmatized by society. Mental illness in college students is becoming more prevalent, however, help-seeking attitudes in students are low due to a variety of factors such as stigma, ignorance, or cultural (Kitzrow, 2003; Soet & Sevig, 2006; Zivin, Eisenberg, Gollust, & Golberstein, 2009). Thorincroft, Rose, and Sartorius (2007) argue that one of the leading causes of stigma is ignorance. Ignorance regarding mental illness is what leads to most stigmas about mental illness. Although many studies have examined stigma about mental illnesses in the general population, few have evaluated college students' stigma towards individuals with mental illness and the mental health literacy of the college population.

The purposes of the study are to examine the attitudes and perceptions college students have towards individuals with mental illnesses. It was hypothesized that females and Psychology majors would accurately identify the presence of mental illness symptoms over males and non-Psychology majors, respectively.

Data were obtained via an online study from 718 undergraduate students at a large southeastern university. Participants were excluded from the study ($n=25$) if they failed to complete the survey. The current study was approved by the Institutional Review Board at a southern university. Participants were recruited from undergraduate psychology courses and received research credits for participating. Participants were asked to provide demographic information such as age, sex, and grade level. Participants read a vignette about Taylor, a college student who is exhibiting DSM-5 symptoms of depression. After reading the assigned vignette, participants were asked a series of questions related to social distance and stigma pertaining to the vignette.

When comparing how many students believed whether or not Taylor was presenting symptoms of a mental illness, we found that 583 (84.1%) of the participants believed that Taylor was presenting with symptoms. Although many participants agreed that Taylor presented symptoms of a mental illness, their responses varied in what particular mental illness Taylor's symptoms indicated. The majority of participants, 69.4% ($N=481$), correctly identified Taylor's symptoms as being indicative of depression. However, 4% ($N=28$) indicated it was an anxiety, 4.8% ($N=33$) thought it could be some combination of anxiety or depression,

1.4% ($N=10$) for Attention-Deficit Hyperactivity Disorder (ADHD), 1.2% ($N=8$) for Bipolar Disorder, and 2.3% ($N=16$) indicated some other condition (e.g., narcolepsy, socially awkward, laziness). We examined the outcomes questions related to social distance and societal stigma toward Taylor. Results indicated that 65.8% of participants endorsed probably willing or definitely willing to share an apartment with Taylor. When asked if they would be willing to be employed at the same job as someone like Taylor, 68.7% endorsed probably willing or definitely willing for the item. Further, 59.5% of college students stated they were probably or definitely willing to recommend someone like Taylor for a job working with a friend of theirs. When inquired about whether participants would ever consider dating someone like Taylor, 60.3% indicated they were either probably or definitely unwilling to date someone like her." Lastly, 91.5% of participants endorsed willingness to have someone like Taylor as a neighbor. These results indicate that the majority of college students that correctly identified Taylor as presenting with a mental illness could also correctly identify what disorder the symptoms indicated, Major Depressive Disorder. Additionally, the responses on the social distance scale indicate that there is still a significant portion of this particular population that show some social distance towards individuals with mental illness. Implications and future directions will be discussed.

Title: Home-based cardiac rehabilitation: Determining feasibility among rural residents

Authors: Kilcrease, Melissa G.; Sanderson, Bonnie; Gibson-Young, Linda

School/College: Auburn University School of Nursing

Description:

Background: A vast amount of research has shown the benefits cardiac rehabilitation (CR) has on cardiovascular patients; however it remains vastly underutilized secondary to lack of physician referral, schedule conflicts, and program availability. New program models are being explored with recommendations supporting the implementation of a home-based CR model utilizing telehealth technology. The purpose of this project was to determine if a home-based phase II CR program is a feasible alternative option to increase patient referral and participation to cardiac rehabilitation in rural areas.

Methods: Target population included individuals in a rural hospital 18 years or older with documented cardiovascular disease and medically cleared to participate in a phase II CR program. On discharge, following informed consent, participants received education and were assessed during weekly phone calls for six weeks. At the end of six weeks, participants were asked to complete a satisfaction survey. Descriptive statistics were used to describe the patient population and satisfaction rates. Paired t-tests were computed for variables of pre and post exercise time (min/week), BMI, and blood pressure.

Results: Of X eligible patients, X consented to participate with an average age of X (sd) years and a completion rate of X%. Out of these participants, there was significant improvement in exercise time, BMI, and blood pressure (all at $p<0.05$) and were highly satisfied with their care.

Conclusions: Home-based phase II CR was easily adopted by patients and resulted in increased access to care. These findings suggest that a home-based CR program is a feasible alternative option for rural patients in this area and further implementation of the project is warranted.

Title: Minimal spanning forests on infinite graphs

Primary Author (and presenter): Kim, Doyon

Additional Authors:

Department: Department of Mathematics and Statistics

College/School: College of Science and Mathematics/Auburn University

Description:

A graph G is a set of vertices connected by edges, thus $G=(V,E)$. A graph G is an infinite graph if the set of vertices or the set of edges are infinite. A path is a sequence of distinct vertices v_1, v_2, \dots, v_k such that $\forall i \in 1, 2, \dots, k-1$, there is an edge between v_i and v_{i+1} . A cycle is a sequence of distinct vertices $v_1, v_2, \dots, v_k, v_1$, where v_1, v_2, \dots, v_k is a path and there is an edge between v_1 and v_k .

Let G be an infinite graph. For each edge e of G , assign a random weight $\lambda(e) \in [0, 1]$, distributed uniformly and independently from the other edges. The Wired Minimal Spanning Forest of G , denoted $WMSF(G)$, is a subgraph of G that is the result of removing every edge that is maximal in some cycle or biinfinite path, and the Free Minimal Spanning Forest of G , denoted $FMSF(G)$, is a subgraph of G created by removing every edge that is maximal in some cycle. We study the structure of Free and Wired Minimal Spanning Forest of various classes of infinite graphs. We prove that if $G = \mathbb{Z} \times K_2$, an infinite ladder, then $FMSF(G)$ is connected. Also, we present the generalized results.

Title: Pricing real options premium based on the Conditional Value at Risk (CVaR) concept

Primary Author (and presenter): Kim, Kyongsun

Additional Authors: Park, Chan S.

Department: Industrial and Systems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Considering the risk and uncertainty in project evaluation is an important part of capital budgeting. Traditionally, we begin analyzing project risk by determining the uncertainty inherent in a project's cash flows. The best that we can reasonably expect to do is to estimate the range of possible future costs and benefits and the relative chances of achieving a reasonable return on the investment. Once we obtain the net present value (NPV) distribution by aggregating these periodic cash flows over the investment life, we may be able to determine the net present value at risk through the conditional value at risk (CVaR) concept. It basically calculates the expected loss on an investment if a certain level of loss is bound to occur over a given time period at a specified degree of confidence. If a typical investor is willing to accept the investment, we may view this amount (CVaR) as his risk tolerance associated with the project. It is important to recognize that real investments are not single decisions without future flexibility, but rather a basket of interacting options driven by many different uncertainties. Those uncertainties, investments into products, systems or technologies, have a changing economic value showing downside risk and upside potential benefits over the project life. Therefore, investors may be interested in hedging this expected loss (CVaR) by either delaying the project or using other features of various real options. In this paper, we will explore a procedure to price the value of this changing option for the investors whose risk tolerance determined by the CVaR. By determining the correct amount of option premium, we would be able to hedge the risk at the right price.

Title: Comparing the floodplain hydrology of a recently restored stream bank to a natural, undisturbed, floodplain

Primary Author (and presenter): King, Benjamin, P.

Additional Authors: Knappenberger, Thorston; Crop, Soil, and Environmental Science

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

The scientific community is increasingly turning their focus to the watershed level when tackling sediment and pollution related issues. This paradigm shift has increased the number and size of the stream restoration projects that have been accomplished. However, there is a lack of data and an inadequate amount of studies conducted to observe how effective these restorations have ultimately been.

In December 2016 an eroded reach of Parkerson Mill Creek was restored. The stream bank degradation only took place on the left floodplain while the right floodplain remained functional. Hence, the stream restoration only took place on the left floodplain. This reach now offers the unique opportunity to study the hydrology of a recently restored floodplain vs. a natural reference floodplain within the same reach. A groundwater-sampling plan was developed to assess the hydrology of the two floodplains. In each floodplain 4-5 groundwater wells were established to monitor floodplain hydrology. Each groundwater well was equipped with a groundwater level sensor. The goal was to understand how rainfall, discharge volumes, and groundwater levels are interconnected and how groundwater levels differ between a recently restored floodplain (left floodplain) to a natural, reference floodplain (right floodplain).

Results showed that groundwater moved more swiftly through the disturbed side of the reach due to a lack of established horizons. This was expected since this soil has been completely disrupted and has not been through the same weathering processes as the established, right, bank of the stream. However, it was observed that the new floodplain has established vegetation and has been stable despite multiple bankfull events.

Title: Impacts of brief in-class mindfulness training sessions on trait mindfulness and stress response in an undergraduate psychology course

Primary Author (and presenter): Kirby, Lauren, A. J.

Additional Authors: Robinson, Jennifer L.

Department: Psychology

College/School: Liberal Arts

Description:

Mindfulness has been credited with providing relief from symptoms associated with a diverse set of psychological and physical conditions (e.g., Davidson & Kozniak, 2015). Mindfulness-Based Stress Reduction (MBSR) courses typically consist of 20 hrs of training, but other researchers (Boettcher, et al., 2014; Carmody & Baer, 2009; Colzato, et al., 2015; Grossman et al., 2004) found smaller doses of mindfulness can be useful in stress reduction. We plan to measure trait mindfulness in college students using the Five-Facet Mindfulness Questionnaire (Baer et al., 2008) with the following five components: observing, describing, acting aware, nonjudgmentalness, and nonreactivity. We plan to experimentally isolate mindfulness's other components from attention (also deployed in progressive relaxation). Volunteers from a psychology course will be assigned to one of three different conditions: mindfulness meditation (MM), progressive relaxation (PR), or true control (C). Daily in class, MM will listen to a 5-minute-long pre-recorded mindfulness body scan meditation, while PR will listen to a progressive relaxation body scan. C will sit silently for the same amount of time. We will use a mobile app measure their heart rate to indicate stress response during their meditation practice and also during weekly quizzes in class. We will measure their trait mindfulness using the FFMQ, and both state and trait anxiety before they begin practicing and then again at the end of the semester. We hypothesize MM and PR will both show changes in heart rate and anxiety compared to C, but that MM will show differences in trait mindfulness and PR and C will not. We also hypothesize FFMQ posttest and heartrate will mediate the relationship between experimental condition and anxiety posttest.

Title: Dust particle circulation and vortices in a dc glow discharge dusty plasma

Primary Author (and presenter): Kish, Ayden, J

Additional Authors: Thomas, Edward

Department: Physics

College/School: College of Science and Mathematics

Description: Complex, or dusty, plasmas introduce a new charged species - dust grains of up to a few microns in diameter - to the dynamics of a background plasma discharge. While the size of these dust grains allow us to observe many plasma phenomena macroscopically, their presence also results in the generation of other processes that are unique to dusty plasmas. This presentation reports the observations of a recent study of toroidally-shaped dust clouds in a direct-current Argon plasma discharge. These dusty plasma clouds are formed by placing a conducting ring on a lower electrode while generating the plasma using an upper, biased electrode. Dust particles become suspended in the plasma between the two electrodes and, under the correct pressure and discharge conditions, the toroidally-shaped cloud is formed. This work reports on a variety of experimental configurations used to generate the clouds, measurements of particle flow and rotation using particle image velocimetry (PIV), and initial characterization of the plasma conditions that lead to the formation of these structures.

Title: Functional studies of genes transcriptionally regulated by calcium in *Xylella Fastidiosa*

Primary Author (and presenter): Kloske, Courtney, M

Additional Authors: Leonardo De La Fuente, Sy Traore

Department: Entomology and Plant Pathology

College/School: College of Science and Mathematics and College of Agriculture

Description:

Xylella fastidiosa (*X.f.*) is a bacterium that causes multiple lethal diseases in plants, including Pierce's disease in grapevines that was first described in the 1880s in vineyards in California. Since then, *X.f.* has been reported to infect many other economic crops including citrus, peach, plum, almond, coffee, pecan, and more recently olive. *X.f.* lives only in xylem vessels which carry the water and nutrients from the roots to the rest of the plant. Proliferation inside the xylem leads to the formation of biofilm that obstructs the plant vascular system causing the plant to not receive the nutrients it needs. Previous reports by our group showed that calcium increases the growth of biofilm and therefore the virulence of the bacterium. Whole transcriptome analysis identified 17 *X.f.* genes that were constantly upregulated by Ca at different times, including 12 without assigned function. I selected three of these genes to study their function: a Cu transporter (PD0585), and two hypothetical proteins (PD0913, PD0926). The objective of this study is to determine the role of these candidate genes in the virulence of *X.f.* To test the virulence of each of the candidate genes, first I obtained deletion mutants in each of the genes. Homologous recombination was used as a system to cleanly delete the candidate genes into the genome of *X.f.* Sequence verification was used to verify the genes of interest were knocked out. Secondly, I will assess the influences of these genes in virulence traits in vivo. I will be looking at the biofilm formation as well as the bacterium's ability to move. Finally, mutant strains will be inoculated into the host plants to test their virulence function in vivo. This will be done to observe how these mutant strains will truly affect the plant. With the results obtained, the virulence of the bacteria can be better understood for future disease management approaches.

Title: The effect of employment on students' grades

Primary Author (and presenter): Klumpp, Kendall

Additional Authors: Bubb, Robert; Slife, Sarah

Department: Psychology, Human Development and Family Studies

College/School: College of Liberal Arts, College of Human Sciences

Description: College students are encouraged to gain practical experience in addition to their course work in order to be more competitive for employment and graduate programs. Along with competitive grades and test scores, employers and admission boards often look for extracurricular activities such as employment, internships, and research experience. However, these additional time commitments may negatively impact academic performance. Negative correlations between investment in education and employment have been seen across age, socioeconomic, and racial groups (Steinberg & Dornbusch, 1991). Previous research has also shown that students who are unemployed spend significantly more time studying than students who work as few as 5 hours a week (Golden, L. & Baffoe-Bonnie, J., 2011). The goal of the current study is to determine if employment has a negative impact on students' grades. A national sample of students from nine introductory psychology courses (68% female) participated in the study via a voluntary in-class survey. At the end of the semester, the course instructor provided each participants' course grade. Students not employed finished the semester with a higher course grade than their employed counterparts. However, this relationship was mediated by the students' lecture attendance and quality of textbook reading. Employed students tended to compensate for missing more class by increasing the quality of their textbook reading. An increase in both lecture attendance and quality of textbook reading would likely mitigate the negative effects of employment on grades. A regression analysis of hours employed a week found similar results. With roughly 80% of all undergraduate students employed, these findings should encourage students to evaluate the negative impact employment may have on their education and develop effective strategies to balance both meaningful employment experiences and academic success (Riggert, Boyle, Petrosko, Ash, & Parkins, 2006).

Title: Impurity studies in fusion research on Wendelstein 7-X

Primary Author (and presenter): Kring, James, D.

Additional Authors: Traverso, Peter; Pablant, Novimir; and Maurer, David

Department: Physics

College/School: College of Science and Mathematics

Description:

Fusion energy has been put forward for years as the energy of the future, and with the recent completion of Wendelstein 7-X (W7-X), a fusion experiment known as a stellarator, that future is coming into focus. A stellarator is a toroidal experiment that uses complex external magnet coils to confine a superheated gas or plasma in order to achieve fusion. In particular, W7-X uses optimized superconducting magnet coils to confine a hydrogen plasma that is heated up to 100 million degrees. Even with the vast technological advancements needed to get an experiment like W7-X built, problems still exist in controlling the super-hot plasma for fusion energy production. Impurities, which are anything in the plasma that is not hydrogen, can limit the heating efficiency and energy confinement by radiating away energy stored inside the plasma. The question that arises is then how to minimize impurities in key areas of the plasma to maximize energy confinement to achieve sustainable fusion. To study and test impurity behavior in the core of a plasma, non-invasive techniques such as x-ray spectroscopy have been developed to analyze the plasma. Described here, the X-ray Imaging Crystal Spectrometer (XICS) on W7-X looks at helium-like Argon spectra to find impurity densities along with other important plasma parameters. Specifically, XICS utilizes a spherically bent crystal to collect and diffract light using Bragg's Law. The result is a spatially resolved x-ray spectrum that provides measurements of ion and electron temperatures, flows in the plasma, and impurity densities. This talk details the analysis needed to be able to accurately measure the impurity densities using XICS and how they are used for impurity studies in the plasma core.

Title: Evaluation of scents for baiting wild pigs

Primary Author: Lambert, Shannon Michelle

Additional Authors: Smith, Mark; Williams, Brian; Johnson, Dana

Department: N/A

School: School of Forestry and Wildlife Sciences

Description: Wild pigs (*Sus scrofa*) cause >\$1.5 billion/year in agriculture related damage in North America. Lethal removal by capturing wild pigs in large corral style traps and then euthanizing them is one of the most cost- and time-effective means for reducing wild pig populations. Scent attractants are often used when baiting pigs to traps; however, no studies have examined the relative effectiveness of different scents in luring wild pigs to bait stations. Our objective was to determine if attractants such as molasses and urine based scents reduced the time it takes for wild pigs to find and visit bait stations relative to those using just bait. Our study was conducted at private land holdings in Hardaway, AL, and at the state-owned Lowndes Wildlife Management Area near White Hall, AL, during the summers of 2014-2016. At each study area, bait stations consisting of 11.3 kg of corn and one of three treatment scents (molasses-based, pig urine, no scent) were placed at a density of 1 bait station/km² in suitable wild pig habitat at each site. A motion-sensitive camera was then positioned at each bait station to capture images of animals visiting the station to consume the bait. We monitored each bait station for 2 weeks and replenished the scent and corn after 1 week. Detection time was measured as the time from when a bait and scent was first placed at a station until a wild pig was captured on a camera image. Wild pigs visited 23 of 66 (35%) of bait stations within the 2-week monitoring period; however, the frequency of visitation among scent types did not differ (48% molasses-based, 35% pig urine, 23% no scent ($P=0.231$)). Likewise, of bait stations that were visited by wild pigs the time until first detection did not differ among scent types ($P=0.600$). Mean time until first detection was 62.0 hours. Commonly used scent attractants did not have a significant impact on reducing the time it takes wild pigs to find and visit bait stations.

Title: Decreasing cardiovascular disease risk factors with family-based interventions

Primary Author (and presenter): Lawson, Stephanie, W.

Additional Authors: Gibson-Young, Linda

Department: School of Nursing

College/School: Auburn Montgomery Nursing

Description:

Evidence strongly suggests that modifiable cardiovascular disease (CVD) risk factors can be reduced with family-based interventions. A thorough review of the literature prioritized family-based interventions including diet, exercise, and life-style choices to reduce CVD risk in young adults. The purpose of this project was to implement an educational family-based intervention and evaluate patient adherence with diet, exercise, and life-style choices with family interventions. Target population included young adults (19yrs or older) at the Dade County Health Department. Following informed consent, participants completed the My Life Check-Life's Simple 7 questionnaire. The nurse manager instructed the participant using the CVD risk reduction brochure and a detailed log book to track weekly progress. A follow up phone call was made after one week and then every two weeks to assess patient adherence. Descriptive statistics were used to describe the patient population, family involvement, weight, BMI, BP, and physical activity (PA). The pre-post My Life Check-Life's Simple 7 scores were compared with paired t-tests. 16 consented to participate (50% females), average age of 30 yrs. Average family involvement was X%, average weight was X lbs, average BMI was X, average BP was X, and average PA was X days. Among participants the mean My Life Check-Life's Simple 7 scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p<0.05$). Adherence to family-based interventions in CVD risk reduction has

improved modifiable CVD risks. Early identification of CVD risk among young adults is attainable in the health department setting and further implementation of the project is justified.

Title: Addressing limitations of previous research on change orders at Auburn University

Primary Author (and presenter): Layson, Joshua, A.

Department: Building Science

College/School: Architecture, Design, and Construction

Description:

Change orders, and the unfortunately associated cost growth, should be expected to accompany any construction project. There has been much research conducted on the nature, causes, and impacts of change orders. This body of research is varied, containing attempts to quantify the impacts of change orders, create front-end planning processes designed to foresee and mitigate such impacts, define and order the causes of change orders, and document the nature of project change as it relates to project delivery. A small part of this body of research deals specifically with electrical construction change orders, and an even smaller part of it deals with construction at public universities. There is, however, some evidence suggesting that change orders are especially troublesome on electrical construction projects at public universities. These studies are largely quantitative, and serve to present the problem and invite further inquiry. A study conducted by Houston White, a graduate student at Auburn University, in 2016 found that change orders to electrical construction projects at Auburn University were especially numerous and expensive. The aim of this research, therefore, is to turn a qualitative eye toward the problem of change orders to electrical construction projects at Auburn University. The research scope is limited to construction projects at Auburn University from 2006 to 2015 for which change order data can be obtained. A qualitative-archival research methodology will be employed to determine the reasons behind change orders to electrical construction projects. It is expected that this research will conclude with a detailed understanding of change orders to electrical construction projects at Auburn University as well as action items to be presented to Auburn University Facilities Management for their use in mitigating and managing electrical construction project change.

Title: Responsiveness to humans generalizes across problem solving in dogs

Primary Author (and presenter): Lazarowski, Lucia

Additional Authors: Thompkins, Andie; Forloines, Martha; Strassberg, L.; Deshpande, Gopi; Wagoner, Paul; Katz, Jeff

Department: Psychology

College/School: Liberal Arts

Description:

Domestication may have led to unique cognitive skills in dogs, enabling them to occupy a significant niche in human society in companion and working roles. Considerable research has revealed the sophisticated socio-cognitive abilities of dogs, but findings are limited to pets neglecting other important sub-populations such as detection dogs. We applied two common measures of canine social cognition to a group of explosives detection dogs. In the unsolvable task (UT), we measured behavioral tendencies indicative of attachment towards the dogs' trainer versus an unfamiliar person. In the object-choice task (OCT), we assessed dogs' ability to utilize communicative cues (pointing and gazing) given by a familiar or unfamiliar person to locate a hidden reward. No biases towards the familiar person were found within either task, but duration and frequency of human-directed behaviors in the UT were correlated with OCT accuracy ($r=.448$, $p<.05$ and $r=.434$, $p<.05$, respectively). Accuracy using the pointing cue when given by the familiar person was positively correlated with UT showing behaviors towards the familiar person

($r=.449$, $p<.05$). These findings suggest that measures of different socio-cognitive abilities may involve similar mechanisms, and may have implications for selecting and training detection dogs. Current findings will be extended to include other subpopulations for comparison, such as pets and service dogs.

Title: *Origanum vulgare* as an alternative treatment for aquatic pathogens

Primary Author (and presenter): Leason, Khrystyn, R.

Secondary Authors: Arias

Department: Fisheries, Aquaculture and Aquatic Sciences

College/ School: Agriculture

Description:

Flavobacterium columnare, *Aeromonas salmonicida*, *Aeromonas hydrophila*, *Edwardsiella ictaluri*, and *Yersinia ruckeri*, are frequently reported bacterial diseases, which affect species such as *Ictalurus punctatus* (channel catfish), and *Oncorhynchus mykiss* (rainbow trout). Current treatments approved by the FDA for use in aquaculture include feeds medicated with; florfenicol (Aquaflor), oxytetracycline dihydrate (Terramycin), and sulfadimethoxine & ormetoprim (Romet 30). However, the use of such medications has resulted in the emergence of multi-drug resistant strains of aquatic pathogens. *Origanum vulgare* (Oregano) is a common herb, which has culinary and medicinal uses. Throughout Asia, and the Mediterranean, Oregano has been used in folk medicine as a remedy for numerous ailments. Previous studies have demonstrated the efficacy of *O. vulgare*'s essential oil (OEO) against pathogens such as *Escherichia coli*, and *Staphylococcus aureus*. In this study, we tested the efficacy of OEO at inhibiting the growth of 20 strains of aquatic pathogens. Using the microdilution method, we demonstrated the efficacy of OEO and developed a minimum inhibitory concentration (MIC) for each pathogen. The results of this research will help develop treatment protocols for channel catfish, which are challenged with *F. columnare*.

Title: Improving self-management of heart failure through enhanced heart failure education

Primary Author: Ledbetter, Laura, S.

College/ School: School of Nursing

Description:

Current research points to the potential for improvements in self-care skills and quality of life for adults living with heart failure when provided proper tools and education. Evidence-based guidelines suggest that education regarding signs, symptoms and self-care strategies and counseling should be ongoing to provide maximum benefit in heart failure management. The purpose of this project is to improve quality of life and self-care behaviors of adults living with heart failure through enhanced education and counseling. The target population included established adult patients previously diagnosed with heart failure in a primary care office. After informed consent was obtained, participants were assessed for baseline knowledge of self-care activities and behaviors affecting heart failure. Initial education and counseling was completed in office with subsequent follow-up telephone calls every other week to assess and reinforce self-care behaviors. Data collection tools used included the Minnesota Living With Heart Failure Questionnaire (1986) and a spreadsheet quantifying the number of times specific self-care behaviors were performed in the previous seven days. At the end of the project, data was compiled and analyzed using paired t-tests. Sixteen adults consented to participate (54% females) with an average age of 61 years. 72% were not practicing any self-care behaviors in the initial education session. Only 15% were able to articulate the signs and symptoms of heart failure. Following the 6 week project, the increase in both the reported quality of life and the frequency of self-care behaviors reached statistical significance ($p<.05$). For adult patients living with heart failure, self-care education including ongoing enhanced

education/counseling programs improved self-care skills, symptom recognition, and quality of life. Further implementation of the project is warranted.

Title: Investigating consumer loyalty to apparel and beauty subscription box retailers

Primary Author (and presenter): Lee, Jong Geun

Additional Authors: Sadachar, Amrut

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

Although subscription box businesses (e.g., Birchbox, Epsy) have rapidly emerged as one of the fastest growing retail segments, there is hardly any academic research that investigates this growing market. Therefore, the purpose of this study was to explore key retail attributes that may influence consumer loyalty to subscription box retailers. Stimulus-Organism-Response (S-O-R) model was used as a framework for examining the relationships among variables, such as product-related attributes (e.g., quality, surprise), attitude, intention (e.g., Word of Mouth (WOM)), and loyalty. Amazon Mechanical Turk (AMT) panel was used for collecting the data. A total of 357 usable U.S. national sample was obtained, which consisted of male (46%) and female (54%) consumers with an average age of 32. A Structural Equation Modeling (SEM) technique was used to test the measurement and research model. The model fit indices suggested that the hypothesized structural relationships fit the data well ($\chi^2(356)=1153.24$, CFI=.91, TLI=.90, RMSEA=.08, SRMR=.06). Findings suggested that product quality ($\beta = .68$, $p < .001$) and product uniqueness ($\beta = .16$, $p < .001$) were significant determinants of consumers' attitude toward subscription box retailers. Whereas, price ($\beta = .12$, $p = .14$), assortment ($\beta = .07$, $p = .16$), and product surprise ($\beta = -.02$, $p = .59$) were not significant determinants of attitude toward subscription box retailers. Furthermore, results indicated that consumer attitude toward subscription box retailers in turn predicted WOM ($\beta = .79$, $p < .001$) and repurchase intention ($\beta = .86$, $p < .001$). This suggests consumers having positive attitude toward the subscription box retailers are more likely to spread positive WOM and to repurchase products from these box retailers. Finally, this study also found that the positive WOM ($\beta = .33$, $p < .001$) and repurchase intention ($\beta = .71$, $p < .001$) significantly influence customer loyalty for subscription box retailers. Significant implications are provided through this study.

Title: An Inquiry into Knowledge Management Strategies, Transformational Leadership, their Effects on Individual Creativity, and the Mediating Role of Knowledge Sharing

Primary Author (and presenter): Lee, Joonghee

Additional Authors: Seol Hyeondo

Department (of primary author): Department of Technology and Systems

College/School (of primary author): College of Business

Description:

Do knowledge management strategies (KMS) and leaders' behaviour improve creativity of members in organizations? If so, what is the mechanism behind the relationships? These are important questions because the ability to create novel and useful ideas has been recognized as crucial to organizational performance, as our world has evolved into a knowledge-based society. Also, a growing body of research has illuminated beneficial effects of leadership on creativity. However, the impact of KMS on creativity has not been reported, even though knowledge and expertise have been considered as essential to fostering creativity (Amabile, 1988; Woodman, et al., 1993), and strategies are a determinant of business (Michael, 1996). To address this shortcoming, this study examined the relationship among transformational leadership (TL), KMS, knowledge-sharing (KS), and creativity of members in organizations. The empirical evidence

in this study, derived using survey data from 445 employees of 42 companies in 2013, suggests that TL and KMS have positive impacts on creativity of members in organizations. Importantly, KMS has only an indirect impact on creativity via KS, while TL has a direct impact on creativity and an indirect impact on it via KS. Taken together, these findings suggest that creativity of members in organizations would be enhanced by leaders' transformational behaviour and KMS via exchanging information and knowledge among members in organizations. The results of this study also provide important implications for managers to encourage employees to create unique ideas for organizational performance improvement. With regard to the relationships among TL, KMS, KS, and creativity, our research suggests that managers should encourage employees to challenge to the status quo and think differently, provide a supportive environment for innovation, and facilitate employees to share their ideas and knowledge with other members in organizations.

Title: An inquiry into knowledge management strategies, transformational leadership, their effects on individual creativity, and the mediating role of knowledge sharing

Primary Author (and presenter): Lee, Joonghee

Additional Authors: Hyeondo, Seol

Department: Technology and Systems

College/School: Harbert College of Business

Description:

Do knowledge management strategies (KMS) and leaders' behaviour improve creativity of members in organizations? If so, what is the mechanism behind the relationships? These are important questions because the ability to create novel and useful ideas has been recognized as crucial to organizational performance, as our world has evolved into a knowledge-based society. Also, a growing body of research has illuminated beneficial effects of leadership on creativity. However, the impact of KMS on creativity has not been reported, even though knowledge and expertise have been considered as essential to fostering creativity (Amabile, 1988; Woodman, et al., 1993), and strategies are a determinant of business (Michael, 1996). To address this shortcoming, this study examined the relationship among transformational leadership (TL), KMS, knowledge-sharing (KS), and creativity of members in organizations. The empirical evidence in this study, derived using survey data from 445 employees of 42 companies in 2013, suggests that TL and KMS have positive impacts on creativity of members in organizations. Importantly, KMS has only an indirect impact on creativity via KS, while TL has a direct impact on creativity and an indirect impact on it via KS. Taken together, these findings suggest that creativity of members in organizations would be enhanced by leaders' transformational behaviour and KMS via exchanging information and knowledge among members in organizations. The results of this study also provide important implications for managers to encourage employees to create unique ideas for organizational performance improvement. With regard to the relationships among TL, KMS, KS, and creativity, our research suggests that managers should encourage employees to challenge to the status quo and think differently, provide a supportive environment for innovation, and facilitate employees to share their ideas and knowledge with other members in organizations.

Title: Evidence-based practice project: elective induction of labor

Primary Author (and presenter): Leger, Ashton, M

Department: MSN Program

College/School: School of Nursing

Description:

Evidence has shown that there is a decreased rate of elective inductions in women who receive induction risk education compared with those who did not. Evidence-based guidelines recommend offering induction education to reduce the number of non-medically indicated inductions of labor. The purpose of this project was to implement prenatal education regarding induction of labor, subsequently reducing the incidence of elective labor inductions. The target population included all pregnant women eligible for an elective induction of labor in an obstetrical clinic. Following informed consent, participants received a brochure outlining the risks of early elective inductions. At the participants first post-partum clinic appointment they will be asked to complete a survey containing questions regarding the decision to either electively induce labor, or allow spontaneous labor. The rate of elective induction before project implementation was then compared to the incidence of elective induction of labor after education implementation. X females consented to participate, average age of X (sd) years. 0 % of group 1 received induction education, while 100% of group 2 received induction risk education. X% of group 2 said the education influenced their delivery method. X% of group 2 allowed spontaneous labor to occur, while X% of group 2 opted to electively induce their labor. Of the X% that electively induced their labor, X% had a successful induction (resulting in a non-assisted vaginal delivery). Among participants who received induction risk education, the mean elective induction rate decreased from pre (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Implementing prenatal education regarding the potential adverse outcomes associated with elective induction of decreased patient requests for elective inductions of labor. The rate of spontaneous vaginal deliveries increased, while the rate of cesarean sections decreased. Decreasing the rate of non-medically indicated labor inductions through education implementation is achievable at this obstetrical setting.

Title: Strategies for lifestyle modifications for blood pressure control

Primary Author (and presenter): Lemon, Megan, M.

Additional Authors:

Department: School of Nursing

College/School:

Description:

There is evidence that lifestyle modifications contribute to blood pressure control. These modifications, such as diet and exercise, are crucial for optimal control. Evidence suggests that technology is a strategy to help implement lifestyle modifications. The purpose of this project was to utilize a mobile application and monitor use, including self-monitoring, exercise and knowledge in conjunction with BP control. Self-monitoring and increased knowledge promote awareness and lifestyle changes. Patient adherence and changes in BP are assessed. Target population included adults over 18 years diagnosed with or at risk for developing hypertension in a family practice. Following informed consent, participants completed a knowledge survey and baseline blood pressure was obtained. A username and password for the application was provided. Phone calls at one week and completion were made to assess patient adherence the knowledge survey was reassessed. Descriptive statistics were used to describe patients and outcome measures include self-monitoring, exercise and knowledge. To assess outcomes, baseline data will be obtained and compared at completion using the application. From baseline, the pre-post knowledge responses, self-monitoring and exercise were compared with paired t-tests. X consented to participate (%F & %M), with the average age of X (sd) years of varying ethnicities (%Caucasian, %AA %Hispanic & %other). The average BMI was X%. Of those who participated, X improved self-monitoring, X% improved exercise and X% had improved blood pressure. Follow-up indicated that X% adhered to recommendations. The mean knowledge scores improved from pre(mean,sd) to post(mean,sd) significantly ($p < 0.05$). The use of strategies aid in lifestyle modifications for hypertensive patients. Increasing education and adding strategies into treatment plans is achievable in this setting and further implementation of the project is warranted.

Title: Improving heart failure management with improved self-care behaviors

Author: Lesniak, Andrea, K.

Secondary Authors: Gibson-Young, Linda

College: School of Nursing

Description:

There is a strong correlation between positive self-care behaviors, improved heart failure management and fewer hospitalizations. Evidence-based guidelines recommend promoting self-care in patients diagnosed with heart failure; follow-up visits, patient education strategies and collaboration with family members to improve quality of care. The purpose of this project was to implement education strategies and encourage self-care behaviors. Target population included adults with chronic heart failure in a primary care office setting. Following informed consent, participants completed a knowledge questionnaire to establish a baseline competency related to heart failure management. Baseline adherence was measured using a series of questions regarding heart failure. After X weeks, follow-up visits and telephone calls were conducted to determine adherence to treatment, overall quality of life and to answer any questions about condition management. A further evaluation of knowledge was conducted post-implementation and responses were compared with paired t-tests. Descriptive statistics were used to describe the patient population, knowledge, adherence and quality of life. X consented to participate, average age of X (sd) years. X% were identified with poor heart failure management, X% experienced greater management, adherence and knowledge, following interventions. Follow-up interventions indicated that X% could manage heart failure better and yielded a decreased rate of readmissions related to heart failure. Among patients with heart failure, knowledge scores improved from pre (mean, sd) to post (mean, sd) significantly ($p=0.05$). Establishing baseline knowledge for management of heart failure and providing education based on the results of the questionnaire guided the recommended interventions and improved self-care behaviors. Implementation was warranted as the interventions are achievable in this primary care setting.

Title: Preparing for specialized practice in design and wellness: A model curriculum

Primary Author (and presenter): Levinson, Emily, C.

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

With people spending nearly 90% of their time indoors and because buildings can contribute both positively and negatively to user's health (International Well Building Institute [IWBI], 2015), it is imperative that interior spaces are designed with the wellbeing of the occupant in mind. The International Well Building Institute is devoted to improving human sustainability through the built environment. They have recently developed the WELL Building Standard, which acts as a guideline and tool for buildings to positively impact human health. This certification system is based on the idea of quantifying and monitoring the performance of the building through their many features. Similar to Leadership in Energy and Environmental Design [LEED], which measures the building's impact on the environment, WELL is a growing trend in the design and building industry. Although this information is available and the certification program exists, WELL is lacking the educational material needed to teach this information to both professionals and design students. The purpose of this thesis is to provide a complete curriculum model, including a syllabus, schedule, lectures, assignments, projects, rubrics, and exams that can be adapted for either a university design lecture, studio, or a professional continuing education course. This is

important because once people are educated on how buildings contribute to occupant health, this knowledge can be used to positively impact the design of the built environment to improve the quality of people's lives.

Title: Beavers are engineers; trees are not: The dam truth

Primary Author (and presenter): Lewis, Alexandra, A.

Additional Authors: John, Rebecca; Parsons, Elizabeth; Price Tack, Jennifer; Gitzen, Robert; Hartman, Patricia; Lepczyk, Christopher; and Zohdy, Sarah

Department: Forestry and Wildlife Sciences

College/School: Agriculture

Description:

Since the term's introduction in 1994, "ecosystem engineer" has been used to describe all manner of organisms. Jones et al.'s original designation describes species that significantly modify, create, or destroy habitat via physical state changes in the environment, dividing organisms into two categories: autogenic or allogenic. Autogenic engineers use their own structures while allogenic engineers use extra abiotic or biotic materials to modify their environment. Every organism plays a role in an ecosystem; therefore, such broad use brings into question the application of this term. Our goal was to understand its use in the last 20 years and determine if it has maintained its utility as an ecological concept given its ambiguity. To address these questions, we reviewed the literature from 1994 to 2016, using the keyword "ecosystem engineer*". A search in Web of Science, Google Scholar, and Ecology Abstracts yielded 2,227 unique records. We found the term's use has increased over time and has described a wide range of organisms including tree biomass, parasite influences, and grazers. Thus, despite Wright and Jones's warnings in their 2004 review, ecosystem engineering has become a token buzzword applied to nearly any biotic effect to promote a species' relevance in an ecological community. Moving forward, we argue the term be restricted to allogenic ecosystem engineers: individuals that cause a state change in their ecosystems due to the construction of an external physical structure such as webs, burrows, and cavities. We suggest that the category of "autogenic engineer" devalues the utility of ecosystem engineering because autogenic engineering is adequately described by niche construction and other ecological concepts. We anticipate that this application will remove confusion and ensure the utility of ecosystem engineering as an ecological concept.

Title: IW2K Android application for young kids

Primary Author (and presenter): Li, Guorui

Additional Authors: Cheryl D. Seals

Department: Computer Science & Software Engineering

College/School: Auburn University

Description:

Children today are growing up in a rapidly developing world filled with rapidly evolving technologies, such as the Internet, smart phones, and smart mobile devices, etc. As a result more applications are developed with children as the targeted population and young students have more ways to obtain educational resources online. This work will discuss an educational application for children who want to find out more about their interests or help them to explore their interests in different topics such as science and health from a youth perspective. The proposed project will be implemented as a mobile application and specifically an android application based on a web crawler system and a recommendation system. The system will collect data from specific organizations that have children specific educational content such as extension.org. Also, we have collected requirements, designed and developed a user-friendly Android application for teenagers (i.e. based on user feedback) and students can utilize this app to access

interesting topics (e.g. youth science). Our aim is to improve user experience in the area of STEM content access. Based on the student interaction with the application, we will refine the design of our recommendation system to analyze student interests and provide comparative data to support the targeted population in quickly finding information in their fields of interest.

Title: Investigating the impacts of *Bacillus* on green algae metabolism

Primary Author (and presenter): Li, Kaiyan

Additional Authors: Higgins, Brendan

Department: Biosystems Engineering

College/School: Agriculture

Description:

The purpose of this research is to determine the impact of the bacteria *Bacillus* sp. on algal metabolism and photosynthesis. The main objective is to determine how bacterial cells or secretions alter algal metabolism compared to axenic control cultures. The experiment was carried in photobioreactors over the course of five days using the model green algae *Auxenochlorella protothecoides*. When cultured on plates, we observed that *A. protothecoides* colonies in the vicinity of bacillus colonies exhibited a darker green color than more distant algal colonies. We therefore hypothesized that addition of live bacillus or bacillus secretions to algal bioreactors would likewise lead to darker green cultures with higher optical density than control cultures. Such an outcome would indicate that there is interaction between algae and *Bacillus* sp. We have observed so far that the bioreactors co-culturing bacillus sp. and algae had higher OD but a lighter green color than control cultures. There is a possibility that the organism interaction impacts algal growth rate and photosynthesis. This algae-bacterial process might improve culture resilience and increase algal growth rates, which can be applied to wastewater treatment, biofuel production, and synthesis of biomaterials.

Title: GWAS analysis revealed the association of genes for muscle and bone development with growth in catfish

Primary Author (and presenter): Li, Ning

Additional Authors: Zhou, Tao; Geng, Xin; Jin, Yulin; Wang, Xiaozhu; Liu, Shikai; Xu, Xiaoyan; Li, Qi; and Liu, Zhanjiang

Department: Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

Growth is perhaps the most important economic trait in aquaculture. Fast growing fish not only increase production, but also allow fish to be grown to market size more quickly. In addition, fast growing fish tend to have a better survival rate. Catfish is the major aquaculture species in the United States, accounting for 65% of the US finfish production. Currently, the majority of the US catfish industry uses hybrid catfish derived from channel catfish female mated with blue catfish male. In this study, we conducted a genome-wide association study (GWAS) for catfish body weight using the 250K SNP array with 556 backcross progenies generated from backcross of male F1 hybrid (female channel catfish x male blue catfish) with female channel catfish. A genomic region (approximately 1 Mb) on linkage group 5 was found to be significantly associated with body weight. Most candidate genes in the associated regions are known to be involved in muscle growth and bone development, some of which were reported to be associated with obesity in humans and pigs, suggesting that the functions of these genes may be evolutionarily conserved in controlling growth. The results provide a strong basis for application of marker-assisted selection in catfish. Additional fine mapping or functional studies should allow

identification of the causative genes for fast growth in catfish, and elucidation of molecular mechanisms of regulation of growth in fish.

Title: Evaluation of microbiome present in bagged Spring mix salad

Primary author (and presenter): Liao, Chao

Secondary author: Wang, Luxin

Department: Animal Sciences

College/ School: Agriculture

Description:

Outbreaks and recalls of fresh salad products have increased in the past decade due to the contamination of foodborne pathogens. The aim of this research is to investigate the diversity and abundance of the microbiome present in salad products. The different natural microbiome harbored in salad products may affect shelf-life and have an antagonistic capacity against foodborne pathogens contaminated during the process of food production. Three commercial salad products (A, B, and C) were stored in the refrigerator (4°C) for 15 days. Samplings were on day 0, 5, 10, and 15. PCR-DGGE was used to evaluate the changes of the microbiome in three brands of salad. The Shannon index was calculated to measure microbial diversity. The populations of aerobic and anaerobic bacteria were enumerated by plating samples on Trypticase Soy Agar (TSA) and Anaerobic Agar (AA). The Shannon indexes of microbial diversities were 2.234 ± 0.069 , 2.573 ± 0.075 , and 2.373 ± 0.053 for brands (A, B, and C) initially. The Shannon index decreased from 2.311 to 1.976 for brand B, while the indexes remained the same for brands A and C from day 0 to day 15. Total aerobic bacteria increased by 1.582, 1.790, and 1.630 Log CFU/g from 8.048, 8.134, and 8.098 Log CFU/g by day 5 for brands A, B, and C, then decreased to 8.050, 8.201, and 8.472 Log CFU/g by day 15. The populations of anaerobic bacteria in the three brands decrease by 0.997, 0.685, and 0.347 Log CFU/g during the 15 days of storage. Salad from brand B decayed more than the other two brands. Different microbial diversity and abundance were found among the three brands. This observation highlights the importance of further evaluating the microbiome present in salad products.

Title: Achievement goal orientations and self-regulated learning strategies of adult and traditional learners

Primary Author (and presenter): Lin, Xi

Additional Authors: Wang, Chih-hsuan and Cordie, Leslie

Department: Educational Foundations, Leadership, and Technology

College/School: Education

Description:

This study examined achievement goal orientations (AGO) and self-regulated learning strategies (SRL) of adult and traditional learners, respectively. The relationship between AGO and SRL of learners is also investigated. An electronic anonymous survey combined with the Achievement Goal Questionnaire-Revised (AGQ-R) and Motivated Strategies for Learning Questionnaire (MSLQ) was distributed to students in a large southeastern research institution. A total number of 469 students participated in the study including 228 traditional learners and 240 adult learners. Data was analyzed through one-way MANOVA and Canonical Correlation. Results indicate that adult learners are more mastery-approach goal oriented, while traditional students are more performance-avoidance goal oriented. Additionally, mastery-approach goal orientation is usually positively linked with students' deep level of processing and their effort regulation strategies, whereas performance goal orientations and mastery-avoidance goal orientation are linked with both deep and surface learning strategies. It is expected that this study will

help education professionals better understand the differences of these two student groups, and to assist various learners efficiently based on their different goal orientations and learning strategies.

Title: Evaluating the influence of plant growth-promoting rhizobacteria as a bio-fertilizer under different fertility sources

Primary Author (and presenter): Lin, Yaru

Additional Authors: Watts, Dexter and Kloepper, Joseph

Department: Crop, Soil, and Environmental Sciences

College/School: Agriculture

Description:

Chemical fertilizers are being extensively used to satisfy the increasing demand for food. However, utilization of chemical fertilizers can be costly and over application for ensuring crop productivity may lead to environmental problems. As a result, interest in using bio-fertilizers to improve soil properties, increase crop nutrient utilization, and potentially offset chemical fertilizer costs has increased in recent years. Plant growth-promoting rhizobacteria (PGPR), as biofertilizers, have the ability to mediate soil processes such as nitrogen fixation, mineralization, solubilization, and nutrient mobilization, thereby, increasing soil productivity and plant growth. Therefore, a greenhouse study was conducted with a Marvyn loamy sand (fine-loamy, kaolinitic, thermic Typic Kanhapludult) to evaluate the effects of PGPR on root establishment and biomass production of maize (*Zea mays* L.) during the early growth stages using three fertility sources. Treatments included three fertility sources (poultry litter, bio-solids, and urea) at a rate of 168 kg total N ha⁻¹ and five PGPR inoculants (four PGPR strain mixtures and one control without PGPR). Applying poultry litter significantly improved root morphological parameters, and increased plant biomass at the V4, V6, and VT growth stages when compared to the other fertility sources. At the V4 stage, PGPR stimulated root growth and enhanced aboveground biomass with urea and poultry litter, while no differences were observed with PGPR and bio-solids. At the V6 stage, poultry litter, bio-solids, and urea with PGPR significantly increased some growth parameters (e.g., plant height, leaf area, and root morphology). However, at the VT stage, PGPR's influence on plant growth was minimal regardless of fertility source. Applying the fertilizer sources at a 168 kg N ha⁻¹ rate may have masked PGPR's influence on maize growth as the plants reached their later vegetative growth stages. Future research is needed to evaluate the influence of PGPR on plant growth when fertility requirements are not optimal.

Title: Effects of competition-mediated dispersal on the persistence of a population

Primary Author (and presenter): Lindsey, Eddie L.

Additional Authors: Cosgrove, Emily

Department: Department of Mathematics & Computer Science

College/School: Auburn University Montgomery/College of Arts & Sciences

Description:

Dispersal of an organism plays an important role in individual fitness, population dynamics, and species distribution. In the literature, dispersal is loosely applied to movement over different spatial scales, e.g. movement between habitat patches separated in space from other areas. Recently, ecologists have found that the presence of a competitor can have a major impact on the dispersal of an organism, a phenomenon known as competition-mediated dispersal. Little is known regarding the patch-level consequences of habitat fragmentation of competing species in the presence of competition-mediated dispersal. In this talk, we will develop a patch-level model built on the reaction diffusion framework to explore effects of habitat fragmentation and competition-mediated dispersal. Our results will focus on a one-dimensional

patch and methods from nonlinear analysis such as time map analysis (quadrature method) and linearized stability. We will also briefly explain the biological importance of our results.

Title: Benthic algae cultivation for recovery of nutrients from aquaponics wastewater

Primary Author (and presenter): Litton, Jarrod, C.

Additional Authors: Blersch, David

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Benthic algae cultivation for recovery of nutrients in wastewater has been investigated for decades, but little investigation has been done for its application in finfish aquaponics. Aquaponics polyculture production facilities are based on the concept of utilizing natural ecosystems to recover aquatic nutrients into useful production streams. One of the challenges of algal cultivation in aquaponics wastewater is the low and variable pH of the water, which often negatively impacts algal growth. The purpose of this research is to investigate the optimization of benthic algal cultivation for nutrient recapture from an aquaponics production system. Two Algal Turf Scrubber (ATS) flow lanes were constructed at the North Auburn Fisheries Unit in conjunction with a tilapia-cucumber aquaponics production system to assess how algae growth and recruitment would affect nutrient recovery and biomass production. The flow lanes receive their source water from tilapia fish waste routed as the plant effluent. Each ATS flow lane acts as a tertiary treatment of the wastewater for the entire aquaponics system. Algal biomass was harvested weekly, and analyzed for growth rate and ash content. Preliminary results show substantial growth rates that correlate with temperature. Growth and nutrient recovery rates will be analyzed for correlations with aquatic nutrient content and other water quality parameters. Results will be useful to determine operational parameters for algal cultivation in an integrated aquaponics scenario.

Title: Improving teen diabetic education through parent and peer support.

Primary Author (and presenter): Litwiller, Kimberly

Additional Authors: Hamilton, Cam

Department: School of Nursing

College/School: Auburn University at Montgomery

Description:

There is strong evidence that uncontrolled diabetes in adolescents can lead to complication such as amputations, cardiac disease and premature death. Evidence-based guidelines recommend a combination of patient, peer, and parent education to improve knowledge and glycemic control. This purpose of this project is to implement an effective diabetic educational program for adolescent patients using group education and peer interaction. Participants were monitored throughout the project for adherence to the recommended guidelines. The target populations consist of patients (12 to 19 years) from the local pediatric endocrinology clinic in South Alabama, diagnosed with diabetes for greater than a year, and with HbA1c levels above 10. Following informed consent, participants will participate in a group education session, led by a moderator to encourage peer interaction, and complete a survey. Other data will be collected from routine appointments. X invited to participate (% females, % males), average age of X (sd) yrs. Average of years diagnosis with diabetes, X % attended X amount of meetings, and X% checked their glucose more than four times daily. Follow-up indicated that X% adhered recommendations by lower their A1C. Among those with baseline diabetes group education, the mean scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Group education with peer interaction is an effective educational tool for diabetic management. Implementing a group teen

diabetic program showed increased in knowledge, an increase in daily testing of blood glucose, and lower blood sugar levels are achievable in this office setting and further implementation of the project is warranted.

Title: An application of internet of things in chemical engineering

Primary Author (and presenter): Liu, Tian

Additional Authors: Hancock, Austin and Skjellum, Anthony

Department: Computer Science and Software Engineering

College/School: Samuel Ginn College of Engineering

Description:

The rise of IoT products and software has enabled improvements to several fields of research and industry. In particular, instances involving monitoring data produced by sensor devices are ideal candidates for these improvements. Our research outlines the use of the MQTT protocol in conjunction with the Apache Cassandra database for transmitting and storing data acquired by sensors connected to IoT devices. The architecture follows the publish/subscribe model enabled by the MQTT protocol. Four primary hardware components utilized are Raspberry Pis, one-wire-protocol temperature sensors, bread boards, and a Jetson TK1. Two multithreaded C++ programs are utilized to facilitate data transmission and reception. An MQTT server (Mosquitto) acts as broker between the two programs. A Cassandra CQL database is used to store all received data. This design makes data access remotely possible, and data collection more flexible and scalable. Multithreaded programs also speed up and stabilize the reading of one-wire-protocol temperature sensors.

Title: Consequences of Maternal Nest Choice in Invasive Red-eared Sliders

Primary Author (and presenter): Lloyd, Robin, B.

Additional Authors: Warner, Daniel

Department: Use Department of Biological Sciences

College/School: College of Sciences and Mathematics

Red-eared sliders (*Trachemys scripta elegans*) are native to the southeastern United States, but have colonized locations all over the world through human introduction via the international pet trade. Like many reptiles, *T. s. elegans* is highly sensitive to developmental environments, most notably to temperature due to temperature-dependent sex determination. Thus, the microhabitat that females choose for nesting can have important effects on development. In this study, we quantified the consequences of maternal nest site choice at a site in Portland, OR, which contains one of the most northern invasive populations. During May and June 2016, we located slider nests and transplanted half the eggs to randomly selected 'nest' sites in order to determine the consequences of maternally-chosen nest microhabitats. At each nest, we measured several microhabitat variables, including distance to water, nest slope, nest soil water content, nest temperature, and canopy openness. Preliminary analyses show that mothers choose nesting locations with significantly less shade cover than expected at random. At this location, egg mortality was extremely low overall due to high deleterious temperatures inside the nests. *T. s. elegans* mothers are choosing open locations with poor moisture holding soils that dry out easily resulting in low survival. This supports evidence to suspect some invasive populations are adequate for adults, but are not suitable for developing young leading to eventual extinction in some populations. Overall, our results provide insights into adaptive nesting behaviors in invasive populations, provide insights in how species with TSD will be impacted by climate change and will provide a better understanding of how competition for nest sites might impact native turtle species that utilize the same nesting habitat as *T. s. elegans*.

Title: A shell of a good time: quantifying box turtle detection probability in an urban landscape

Primary Author (and presenter): Long, Brandon, S.

Additional Authors: Gitzen, Robert; Bennett, Mary; Lepczyk, Christopher.

Department: N/A

College/School: School of Forestry and Wildlife Sciences

Description:

The eastern box turtle (*Terrapene carolina carolina*) is a terrestrial species found in much of the eastern United States. Eastern box turtles live in the same home range for their entire lifespan, which on occasion can reach upwards of 100 years. This species is often observed in urban landscapes such as the Auburn area, but it is unknown whether populations are likely to persist as human development continues.

Assessing population trends requires well-tested techniques. Visual surveys are a common method used in the study of a wide range of taxa, including that of the eastern box turtle. However, it is unclear how accurate visual surveys are in detecting cryptic eastern box turtles. We are assessing the effectiveness of visual surveys in detecting this elusive reptile in forested areas on Auburn University property. Due to the low detectability and uncertain occurrence of actual box turtles, our study uses model turtles (real shells or shells made from clay) as a proxy for live turtles. Model shells without natural coloring are painted to closely replicate the eastern box turtle. For each field trial, one researcher places models within the plot, and the other surveys the plot without knowing how many models are present or where models were placed. Preliminary results show the probability of detection to be very low, with the highest estimate of detection success to be approximately 15%. Although searches to date have focused on a 1-ha plot size, our initial findings suggest reducing plot size while maintaining search time in order to allow for a more thorough search. The results of the surveys will provide critical information regarding detection methods for future studies of the eastern box turtle in the Alabama landscape.

Title: High-Beta Analytic Equilibria in Circular, Elliptical and D-Shaped Large Aspect Ratio Axisymmetric Configurations with Poloidal and Toroidal Flows

Primary Author (and presenter): Lopez Ortiz, Omar, E

Additional Authors: Guazzotto, Luca

Department: Physics

College/School: College of Sciences and Mathematics

Description:

The Grad-Shafranov-Bernoulli system of equations is a single fluid magnetohydrodynamical description of axisymmetric equilibria with mass flows. Using a variational perturbative approach, analytic approximations for high-beta equilibria in circular, elliptical and D-shaped cross sections in the high aspect ratio limit are found, which include finite toroidal and poloidal flows. Assuming a polynomial dependence of the free functions on the poloidal flux, the equilibrium problem is reduced to a modified Helmholtz partial differential equation subject to homogeneous Dirichlet conditions at the plasma edge. An application of the Green's function method leads to a closed form for the circular solution and to a series solution in terms of Mathieu functions for the elliptical case, which is valid for arbitrary elongations. To extend the elliptical solution to a D-shaped domain, a boundary perturbation in terms of the triangularity is used. Analytical results are compared with numerical simulations using the code FLOW for fusion relevant scenarios.

Title: The effects of maximizing decision styles on perceptions of work-life balance

Primary Author (and presenter): Lorys, Anna, J.

Additional Authors: Michel, Jesse and Franco-Watkins, Ana

Department: Psychology

College/School: Liberal Arts

Description:

Individual decision-making style has promised a wide array of both positive and negative outcomes for an individual. To date, no studies have examined how a maximizing decision-making style may influence how decisions are made and resources are allocated in balancing work and life roles. The majority of studies on maximization have emphasized a variety of negative outcomes for individuals who use this decision style. These individuals tend to make better decisions (e.g., better employment opportunities) but experience less satisfaction with their decisions. This maximization could then require individuals to use more resources as they navigate work and life roles and make decisions. Conservation of resources theory argues that individuals have a limited number of resources that may be devoted to the various roles that an individual has. Based on conservation of resources theory, we hypothesized that individuals who maximize will perceive themselves to be less satisfied but more effective in balancing work and life roles due to this demand for resources. Using a sample of diverse, working individuals, we tested the relationship between work-life balance and maximizing through correlational and regression analyses. We found support for our hypotheses that decision-making style does influence how we perceive our work-life balance. Specifically, individuals felt that they were more effective in finding alternative ways to balance work and life roles but were overall less satisfied with how they made decisions in work and life domains. This research aims to link both the decision sciences and work-life research in further illustrating why individuals may experience different levels of work-life balance.

Title: The Importance of Education on a Healthy Lifestyle for Diabetic or at Risk Adolescents

Primary author (and presenter): Lovvorn, Melissa K.

Additional Authors: Hamilton, Cam

Department: Nursing

College/School: Auburn University School of Nursing

Description:

There is evidence that applying lifestyle changes such as healthy diet and exercise contributes to better health outcomes for adolescents with type 2 diabetes or at risk. Evidence-based guidelines recommend initiating education on lifestyle modifications and implementing physical activity. The purpose of this project was to provide education on healthy lifestyle choices and encourage a better understanding for these patients. Patient self assessments of baseline understanding of lifestyle changes and follow up after education were assessed for improved understanding. The population included adolescents (13-18 yrs) in a pediatric clinic. Following an information letter, participants completed a pre questionnaire to assess current knowledge on healthy lifestyle. Education was provided in the form of educational handouts on healthy lifestyle and being active. A post questionnaire was given to evaluate understanding. X adolescents participated (%), average age of X (sd) yrs. X% were identified as having no previous education, X % currently apply healthy lifestyle, X% would manage their lifestyle choices and diabetes better, and X% would choose a healthier lifestyle. The pre-post questionnaire responses were compared with paired t-tests. Follow-up indicated that X% had a better understanding of a healthy lifestyle after education. Among those at risk or having type 2 diabetes, the mean of the questionnaire given improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$).

Providing education to adolescents with type 2 diabetes or those at risk addressed the need for understanding the importance of lifestyle changes and may improve the adolescent's choices in a healthier lifestyle. Early education on type 2 diabetes for those diagnosed or at risk is achievable in this office setting and further implementation of this project is warranted.

Title: Evaluating the effectiveness of and preference for peer vs. supervisor feedback

Primary Author (and presenter): Luna, Odessa

Additional Authors: Pence, Sacha

Department: Psychology

College/School: Liberal Arts

Description:

A behavioral skill training (BST) package involves instructions, modeling, rehearsal, and feedback. This package has been used to effectively teach staff to implement a variety of procedures across different settings. In general, the BST literature demonstrates that effective staff training produces improvements for both trainees and consumers. Despite the robust evidence in support of BST, there is much to learn about the most effective and efficient ways to implement the training package. Specifically, one component of BST, performance feedback (information regarding how well an individual implements a procedure), is critical for skill acquisition during training. Without feedback, individuals may not acquire skills or may implement procedures incorrectly. The delivery of the feedback can vary along several dimensions (e.g., frequency, content, medium). However, feedback source has been relatively understudied. The first purpose of the current study was to compare peer-delivered to supervisor-delivered feedback on acquisition of teaching procedures with 16 special education paraprofessionals. Paraprofessionals were trained on procedures using peer and supervisor-delivered feedback. All paraprofessionals acquired the necessary skills, but supervisor feedback was more effective for most participants. The second purpose of the current study was to evaluate paraprofessionals' preference for supervisor or peer feedback during acquisition of different teaching strategies. In general, paraprofessionals choose to receive supervisor feedback over peer feedback during the training. Implications and next steps in peer-feedback delivery research in undergraduate and graduate courses will be discussed.

Title: The comparative effects of honokiol and pioglitazone on mitochondrial function in an *in vitro* Alzheimer's disease model

Primary Author (and presenter): Lynd, Tyler, O

Additional Authors: Govindarajulu, Manoj; Briggs, Wynne; Suppiramaniam, Vishnu; Adamek, Danielle; Bloemer, Jenna; Alhowail, Ahmad; Das Pinky, Priyanka

Department: Department of Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Mitochondrial function preserves an important role in Alzheimer's disease pathogenesis. Imbalance between reactive oxygen species (ROS) and superoxide dismutase (SOD) levels in the neurons are known to trigger the pathogenesis of AD. High levels of ROS attack the mitochondrial membrane by activating the mitochondrial permeability transition pore (MPTP) leading to apoptosis. Pioglitazone, a PPAR gamma agonist used as an anti-diabetic agent, has been shown to improve pathologies and cognition in AD. It activates PGC1 α a transcription factor which promotes mitochondrial biogenesis. SIRT3 proteins are a family of NAD⁺-dependent deacetylases present in the mitochondria and are implicated in improving the pathology of AD. Honokiol, a SIRT3 agonist, deacetylates lysine residues of SOD and promotes

mitochondrial function. The purpose of this study is to elucidate the effects of pioglitazone and honokiol on mitochondrial function *in vitro*. The neuroprotective effects of honokiol and pioglitazone were evaluated using PS70 cells and markers of oxidative stress, mitochondrial function and other relevant mechanisms related to apoptosis were studied. Our data indicates honokiol to promote mitochondrial function better than pioglitazone. Further studies are underway to validate the results.

Title: Effect of prenatal cannabinoid exposure on learning and memory

Primary Author (and presenter): Lynn, Jacob (presenter)

Additional Authors: Das, Priyanka; Setti, Sharay; Bloemer, Jenna; Reed, Miranda; Suppiramaniam, Vishnu

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy / Auburn University

Description:

With the recent legalization of marijuana in many states nationwide the incidence of mothers who smoke marijuana during pregnancy is likely to increase. Given that marijuana can readily cross the placenta and can even be found in breast milk, it is likely that offspring of these mothers may suffer detrimental alterations in their development. The goal of the current study was to examine the effects of prenatal cannabinoid exposure on spatial memory in adolescent rats. Previous research suggests that prenatal exposure to cannabinoids reduces memory recall and impairs learning in mice, while also influencing the levels of certain neurotransmitters such as glutamate in the hippocampus of rats. Dams were implanted with osmotic pumps delivering WIN 55,212-2 or vehicle (N-methyl pyrrolol) at 2.5 mg/kg per day throughout pregnancy and nursing. The offspring were then assessed for deficits in performance on the Morris water maze, a hippocampal-dependent behavioural paradigm in which rats must locate a hidden platform to escape a pool of water. Rats exposed to cannabinoids prenatally (WIN rats) are expected to have a slower acquisition during training trials, in which the hidden platform is present, as indicated by longer latencies and increased path length to locate the platform compared to age-matched controls. Additionally, WIN rats are expected to exhibit deficient recall in spatial memory during probe trials, in which the platform has been removed, as indicated by less time spent in the target quadrant compared to other quadrants, when compared with age-matched controls exposed to saline during gestation. The results from this study will inform the literature regarding the long-term effects of prenatal cannabinoid exposure on learning and memory.

Title: “Designer Drugs” Are they a future potential threat towards increasing the risk for movement and mental disorders in the society?

Primary Author (and presenter): Majrashi, Mohammed, A.

Additional Authors: Almaghrabi, Mohammed; Ramesh, Sindhu; Desai, Darshini; Govindarajulu, Manoj; Fujihashi, Ayaka; Deruiter, Jack; Randall Clark, C.; Suppiramaniam, Vishnu; Dhanasekaran, Muralikrishnan

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Investigate the neurotoxic effects of the designer drug- Tri-Fluoro-Methyl-Phenyl-Piperazine derivatives (2, 3 and 4 TFMPP). The use of designer drugs in the United States and around the World have increased tremendously. Most of the new designer drugs have psychedelic properties. These designer drugs are highly dangerous and most importantly the abusers don't have a clue with regard to “what they're getting or getting into”. Thus, currently it's casting a pall over the renaissance of scientific research into legitimate uses for psychedelic drugs. TFMPP derivatives are presently being abused and there are very

few reports on its neurotoxic effects and the mechanisms associated with its neurotoxic actions. N27 dopaminergic cell lines were used in the current study to investigate the neurotoxic effects of TFMPP derivatives. TFMPP derivatives were synthesized in our lab. We assessed the neurotoxic effects using cell viability assay and morphological measure. Furthermore, the neurotoxic mechanisms were also elucidated. Effect of TFMPP derivatives were studied on the markers of oxidative stress, mitochondrial functions and other relevant neurotoxic mechanisms. We also studied the different receptor binding profile of the TFMPP derivatives. TFMPP derivatives (2, 3 and 4) dose-dependently induced neurotoxicity. Furthermore, they also induced oxidative stress and mitochondrial dysfunction. If the use of the designer drugs are not properly regulated, there is a potential threat towards increasing the risk for movement and mental disorders in the society.

Title: Time course of DPP-IV, CD26+ T-cells and IL-6 following a DOMS protocol in college aged participants

Primary Author (and presenter): Mann, Elise, K.

Additional Authors: Neidert, Leslie; Rightmire, Zachary; La Mantia, Anna; Kluess, Heidi

Department: Kinesiology

College/School: Education

Description:

To determine the influence of delayed onset muscle soreness (DOMS) on the relationship between dipeptidyl peptidase IV (DPP-IV), CD26+ T-cells, and interleukin 6 (IL-6) over time. Six college-aged participants (male n=3, female n=3) underwent an established bicep brachii DOMS protocol. Blood was collected on the DOMS induced arm via venipuncture to measure local plasma DPP-IV activity, plasma IL-6, and CD26 activated T-cells. Plasma DPP-IV activity was measured on the contralateral arm via finger stick. DOMS was assessed with a soreness assessment scale and an algometer. All measurements were taken before, immediate post, 3, 24, and 48 hours post completion of the DOMS protocol. Participants reported significantly increased soreness at 24 and 48 hours post (both $p < 0.05$). This was supported by a decrease in pressure sensitivity at 24 hours post ($p < 0.05$). IL-6 was significantly increased $166.1 \pm 124.3\%$ immediately post and $164.9 \pm 91.26\%$ 3 hours post before returning to baseline by 24 hours post. DPP-IV significantly increased $9.9 \pm 5.7\%$ at 24 hours post and $9.3 \pm 9.6\%$ at 48 hours post from baseline, but was not increased in the contralateral arm. No significant change in CD26+ activated T-cells over time was measured. Following DOMS, inflammatory IL-6 may be hydrolyzed by the local release of the myokine, DPP-IV. Overall, this interaction of IL-6 and DPP-IV appears to be localized to the site of damaged muscle fibers and does not appear to be influenced by the activation of CD26+ T-cells.

Title: An analysis of suitable materials for use in tiny home construction

Primary Author (and presenter): Martin, Douglas H.

Additional Authors:

Department: Building Science

College/School: Architecture Design & Construction

Description:

A tiny home can either be a structure built on a foundation or a structure built on a trailer and typically range between 100 and 400 square feet. Currently there are many obstacles to make a tiny home a permanent dwelling, specifically related to building code and zoning laws which require minimum square footages. Many builders circumvent these requirements by building the tiny home on a trailer which then classifies them as recreational vehicles. Tiny homes on wheels, THOW's, are currently the most common

type of tiny home construction due to the mobility that is required in order to follow local zoning laws pertaining to recreational vehicles.

The purpose of this research is to analyze the materials and methods used in the construction of tiny homes and which materials and processes are most suited for this type of construction. This research is needed to determine which materials are suitable for use in construction of structures that will at some point be towed on roadways. This research will provide information that can be used to safely construct THOWs that will occupy the roadways. The information that is attained through this research can be used in the future to update zoning laws and building codes.

Title: Uncomplicated Skin and Soft Tissue Infections

Primary Author (and presenter): Mason, David K.

Additional Authors: Ellison, Kathy Jo

Department: Nursing

College/School: Auburn University/Auburn University Montgomery

Description:

Background: Skin and soft tissue infections (SSTI) is ranked in the top twenty-five reasons for admission to a hospital per Healthcare Cost and Utilization Project. This evidence based project (EBP) provides recommendations and guidelines to follow when treating SSTI. This projects purpose is to provide standardized forms that cover treatment for SSTI such as wound size, location, wound culture, incision and drainage (I&D) and follow-up.

Method: Target population included adults (18-99 yrs) with an uncomplicated SSTI. Each physician and practitioner reviewed and agreed to use the Cellulitis and Abscess Management in the Era of Resistance to Antibiotics (CAMERA) forms to evaluate and treat uncomplicated SSTI. Every week for two months an audit form is used to evaluate wound progression. The outcomes measured are the progression of uncomplicated SSTI to complete healing of wound or further medical management required. Data will be collected from pre-and post-implementation of EBP and a representation of effectiveness will be examined using paired t-tests.

Results: X patients (X% males) with an average age of XX (SDXX), average weight of XXX pounds were treated for uncomplicated SSTI. X patients were treated with I&D alone. X patients were treated with I&D and adjunct antibiotics. XX patients had cultures collected with x requiring change in antibiotic course for non-healing wounds. X patients were treated with LOOP technique. X patients requested antibiotics only and never returned to clinic. Follow-up resulted in XX% healing of wound completely, X% did not return for follow-up and X% required further treatment. The CAMERA audit form provided data shows improvement in wound healing, bacterial identification and reduced antibiotic use, pre (M=x, SD xx), post (M=xx, SD xx) significantly ($p < 0.05$).

Conclusion: Using EBP treatments improved wound healing. Continuing the use of the CAMERA form and EBP treatments gives justification for further advancement of this project.

Title: Designing a better care facility: incorporating the resident, staff, and family needs

Primary Author (and presenter): Mathews, Caroline, E.

Additional Authors: Mitchell, Sarah, A; Temples, Rachel, E.

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

This project seeks to examine specific aspects of senior care interior design which impact the health, safety and wellness of the residents, staff and visitors, with a particular focus on residents with

Alzheimer's disease. A literature review of relevant research from medical and interior design perspectives was performed to gather information. Based on the material reviewed, the researchers hypothesize that physical and visual access to nature, participation in regular exercise and purposeful activities, long-term memory-based wayfinding, household-style space arrangements, Alzheimer's disease-specific and age-specific design elements, and the integration of technology will improve the health, safety, and wellbeing of residents, staff and visitors by creating a wellness-centered culture. The effectiveness of the integration of the stated design components would be gauged by interviews and surveys of staff, residents, and visitors, observation of facility usage and occupant activity, and quantitative data pertaining to staff and resident activities. The new knowledge gained from this project will add value to the existing body of research related to senior care facility design for Alzheimer's disease, a medical issue of increasing importance in the United States due to its rapidly escalating prevalence.

Title: An examination of job satisfaction and work-life balance among racial minority faculty in higher education

Primary Author (and presenter): May, Viola, S.

Additional Authors:

Department: Special Education, Rehabilitation and Counseling

College/School: Education

Description:

Faculty in higher education have the task of educating a racially diverse student body; however, the absence of racially diverse faculty creates a conflict that few programs in higher education have resolved. In fact, racial minority faculty continue to be underrepresented in graduate and professional schools across the country. Despite the need for and advantages of having racial minority faculty, racial minority faculty encounter several barriers that impact their experience and satisfaction, which results in lower retention rates. The purpose of this study is to examine the relationship between job satisfaction and work-life balance among racial minority faculty in higher education. The study will also explore racial minority experiences in regards to several work and education supports such as mentoring, collegial collaboration and the tenure/promotion process. This study aims to increase awareness of the challenging experiences racial minority faculty encounter and the factors that influence racial minority faculty job satisfaction and work-life balance. The study also intends to increase scholarship related to racial minority faculty experiences in higher education, and provide insight into the implications for improving the recruitment and retention of racial minority faculty. Participants will be recruited via higher education special interest groups and organizations. Participants will complete a survey in Qualtrics. The quantitative survey results will be compiled and analyzed using the Statistical Product for Social Sciences (SSPS). The qualitative data will include descriptive responses about the participants' experiences related to mentoring, collaboration with colleagues, and the tenure/promotion process, and will be synthesized and coded. The results from the research study are still in progress and will be available for presentation in April.

Title: Peer victimization and adolescent adjustment: Do personal orientations play a role?

Primary Author (and presenter): McConnell, Leanna, M.

Additional Authors: Erath, Stephen, A.

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Peer victimization peaks in early adolescence and is experienced frequently by 10-15% of early adolescents and at least occasionally by nearly 50% of early adolescents. Peer victimization has been associated with aggression and depression. The present study examined whether the association between peer victimization and later aggression and depression is moderated by personal orientations (e.g., interests, values). Data were collected from 123 early adolescents when they were initially in the fifth or sixth grade and again ten months later after the transition to middle school. Both early adolescents and teachers reported on peer victimization, and multiple informants reported on participants' personal orientations and adjustment. Regression analyses revealed that personal orientations moderated prospective associations between peer victimization and adjustment, and several moderation effects were corroborated across adolescent- and teacher-reported peer victimization. In particular, as hypothesized, elevated popularity orientation (i.e., desire for popularity) heightened the associations between adolescent- and teacher-reported peer victimization and aggression. In addition, the associations between both adolescent- and teacher-reported peer victimization and depression were stronger at higher levels of affiliation orientation compared to lower levels of affiliation orientation (i.e., desire for close relationships). Finally, associations between both adolescent- and teacher-reported peer victimization and depression were weaker at elevated levels of activity orientation (i.e., commitment to organized activities). Results suggest that promoting activity orientation may be an intervention target that would reduce depressive symptoms in the context of peer victimization. In addition, encouraging early adolescents to place less priority on popularity may help reduce aggressive behavior in the context of peer victimization.

Title: 1-Thia-3,4-Diazolidine-2,5-dione polymers

Primary Author (and presenter): McCormack, Kaylee, L.

Additional Authors: Squillacote, Michael

Department: Chemical Engineering and Chemistry and Biochemistry

College/School: Samuel Ginn College of Engineering, Auburn University

Description:

Novel, well-designed photodegradable polymers have the potential to profoundly influence society due to their wide range of applications. The photochemistry and bisfunctionality of the 1-thia-3,4-diazolidine-2,5-dione (TDAD) structure allows for the development of these unique materials. An area of particular interest with TDAD polymers is that of photoresists. Photoresists are light sensitive polymers used to coat silicon wafers that are etched to create integrated circuits, which are a vital component of modern electronics. Portions of the photoresists are photolyzed, and then a wash is required to remove the remaining organic molecules. If a photodegradable polymer used in this process photolyzed completely to innocuous gaseous molecules, the step to remove the products of the photolytic decomposition could be eliminated. The cost, waste, and time associated with this wash would therefore be unnecessary, which would have a massive impact upon the industry. Experiments with TDADH utilizing base-catalyzed anion polymerization have shown that with efficient leaving groups, the intermediate TDAD anion can rearrange, leading to a thermal decomposition. Experiments using 1,2-diiodoethane have exhibited this decomposition, which is partially due to the stability of the ethylene decomposition product. New methods of forming these polymers which will avoid this rearrangement are being examined. One method is the use of 1,1-disubstituted dihalides instead of 1,2-disubstituted dihalides in the anionic polymerization. Decomposition of the intermediate TDAD anion made from this type of dihalide would afford high-energy carbenes, making this undesirable thermal rearrangement unlikely. Because TDAD polymers offer the possibility of different connecting groups a variety of syntheses are possible. Besides current experiments with alternative leaving groups and manipulating the alkylation processes, the nylon 6 approach ring opening metathesis polymerizations will be explored.

Title: Smoking cessation in people with type 2 diabetes mellitus

Primary author (and presenter): McDonald, Brittini, A.

Secondary author: Ellison, Kathy

College/ School: School of Nursing

Description:

The smoking of cigarettes in people with type 2 diabetes mellitus (T2DM) has been shown to increase the risk of health complications associated with T2DM, such as microvascular complications and difficulty managing blood glucose levels. The purpose of this small test of change (STOC) is to provide evidence-based smoking cessation education to this population through a nurse managed education program. Target population included participants that reported currently smoking and a diagnosis of T2DM at StatMed Family Clinic. After signing a participation agreement, the participants were educated on the harmful effects that smoking has on their T2DM. Data was gathered from the participants about smoking history, years diagnosed with T2DM, and average blood glucose levels. The participants also completed a 5-point Likert scale of perceived preparation for smoking cessation and signed a personal contract with a quit date and provided their contact information. Over the next six weeks, they were contacted through telephone calls, emails, and letters to provide support. The outcomes measured were cigarettes smoked after the program and average blood glucose levels. X agreed to participate, average of X cigarettes smoked per day. X% reported complications with their diabetes, with an average of X years of diagnosis of T2DM and average blood glucose levels of X. Follow-up indicated that X% made a decrease in their consumption of cigarettes with X participants reporting complete cessation. Post-program blood glucose levels averaged X, and post-likert scale scores shows that X% felt more prepared to stop smoking after the program. Providing a nurse managed smoking cessation program to people with T2DM showed that increased support can be beneficial in improving the health of this population. Increased support ensures that cessation is achievable in this setting and further implementation of the project is warranted.

Title: Improving adult vaccination rates in primary care

Primary Author: McDonald, Whittni, E.

Secondary Author: Peterson, Mary

College/ School: School of Nursing

Description:

Improvement of adult vaccination rates has become a national priority due to the poor rates in the United States. Evidence-based guidelines strongly recommend consistent assessment of vaccinations by providers at every clinical encounter. The purpose of this project was to improve provider education on the importance of consistent patient assessment and current recommendations to improve long-term rates of influenza vaccine reception. Target population included adults (21+ years) scheduled for an appointment at a primary care office practice. Before provider education was performed, 15 adults voluntarily completed a four-question survey on influenza vaccines after assessment by the nurse practitioner. The physician and nurse were provided education using the Center for Disease Control and Prevention's "Immunizations: You Call the Shots" to measure pre-post knowledge increase. Post-provider education, 15 additional adults voluntarily completed a four-question survey on influenza vaccines. Information obtained by the surveys included: current influenza vaccination status, patient perception of provider recommendations, and previous year vaccination status. X consented to participate, (% females, % males), average age of X (sd) yrs. X% of pre-provider education obtained influenza vaccine, while X% of post-provider education obtained influenza vaccine. X% of adults perceived provider recommendation as "extremely important." Between both groups surveyed, the mean survey scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Consistent provider assessment and recommendation of vaccination rates among adult patients is important to improved

influenza vaccination rates. Suggestions for the larger project include incorporation of partner physicians and nurses to participate in influenza education. Consistent assessment and improvement of adult vaccination rates are achievable in this office setting and further implementation of the project is warranted.

Title: Medicare outreach program: satisfaction and cost-savings

Primary Author (and presenter): McFarland, Stuart, J

Additional Authors: Hohmann, Lindsey; Hastings, Tessa; Westrick, Salisa

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

To evaluate the impact of a Medicare Outreach program on beneficiary satisfaction and cost-savings and to describe the experiences of PharmD students volunteering at these events. Second-year pharmacy students completed didactic and case-based Medicare coursework and assisted Medicare beneficiaries with plan selection as part of an ongoing Medicare Outreach program in 2016. This program aims to reach Medicare beneficiaries, who otherwise would not have an opportunity, to receive assistance in plan selection through partnership between the Harrison School of Pharmacy (HSOP) and the Alabama State Health Insurance Assistance Program (SHIP). These joint events were held throughout Alabama, with each event located in a community venue. Measures included beneficiaries' plan cost savings, self-reported satisfaction, as well as students' self-reported changes in knowledge and attitudes. There were 13 Open Enrollment Events in 8 Alabama counties with 87 student volunteers and 134 Medicare beneficiaries served. 46% of Medicare beneficiaries switched to a cost saving plan and saved an average of \$1402.83. Most beneficiaries strongly agreed that the Medicare Part D explanations offered by the pharmacy students helped them better understand Medicare plans, and that they would recommend the program to others. Many students stated that the Medicare Open Enrollment Events were very "eye-opening" and that they would be willing to volunteer again in the future. Students felt that they improved their understanding of the Medicare Online Plan Finder Tool and could help beneficiaries save money. These Open Enrollment Events resulted in the education and financial assistance of many elderly and disabled individuals in Alabama. These events greatly facilitated the best plan choice for beneficiaries. Furthermore, future pharmacists gained an understanding of Medicare Part D that will allow them to better assist their patients in the future.

Title: Common neural networks in alcoholism and depression

Primary Author (and presenter): McKinell, Zachary E.

Additional Authors: Robinson, Jennifer

Department: Department of Psychology

College/School: College of Liberal Arts

Description:

Psychiatric mood disorders and substance use disorders have high rates of co-morbidity. However, we know very little about the underlying neurophysiological mechanisms that may sub serve this observation. This is important to understand because over 85,000 people die each year due to alcohol overdose and over 20% of these individuals also suffer from depression. Since these rates are so high it is important to start investigating how these diseases effect the mechanisms in the human mind. This is difficult because western culture glorifies alcohol consumption and many people do not want to stop consuming alcohol. The present study leveraged big-data resources (i.e., the BrainMap database) to examine common activation pattern differences in brain networks amongst individuals with alcoholism

and those with depression compared to healthy controls, to serve as a foundation for model development. Using the BrainMap software, we performed a quantitative meta-analysis on functional neuroimaging data using activation likelihood estimation (ALE). To do this, we first searched the database for studies that contrasted 1) participants with depression to healthy controls, and 2) participants with alcoholism compared to healthy controls. Our search yielded 72 papers for the depression search, and 18 papers for the alcoholism search. After subjecting the sets of coordinates to ALE, we found that both depression and alcoholism were associated with greater activation in sub-lobar, frontal, and limbic lobes of the brain. All activity was found in both sides of the cerebrum. This is consistent with our hypotheses that both alcoholism and depression share common neural correlates. It is also consistent with the behavioural characterization of each of these disorders. Data from this study creates opportunities to develop neurophysiological models of psychiatric conditions, especially those that are frequently co-morbid, thus opening the possibility of better treatment methods.

Title: Evaluation of inhibitory effect of Maca on CYP3A4 liver enzyme

Primary Author (and Presenter): McLendon, Lane, A.

Additional Authors: Rants'o, Thankhoe, Jung, Da, Calderón, Angela I.

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

The aim of this study was to determine if *Lepidium meyenii* Walpers, also called maca, can be safely consumed by humans. The present study investigates the effect of bioavailable active compounds on the inhibition of liver metabolism. Human microsomes and hepatocytes are ideal for the investigation of hepatic metabolism of natural products from dietary supplements. Evaluation of the inhibitory effect of natural products, contained in the supplements, on liver enzymes to predict botanical interactions is important for patient safety. Extracts were prepared and used for chemical profiling of maca plant extracts. Liquid chromatography-mass spectrometry (LC/MS) analysis of methanol (MeOH), acidic methanol (Ac. MeOH), and dichloromethane (DCM) extracts showed that the major bioactive compounds were macamides, phenolic compounds, and glucosinolates, respectively. A Parallel Artificial Permeability Assay (PAMPA) was used to determine the intestinal absorption potential of the bioactive compounds. MeOH, Ac. MeOH, and DCM extracts of maca at concentrations of 5, 10, and 15 $\mu\text{g}/\mu\text{L}$, were used for this test. The majority of compounds showed low permeability due to their polar nature. After the PAMPA test, a C_{18} macrospin column was used to desalt the compounds before LC/MS analysis was performed. Compounds that passed through the intestinal membrane were tested for inhibitory interactions with the CYP3A4 enzyme in human liver microsomes and midazolam was used as the substrate for CYP3A4. The production of 1-hydroxy-midazolam was monitored by LC/MS to determine the inhibitory effects of maca on the CYP3A4 enzyme. Phase I and II metabolites of maca inhibited CYP3A4 with substrate metabolite clearance showing a 50-80% decrease. Phase II glucuronidation metabolites of maca extracts showed mixture of weak and moderate inhibition on the CYP3A4 enzyme.

Title: Plants used for maternal and women's health by indigenous populations in Panama: a review

Primary Author (and presenter): McLeroy, Jesse; McLeroy, Jordan

Additional Authors: Calderon, Angela, I

Department: Department of Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Indigenous populations in the country of Panama in Central America have long used medicinal plants to treat illnesses, especially women's ailments, due to cultural traditions and a lack of widely accessible healthcare. The aim of this project was to provide a reference list of plants used for women's health in Panama, mainly by indigenous peoples, and to find any biological activities in the scientific literature that validates each plant's use. A list of 60 plants was compiled that includes the ethnic group that uses each plant, the plants' vernacular names, uses in women's health, plant parts used, methods of preparation, biological activities that validate the use, and toxicity information. Of these 60 plants, 26.7% were confirmed to show promise of treating the specific ethnomedicinal use based on experimental data. None of the plants were found to have high acute toxicity; however, 13.3% had low acute toxicity, and 5.0% had moderate acute toxicity. With a proper understanding between indigenous populations and allopathic healthcare providers as to the benefits and limitations of both folk medicine and allopathic care, syncretism of the two systems and optimal healthcare quality for Panamanians may be achieved. Panama's abundance of flora, ethnomedicinal knowledge of indigenous groups living there, and the indigenous groups' dependence on natural healthcare present a unique opportunity for further research.

Title: Cardioprotection of HIF-1 Frataxin against ischemia reperfusion injury in diabetic myocardium.

Primary Author (and presenter): Meagher, Mallory M.

Additional Authors: Doan, Kevin; Ryan, Edward; Kavazis, Andreas; Quindry, John; and Amin, Rajesh

Department: Kinesiology

College/School: Education

Description:

Diabetes is at epidemic proportions today and exists as a comorbidity of more than 50% of all myocardial infarction mortalities due to myocardial energy dysregulation associated. Despite significant research efforts, major gaps in knowledge exist to identify molecular targets that improve outcomes from myocardial ischemia reperfusion (IR) injury. The long-term goals of the *Amin laboratory* are to identify potential molecular targets that can be therapeutically manipulated to reduce the post-ischemic damage in the diabetic heart. Our lab is investigating the cardioprotective mechanism of Hypoxia Inducible Factor-1 (HIF-1) against IR injury by orchestrating an adaptive response to hypoxia. Recently we have observed that HIF-1 regulates the iron-sulfur cluster biogenesis protein frataxin. Frataxin is an evolutionary conserved mitochondrial matrix protein that limits oxidative stress via sequestration of free iron in the mitochondria. In the current study we hypothesized that frataxin is significant towards mitochondrial iron regulation and ischemia in response to diabetogenic stress. Mitochondrial iron levels were measured in 2 and 4 month old db/db mice. Iron levels, mitochondrial respiration and ROS measurements were measured in frataxin over-expressing and knock-out cells following hypoxia (6 hours)-reoxygenation (24 hours). We observed increase in heart size in 4 month old db/db diabetic mice, reduced frataxin levels and an increase in mitochondrial iron accumulation when compared to younger diabetic mice hearts. Interestingly we also observed increased hyperacetylation of frataxin and mitochondrial iron accumulation in cardiac cells treated with diabetic stress. We hypothesize that reduced frataxin expression is in line with the decline in myocardial energetics observed in diabetic hearts as it progresses to failure. Further that regulation by HIF-1 may offer cardioprotection against IR injury and mitochondrial energy dysregulation.

Title: Forecasting medium-range reference evapotranspiration for the continental U.S. using the TIGGE multi-model ensembles.

Primary Author (and presenter): Medina, Hanoi

Additional Authors: Tian, Di

Department: Crop, Soil, and Environmental Sciences
College/School: Agriculture

Description:

Reference evapotranspiration (ET_o) forecasts provide important information for agricultural and water resources management. Multi-model ensemble forecasts combining single-model forecasts have shown superior skill than individual models. The objective of this work is to evaluate the performance of medium range (1-2 weeks) ET_o forecasts over the continental US. Daily ET_o ensemble forecasts was estimated using the FAO-56 Penman-Monteith equation with the temperature, solar radiation, relative humidity, and wind speed forecasts obtained from the THORPEX Interactive Grand Global Ensemble (TIGGE) dataset. The TIGGE archive contains medium-range forecasts from nine operational, global ensembles, produced by the leading numerical weather prediction systems. Observation-based ET_o is estimated using the same weather variables obtained from the quality-controlled Meteorological Assimilation Data Ingest System (MADIS). The forecasted and observation-based ET_o covers 5 years, both from 2007 to 2011, providing an opportunity for forecast diagnosis and evaluation. The probabilistic performance was evaluated using the Brier Skill Score and the Reliability Diagram. The results show that the higher improvements with respect to the best individual model are reached when combining only a reduced multimodel system. Insights about the influence of the season and lead time on the skill and reliability of the “optimal” post-processing scheme are also provided. The implications for the improvement of the current forecasts of some relevant agrometeorological indicators closely linked to the ET_o patterns are also discussed.

Title: Effect of *Leptographium terrebrantis* on tree physiology and growth of loblolly pine

Primary Author (and presenter): Mensah, John K.

Additional Authors: Sword Sayer, Mary A.; Nadel, Ryan L.; Matusick, George; Fan, Zhaofei; and Eckhardt, Lori G.

Department: Forest Health

School: School of Forestry and Wildlife Sciences

Description:

Loblolly pine is one of dominant conifer species in most temperate and boreal ecosystems. Within the southeastern United States, it is the predominant and economically the most important tree crop and contributes significantly to the gross domestic product of southeastern states economies. Notwithstanding its economic contributions and ecological significance, loblolly pine is affected by pests and diseases which imparts negatively on growth and productivity. Southern pine decline is one of the disease complexes caused by bark beetles and its associated ophiostomatoid fungi: *Leptographium terebrantis*. A study was designed to evaluate varying *L. terebrantis* inoculum load levels in loblolly pine and its influence on the trees physiological process to impact growth. The study was conducted in naturally regenerating pine forest with loblolly and slash pines as the predominant pine species. The artificial inoculations were done using sterilized and colonized toothpicks to mimic the feeding habits of the bark beetles. The results show that *L. terebrantis* infected healthy xylem tissues of loblolly pine and caused tissue occlusions of up 60% depending on the initial inoculum load level. Hydraulic conductivity within the occluded segment was significantly affected but interestingly did not cause water stress in trees as indicated by predawn water potential values of less than -1MPa. It is noteworthy that inoculated points along the radial section of the stem declined in growth whereas non-inoculated points continue to grow resulting in a crooked growth pattern.

Title: Interdisciplinary research: Improving compression garments for women athletes

Primary Authors (and presenters): Gascon, Sarah, S. and Michaelson, Dawn, M.

Additional Authors: Teel, Karla and Oliver, Gretchen

Department: Kinesiology; Consumer and Design Sciences

College/School: Education; Human Sciences

Description:

Compression garments have become increasingly popular with athletes for performance, training, and exercise recovery yet literature is not consistent on their overall benefits. They are designed to be body hugging and made with highly elasticized fabric. Proper fitting and functioning garments allow athletes to perform without garment complications. However, prior studies on sports garments found that participants did have concerns when wearing their garments. Therefore, the purpose of this study was to take an interdisciplinary approach to 1) investigate women athlete's perception and satisfaction with compression garments and 2) develop an improved compression garment for women athletes. Survey results reveal most women athletes (n=104) wore compression garments for thermal properties, prevention of chafing and/or rashes, as a required sport garment, and to reduce risk of injury. They wanted to be identified as a feminine athlete yet they did not feel compression garments fulfil this. Fit, mobility and comfort were the most highly rated attributes for the garment. Fit and quality were rated as satisfactory but improvement was still desired. Mobility was highly rated. Participants did state compression garments were useful and functional, although they were only slightly satisfied with performance enhancement. Woman athletes wanted garments to resist or reduce the risk of injury, move unencumbered in while performing sport specific tasks, and prevention of chafing/rashes all while still identifying as a women athlete. A series of prototype compression garments were developed to improve fit, mobility, comfort, female athletic identity, and athletic performance. Fabric selections were made based on stretch performance, comfort factors, and wicking properties. Garment design lines were fashioned to enhance the feminine form. Future research includes body scanning women athletes to manufacture the garment in various athletic sizes.

Title: Assessing the economic costs of managing invasive species across the United States

Primary Author (and presenter): Miller, Madison A.

Additional Authors: Vice, Rachael; Hall, Elizabeth; Patterson, Autumn; and Lepczyk, Christopher

Department: Wildlife Ecology and Management

College/School: School of Forestry and Wildlife Science

Description:

Invasive species in the United States cause billions of dollars in damage and lost revenue annually, disrupting ecosystems and outcompeting native species. Intensive management efforts are often required to minimize the damage invasive species cause. Given the costs of invasive species to the economy our goal was to determine how much money each state allocates specifically to the control of invasive species and what species they spend the money on. We contacted representatives from each state natural resource agency by phone or by email to obtain invasive species management budgets for each state. When a representative could not be reached, we searched for documentation of the state's budget from a relevant government-sponsored website. We received data from 21 states with budgets ranging from \$42,000 to \$39 million annually. The combined annual budget for all states that we obtained data from totalled approximately \$79 million, suggesting that the states spend only a fractional amount controlling invasive species compared to the billions of dollars of damage they cause each year. This is an often overlooked issue that could easily save states millions of dollars in damage annually if more time, money, and manpower went into controlling invasive species.

Title: Screening of FDA compounds for MPO inhibition

Primary Author: Milton, Amber
Secondary Author: Panizzi, Peter
Department: Drug Discovery and Development
College/ School: Harrison School of Pharmacy

Description:

Myeloperoxidase (MPO) is a heme-containing enzyme present in inflammation. MPO catalyzes the production of Hypochlorous Acid (HClO) by reacting with hydrogen peroxide (H₂O₂) and Chloride (Cl⁻). MPO together with H₂O₂ and a halide represents a potent oxidizing system that is involved in a variety of functions that include the killing of bacteria, and the lysis of mammalian cells and inflammatory mediators. To determine this inhibition of MPO we tested inhibitors that we know inhibit. To start we tested this inhibition by H₂O₂ dependence. Serial dilutions of H₂O₂ were made using 30% stock of H₂O₂ to determine concentration of H₂O₂ necessary to produce the highest fluorescence signal using 530nm excitation wavelength and 590 nm emissions using a SpectraMax plate reader. This allowed us to see the highest fluorescence value for that particular dilution. Fluorogenic peroxidase substrate 10-acetyl-3, 7-dihydrophenozazine, MPO, were mixed in sodium acetate buffer at pH 5.6 in the absence and presence of H₂O₂ to serve as the negative and positive controls, respectively. Three compounds were tested for MPO inhibition namely benzoic acid hydrazide (BAH), tofacitinib, and ruxolitinib. The same conditions were used for each inhibitor. First we tested each inhibitor at a concentration of 10mM. Once we received data we did an unpaired student T-test. After completing an unpaired student T-test comparing the positive control to each inhibitor it was determined that both BAH and tofacitinib were significantly different but ruxolitinib was not. The concentrations of the inhibitors were decreased from 10mM to 1mM and the experiment was done again under the same conditions. After completing an unpaired student T-test and comparing each inhibitor with the positive control again it was determined that all inhibitors were significantly different at this concentration. This information does in fact tell us that all three inhibitors do inhibit MPO. We plan to test these inhibitors at different concentrations and determine the solubility of them to determine if there are any similarities between them.

Title: Impact of microstructure on physical and optoelectronic properties of polyalkylthiophenes

Primary Author (and presenter): Minkler, Michael J.

Additional Authors: Beckingham, Bryan S.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Alkyl-substituted polythiophenes have attracted much attention for their use in flexible semiconductor media for organic electronic devices such as thermoelectric generators, solar panels, chemical sensors, and field effect transistors due to their well-controlled synthesis, favorable optoelectronic properties, and improved solubility in organic solvents. Synthetic microstructural control in these polymers provides a handle for tuning their solution and solid-state properties. For example, substituting an aliphatic chain onto the thiophene ring greatly enhances solubility but dramatically decreases conductivity. In this study, we utilize Grignard metathesis polymerization to synthesize poly(3-hexylthiophene) (P3HT), polythiophene (PT), and statistical copolymers (P[3HT-co-T]) over a range of molar compositions. We probe the physical properties (melting temperature, crystallinity, etc.) via differential scanning calorimetry and wide-angle X-ray scattering and optoelectronic properties by UV/Vis spectroscopy. By systematically varying the composition of the polythiophene microstructure this work provides insight into the relationship of the microstructure to the various physical and optoelectronic properties.

Title: The association between patient sociodemographic characteristics and generic drug use: A systematic review and meta-analysis

Primary Author (and presenter): Mishuk, Ahmed Ullah¹

Secondary Authors: Qian, Jingjing¹; Howard, Jennifer, N.²; Harris Ilene²; Frank, Gavriella²; Kiptanui Zippora²; and Hansen, Richard¹

Department: ¹Health outcomes research and policy

College/ School: ¹Harrison School of Pharmacy

Other Affiliations: ²IMPAQ International LLC, Columbia, MD

Description:

Generic drugs are bioequivalent and cost effective alternatives to brand name drugs. In 2014, \$227 billion was saved because of generic drugs in the U.S. To inform the development of educational outreach for improving generic drug use among patients, we sought to critically assess evidence on the association between patient characteristics and generic drug use. We systematically searched the literature between January 2005 and December 2015 using PubMed, Web of Science, OVID-Medline, Google Scholar, and EBSCO IRA-Medline for potentially relevant studies. The titles and abstracts of identified articles were assessed independently by two reviewers. Titles and abstracts that were not written in English, published prior to 2005, not empirical, did not contain sociodemographic data, or were not policy or methodologically relevant to generic drug use were excluded. Data were pooled in meta-analysis using Rstudio software to assess the association of patient-related factors with generic drug use. Our searches resulted in 11 articles on patient-level factors, and 6 of these articles had sufficient information to conduct meta-analyses in the domains of patient sex, age, race/ethnicity, and income. Quantitative analysis indicated no differences in generic drug use existed between subgroups of patients defined by sex, age, or race/ethnicity. However, patients with lower income (i.e., <200% federal poverty level (FPL)) were more likely to use generic drugs than those with higher income ($\geq 200\%$ FPL) (pooled odds ratio (OR) = 1.32, 95% confidence interval (CI) = 1.15–1.52). Heterogeneity was high ($I^2 > 75\%$) for all analyses but income. Patients with lower income were more likely to use generic drugs, whereas we don't have adequate evidence to draw conclusion on the association of generic use with sex, age, or race/ethnicity. Educational outreach targeting patients with higher incomes to understand their perspectives in generic drugs might help improve generic drug use.

Title: Study of charge transfer dynamics in spray deposited cu2znsns4 (czts) photoelectrodes for performance improvement

Primary Author (and presenter): Mondal, Animesh

Additional Authors: Radich, James

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Thin film solar cell based on Cu₂ZnSnS₄ (CZTS) has the potential for large-scale electricity production using solar radiation where the elements are earth abundant, inexpensive and environment friendly. The state of art CZTS solar cell has reached 12.6% efficiency while the commercial production will require at least 15% for economic feasibility. Here, we approach to understand the charge transfer dynamics in CZTS using ultrafast laser spectroscopy and focus on improving the efficiency of CZTS photovoltaics through the incorporation of a mesoscopic hole acceptor, nickel oxide. CZTS photo electrode is prepared using spray deposition of precursor solution, and characterized using SEM, TEM, XRD, XPS and Raman Spectroscopy. The performance of the material is tested in three-electrode photo electrochemical cell.

Title: Effects of sound recover feature on speech intelligibility in noise in new hearing aid wearers

Primary Author (and presenter): Moore, Whitney, R.

Additional Authors: Krishnamurti, Sridhar

Department: Communication Disorders

College/School: Liberal Arts

Description:

One common characteristic of sensorineural hearing loss is greater loss of hearing sensitivity in the high frequencies relative to lower frequencies. Some hearing aids attempt to extract speech information from the high frequency regions and use the better low frequency thresholds to improve audibility of high frequency speech components. This feature, frequency shifting, is currently used by hearing aid manufacturers to enable hearing aid wearers to not only detect high frequency sounds, but also to extract some spectral components of the original signal and lowering these components linearly by a fixed displacement. A variant of frequency shifting is called frequency transposition, which involves using a selected portion of the original frequency spectrum and lowering it. This frequency transposition feature has been introduced by commercial hearing aid manufacturers (e.g., Sound Recover by Phonak). While earlier studies have found that frequency transposition strategies help hearing aid users obtain better speech understanding in quiet, it is currently unclear how frequency transposition features influence speech intelligibility in noise. This research was completed on bilateral Phonak hearing aid users with bilateral sloping sensorineural hearing losses. The QuickSIN test was used to study the intelligibility of sentences recorded in background noise. Intelligibility on the QuickSIN test was measured under unaided (no hearing aid) and aided (hearing aid) conditions. Sound Recover was turned on and off during programming of the hearing aids and all subjects were tested under both listening conditions. When Sound Recover was enabled in the hearing aids, three levels of frequency transpositioning (mild, moderate, and severe) were used to investigate the effects on speech intelligibility in noise. Results showed one must be very particular and understand what the frequency lowering is doing to the signal.

Title: Only a fraction of host-associated odor blend mediates attraction in parasitoids

Primary Author (and presenter): Morawo, Tolulope

Additional Authors: Fadamiro, Henry

Department: Entomology and Plant Pathology

College/School: Agriculture

Description:

Herbivorous insects emit multi-component odor blends that can be used as host location cues by natural enemies, such as parasitoids. However, it is not clear whether all the components of the odor blend mediate attraction in parasitoids. We used the larval parasitoid, *Microplitis croceipes* (Hymenoptera: Braconidae) and its herbivore host, *Heliothis virescens* (Lepidoptera: Noctuidae), a major pest of cotton plant as model species to identify key compounds mediating attraction of parasitoids to hosts. Comparative headspace volatile analyses of cotton-fed versus artificial diet-fed hosts indicated that 12 of 17 compounds in the headspace of *H. virescens* larvae were plant-associated. In Y-tube olfactometer bioassays testing parasitoid responses to modified blends, 1-octen-3-ol, decanal, (*E*)- β -caryophyllene, α -humulene, α -farnesene and β -pinene were identified as key compounds contributing to attractiveness of the natural blend of volatile compounds emitted by cotton-fed hosts. The results showed that while various host-associated compounds act in concert to serve as useful host location cues, only a fraction of the natural blend mediates attraction in parasitoids.

Title: *In vivo* effects of deepwater horizon crude oil and corexit dispersant on rodent hematological markers

Primary Author (and presenter): Morgan, Marlee, R.

Additional Authors: Dhanasekaran, M.; Bhattacharya D.; Ramesh, S.; Majrashi, M.; and Clement, T.P.

Department: Biological Sciences; Drug Discovery and Development

College/School: College of Science and Mathematics; Harrison School of Pharmacy

Description:

The purpose of this study is to investigate the *in vivo* effects of Deepwater Horizon (DWH) crude oil and the dispersant Corexit (9500A) on various hematological markers in rodents.

The DWH oil spill is the largest accidental marine oil spill in history. In the aftermath of the spill, British Petroleum used a chemical dispersant (Corexit 9500A) to disperse and contain the oil. The health impacts of crude oil and Corexit to humans, animals, fish and birds are mostly unknown. Rodents are an excellent animal model to study the hematological toxicity effects associated with exposure to oil spill chemicals. C57 Bl6 mice were treated with DWH crude (0.1 ml = 80 mg/kg) and/or Corexit (0.1 ml = 95 mg/kg) through intraperitoneal injection. Controls received saline water. Several hematological markers including complete blood cell count, serum alanine aminotransferase, aspartate aminotransferase, Gamma-glutamyl transferase, blood urea nitrogen, creatinine, cholesterol, and triglycerides were analyzed. Statistical analysis was performed using Sigma-stat. DWH crude oil and Corexit significantly altered neutrophil, lymphocyte, and platelet counts; however, both oil and Corexit had no effect on monocytes. Dohle bodies and hemoglobin crystals were also found. The study has provided preliminary data to elucidate the potential toxic effects of DWH crude oil and Corexit that remain trapped in DWH oil spill residues previously found along the beaches of the Gulf Coast and still found on the ocean floor.

Title: Multidisciplinary approach in diabetic patients

Primary Author (and presenter): Morris, Alicia, L.

Department:

College/School: School of Nursing

Description:

There is strong evidence that most people with diabetes are not receiving any structured diabetes education which contributes to poor outcomes among diabetic patients. Evidence-based guidelines recommend a multidisciplinary approach to control and managed diabetes. The purpose of this project was to implement a multidisciplinary approach and provide appropriate education based on the patients' needs. Target population included adults (18-60yrs) with diabetes type II. Following informed consent, participants completed a Diabetes Project Participant Questionnaire. The physician reviewed the results to guide education recommendations. The participants participated in three meetings. A phone call at 6 weeks was made to assess diabetes knowledge, medication adherence, and improvement in glucose levels. Descriptive statistics were used to describe the patient population, diabetes knowledge, treatment recommendations, and patient adherence. Among patients with minimum diabetes education at baseline, the pre-post questionnaire responses were compared with paired t-tests. X consented to participate (% females), average age of X (sd) yrs. X% were identified with improved medication adherence, X % were identified with improved diabetic knowledge, and X% had improved blood glucose levels. Follow-up indicated that X% benefited from the multidisciplinary approach. Among those with diabetes type II, the questionnaire scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Screening for need of additional diabetes education and incorporation of a multidisciplinary approach among diabetic patients guided appropriate education recommendations and improved symptoms. Early identification and improved education approach of diabetic patients are achievable in this primary care office setting and further implementation of the project is warranted.

Title: Educating nurses on the Braden Q Scale

Primary Author: Morris, Mary Frances

Secondary Author: Hamilton, Cam

College/ School: School of Nursing

Description:

Nurses are at the forefront of pressure ulcer prevention and must be appropriately educated on the use the Braden Q Scale “Scale” to be used as a part of effective pressure ulcer prevention. The purpose of this evidence-based practice project is to educate nurses on how to correctly score the Scale to determine a patient’s pressure ulcer risk. The short-term goals of this small test of change are that the participants will state they are familiar with the Scale, and that the participant’s rate each subcategory of the Scale by comparing to the Scale descriptions in the electronic health record. Nurses in the Technology-Dependent ICU at Children’s Healthcare of Atlanta at Scottish Rite voluntarily participated in an educational intervention about the Scale. The participants took a demographic questionnaire and pre-test, to gather data on their baseline understanding of the Scale, received an educational intervention about the Scale, and then took a post-test to determine if there was a change in their knowledge. Descriptive statistics were used to describe the demographic data of the participants. Quantitative statistics were used to show the changes in the participants’ knowledge of the Scale. X nurses participated in the project, with X% female, X% male. X% showed an increase in knowledge, while X% stayed the same, and 0% had a knowledge decrease following the intervention. There was a X% increase in the number of participants who became familiar with the Braden Q Scale, and a X% increase in the number who will use the Scale to grade their patients’ risk. This evidence-based project showed that education on the Braden Q Scale could improve nurses’ understanding of a risk assessment scale. Improvements for the larger project are X, X, and X.

Title: Dress of the instructor in a lab setting

Primary Author (and presenter): Moss, Jackson, L.

Additional Authors:

Department: Secondary Science Education

College/School: Education

Description:

The dress code of a teacher has been noted to influence the thoughts of students in a classroom based on pictures of teacher dress and surveys of student opinion. This study used action research in a classroom to see if dress had a significant influence on student behavior in the classroom and in how they emailed the lab graduate teacher. A formal and informal dress was used in separate labs This study found that at midterms there was a difference in how students saw the grading of the GTA as fair or not with students seeing the grading as fair when the researcher was dressed in a more formal style and were less hesitant to ask questions when the researcher was dressed in a more casual style, but by the end of the semester there were no significant differences in student behavior toward the researcher suggesting teaching style has more impact than dress.

Title: Prevalence of food insecurity among students enrolled at Auburn University, Alabama

Primary author (and presenter): Mukigi, Dorcas

Secondary author: Brown, Onikia

Department: Nutrition, Dietetics, & Hospitality Management

College: Human Sciences

Description:

Previous studies have indicated that college students experience food insecurity at significantly higher levels than the national average. Some college students are vulnerable to food insecurity because of the increase in the cost of higher education. Students face budget demands that compete with their food dollar allocation. Auburn university is situated in Alabama, a state whose rate of food insecurity (18.2%) is greater than the national average (14%). The aim of this study was to examine the prevalence and possible risk factors of food insecurity among college students at Auburn University. A cross-sectional study design was used to investigate the food security status of Auburn University students, using an email delivered survey including United States Department of Agriculture's Household Food Security Survey Module, demographic, income and spending variables. Thirty-one percent (31%) of the students who completed the survey (n=990) were found to be food insecure. Binary logistic regressions showed that having credit card debt (odds ratio [OR], 0.585; 95% confidence interval [CI], 0.375-0.727), working for pay (OR 0.862; 95% CI, 0.514-0.987), classification (OR, 1.837; 95% CI, 1.375-2.454), and meal plan (OR, 0.614; 95% CI, 0.476-0.916) were linked with food insecurity. Participants living on campus alone were 3 times likely to be food insecure than those living off campus with a spouse and African Americans were 3 times likely to be food insecure as compared to Caucasians. Food insecurity is an important student issue among Auburn University students. Intervention measures and support systems are necessary to increase availability and accessibility of nutritious food for all students. Further research to investigate the impact of food insecurity on academic performance, college completion, behavioral, health and social outcomes of food insecurity is needed.

Title: Central nervous system and organ tissue analysis after fourth ventricle AAV-gene therapy for feline GM1 gangliosidosis

Primary Author (and presenter): Muller, Reka, D.

Additional Authors: Ellis, Lauren; Gray-Edwards, Heather; Martin, Douglas

Department: Scott-Ritchey Research Center

College/School: College of Veterinary Medicine

GM1 gangliosidosis is an inherited neurodegenerative disease resulting from a deficiency of lysosomal β -galactosidase (Bgal). Feline models of GM1 mimic that of the human disease and have been utilized to test efficacy of adeno associated-viral (AAV) gene therapy. The vector AAVrh8-CBA-fBgal-WPRE encoding β -galactosidase was injected in the fourth ventricle of cats with GM1 at the average age of 3 months at a dose of 2.5×10^{11} vg/kg body weight. Enzymatic activity was further examined in the cats treated with AAV. Enzymes were isolated from the brain, spinal cord, kidney, heart, liver, spleen, adrenal gland, cerebrospinal fluid (CSF), skeletal muscle and sciatic nerve from normal (n=3), GM1 (n=3), and GM1+AAV (n=3) cats. Restoration of enzymatic activity was determined with a synthetic, fluorogenic substrate. Cats treated with AAV injected in the fourth ventricle showed little restoration of Bgal activity in the cerebrum, but 21% ($\pm 8\%$) of normal activity in the cerebellum. Analysis of the spinal cord revealed a 30% ($\pm 4\%$) restoration in the cervical spinal cord. Analysis of the peripheral tissues revealed significantly increased β -gal activity with 75% ($\pm 17\%$) restoration of activity in the liver, 150% ($\pm 26\%$) in the CSF, 76% ($\pm 13\%$) in the kidney and 10% ($\pm 0.7\%$) in the adrenal gland compared to untreated controls, which had background levels of activity. Fourth ventricle gene therapy resulted in slight restoration of Bgal activity close to the injection site including the cerebellum and the cervical spinal cord, but not uniformly in the entire central nervous system. The most significant increase in the enzyme activity, 150% of normal, was measured in the CSF as expected due to the 4th ventricular injection site. Restoration of Bgal activity was also significant in lysosome rich organs including the liver and the

kidney. Future studies include histochemical staining for Bgal activity, Periodic Acid-Schiff staining for storage, and qPCR to assess vector distribution.

Title: Fueling the boom or smothering it? Examining fracking policy differences across the States

Primary Author (and presenter): Nelson, Steven

Additional Authors: Fisk, Jonathan and Good, AJ

Department: Political Science

College/School: Liberal Arts

Description:

Public concern about the health and environmental risks from oil and gas fracking operations is rising. However, scholarly attention is just beginning to unpack the regulatory differences to how states are responding to the shale oil and gas boom. For some states, a laissez faire response is preferable because of the substantial economic benefits that accompany natural resource development. Others prefer a more activist state government and one that is more willing to use its oversight and regulatory powers to mitigate fracking related problems. Using data drawn from a variety of political, economic, regulatory, and energy sources, we ask which factors are most helpful in accounting why some states race to the bottom while others become leaders in balancing environmental protection with energy development?

Title: Rheo-optical investigation of liquid crystalline double-stranded DNA and single walled carbon nanotube dispersions

Primary Author (and presenter): Noor, Matthew M.

Additional Authors: Davis, Virginia

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Aqueous dispersions of single-walled carbon nanotubes (SWNT) and double-stranded DNA (dsDNA) exhibit either nematic or cholesteric lyotropic liquid crystalline ordering, depending on dispersion preparation. If the initial dilute dispersion of individual and bundled dsDNA/SWNT adducts is concentrated, the system forms a nematic liquid crystal with a microstructure that has been observed in other SWNT dispersions. However, if the dispersion is centrifuged and only the supernatant of individual dsDNA/SWNT is concentrated, the system forms a cholesteric liquid crystal with a similar morphology to pure dsDNA dispersions. Better understanding this unique behavior will enhance fundamental understanding of the emerging field of nanomaterial based liquid crystals. In this research, optical microscopy and a rheo-optical shear cell were used to obtain images of both the cholesteric and nematic dsDNA-SWNT dispersions at rest, during startup of shear, at steady shear, and during post-shear relaxation over a range of concentrations. Results were compared to previous work from our research group cholesteric cellulose nanocrystal dispersions. In addition to advancing scientific understanding, these results are directly applicable to developing processing methodologies for producing nanomaterial coatings and films with controlled microstructures and bulk properties.

Title: Improvement of soy based diet efficiency for Florida pompano *Trachinotus carolinus* L by using combination of advance soybean and squid products

Primary author: Novriadi, Romi

Secondary authors: Rhodes, Melanie; Salze, Guillaume; and Davis, Allen, D.

Department: Fisheries, Aquaculture and Aquatic Sciences

College: Agriculture

Description:

This study investigated how complete replacement of poultry by-product meal (PBM) by advance soybean meal (SBM) as basal diet affected the growth performance, feed utilization, amino acid profile, body composition, digestive enzymes, blood biochemistry and distal intestine histology of Florida pompano (*Trachinotus carolinus*). Advance SBM was then replaced by squid hydrolysates (SH) and squid meal (SM) in increments, designated as 1%SH, 2% SH, 4% SH, 1% SM, 2% SM, and 4%SM, respectively. Each diet was fed to quadruplicate groups of 20 pompano for 56 days. Results from the growth trial indicate that fish fed with basal diet exhibited significantly lower growth performance as compared to fish fed with PBM. The addition of 4% SH improved the efficiency of basal diet and did not show any significant difference in terms of growth performance as compared to PBM. Whole body proximate and amino acids composition of fish were not significantly different among fish reared on any of the diets. Total protein, glucose and cholesterol level of fish fed PBM were significantly lower compared to soy-based diet. Total albumin, Alkaline phosphatase, Alkaline transaminase, Aspartate transaminase, and bile acids were similar among the dietary treatment. Complete soy protein sources in diet formulation may slightly impair the intestine and increase the number of goblet cells. The addition of 4% SH in the diet positively restores the intestinal integrity and reduced the number of goblet cells into PBM. This study showed that 4% SH proved an efficient feeding stimulant for Florida pompano and improve the efficiency of complete soy-based diet.

Title: Evaluation of parent-child interaction therapy following functional analyses

Primary Author: Nuhu, Nadratu, N.

Additional Authors: Pence, Sacha

Department: Psychology

College/School: Liberal Arts

Description:

Children with severe behavior problems are at high risk for poor school outcomes, social skill deficits, and juvenile delinquency. Thus, the reduction of problem behavior is of paramount importance in light of the detrimental effects these problem behaviors can produce. Parent-child interaction therapy (PCIT) is an empirically-supported intervention designed to address childhood disruptive behavior disorders. Although PCIT is a well-established intervention for parents of children with disruptive behaviors, little is known regarding the role of the function of a child's problem behavior on the efficaciousness of PCIT. One major component of PCIT is the use of a time-out procedure as a consequence for noncompliance. Considering that time-out may act as a reinforcing event for children engaging in problem behavior maintained by escape from demands, it is important to investigate the effects of PCIT on problem behavior maintained by different functions of problem behavior. Currently, the PCIT literature has not directly evaluated the relationship between functions of problem behavior and the effects of PCIT. Some studies assessing the use of PCIT with families, noted that PCIT was selected based on the hypothesis that the child's problem behavior was sensitive to caregiver attention. No studies to date have used functional behavioral assessment (FBA) within the context of PCIT, however, PCIT treatment outcome could be greatly enhanced with the addition of functional behavior assessment data. The purpose of the present study is to investigate the treatment effects of PCIT on problem behavior maintained by the most common reasons (e.g., access to attention, toys, or escape from demands). A single-subject design will be used in this study to identify which functions of problem behavior may be addressed by PCIT. It is hypothesized that PCIT may be more effective for certain functions (attention and toys) compared to other functions (escape).

Title: Functional behavior assessment of parents' nonadherence to behavior intervention plans

Primary Author: Nuhu, Nadratu, N.

Additional Authors: Pence, Sacha

Department: Psychology

College/School: Liberal Arts

Description:

Board certified behavior analysts and clinical psychologists have developed a large number of effective evidence-based interventions that alleviate problem behavior exhibited by typically developing children and those with autism spectrum disorder (ASD). Unfortunately, research focusing on the maintenance and generalization of these interventions suggest that treatment effects may not generalize to naturalistic settings when implemented by caregivers or maintain across time. One primary reason for poor maintenance and generalization of effects is poor treatment adherence by parents and caregivers during and following training. Function-based interventions have been identified as being more effective than non-function based interventions in decreasing problem behavior exhibited by children. Given that parent behavior is sensitive to environmental contingencies, systematic manipulations of the environment could provide information about what maintains low adherence. The purpose of the current study is to develop a procedure that identifies the variables maintaining caregiver nonadherence behavior by altering the environmental events proceeding and following nonadherence behavior. Eight caregiver-child dyads will participate in the study. A contingency reversal design will be used in the assessment to identify if parental nonadherence is a function of attention from others or escape from their child's problem behavior. Data analysis will be performed by visual inspection of the graphed performance. It is hypothesized that caregivers will engage in higher rates of nonadherence during the escape from problem behavior condition compared to the attention condition.

Title: Alcohol consumption and crime: A panel study of South-eastern counties in the USA

Primary Author (and presenter): Odabasi, Suzan

Department: Agricultural Economics and Rural Sociology

College/School: Agriculture

Description:

Criminal behaviours are important economic obstacles to the development of nations. According to FBI's Uniform Crime Reporting Program (UCR) more than 40% of the total violent and property crimes in the USA happens in the southern region of the US. This study examines the relationship between crime and alcohol consumption in the south-eastern counties in the US. A panel data from 2007 to 2010 for 616 counties is employed to estimate the impacts of the alcohol consumption on crime. Based on information and statistics from the Federal Bureau of Investigation (FBI) and the Behavioural Risk Factor Surveillance System (BRFSS), the classical two stage-least squares (2SLS) model is proposed to analyse the relationship of crime and alcohol consumption. The results show that there exists a significant impact of alcohol consumption on crime. Additionally, the results show that high temperature is also one of the factors which cause high incidence of crime in the south-eastern regions.

Title: Identifying elite parents of channel catfish (*Ictalurus punctatus*) female x blue catfish (*I. furcatus*) male F1 hybrid progeny with superior performance traits using combining ability analysis

Primary Author (and presenter): Odin, Ramjie, Y.

Additional Authors: Vo, Khoi; Robinson, Dalton; Gosh, Kamal; Drescher, David; Bugg, Will; Youssef, Nermeen; and Dunham, Rex.

Department: Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

Hybrid catfish are considered best for commercial catfish farming due to their faster growth rate, disease resistance, tolerance to environmental stress, better FCR and harvestability, and high carcass yield. However, not all hybrids are consistent and stable with their performance due to varying parental strains. The technique to analyse combining ability which was originally used for corn breeding program was used in this study to analyse the catfish parental combining abilities and improve its hybridization program. The analysis of general combining ability (GCA) and specific combining ability (SCA) are important in identifying elite catfish parents that can produce superior performing hybrids. Such information would be beneficial to the catfish industry. Twenty female channel and twelve male blue catfish were crossed in 20x12 factorial mating design. The progenies were reared in flow-through aquaria system for 323 days and fed *ad libitum* with 32% protein diet daily. Each family was replicated in three tanks and each tank was stocked with 70 fish. The resultant 40 hybrid families were evaluated for their performance traits following restricted estimation of maximum likelihood. The combining ability analysis revealed that GCA variances for dam and sire were higher than the SCA variances for growth and survival from *Aeromonas* and Ich infection, respectively. These indicate the prevalence of additive gene actions controlling inheritance of growth traits which is contributed by female parent and resistance to *Aeromonas* and Ich infection which is contributed by male parent. The GCA estimates identified the elite parents for superior hybrid catfish. Overall, the reciprocal recurrent selection in terms of additive genetic value of the channel catfish female and blue catfish male using the combining ability analysis has the potential to improve the performance of hybrid catfish.

Title: Powering the future

Primary Author (and presenter): Ossenfort, Christian

Department: Environmental Design

College/School: College of Architecture, Design and Construction

Description:

As society grows and becomes more sophisticated, the power industry grows with it. In the past, we have relied on fossil fuels, but we are starting to see the environmental effects of carbon emissions produced by this reliance. My research focuses on alternatives to power our world, specifically focusing on clean, renewable energy. I gathered data from governmental programs and environmental organizations, focusing not only on the local scale, but also the global scale. I made two boards that corresponded to this research. The global board focuses on comparing fossil fuels to renewable resources and the global impact that carbon emissions have on the world. The local board focuses on cities in America that have made the switch to renewables to power their entire city. This topic is important because carbon emissions are not only harmful to our planet, but also to our entire population. This research allows people to see that not only are renewables reliable, but they are powerful and capable of powering our cities, and hopefully someday, our entire world.

Title: Improve medication adherence in type II diabetes through teach back and pictorial image

Primary Author (and presenter): Overby, Ragan Jones

Additional Authors: Dr. Ellison, Kathy Jo

College/School: School of Nursing

Description:

There is strong evidence that teach back and pictorial image educational methods can improve the gap of medication adherence as well as improve glycemic control in patients with type 2 diabetes (T2DM) and low literacy levels. Accommodating low literacy level using simple educational strategies can increase knowledge. Developing a diabetes management program for low literacy patients is not only beneficial to patients' health but also can help to improve their quality of life. The target population included adults (40-70 years) with T2DM in a continuity clinic. Following informed consent, participants completed the Morisky Medication Adherence Survey and Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD) Knowledge Survey as well as an initial baseline hemoglobin A1C (HgA1C) if one was not provided in their chart. The advanced practicing nurse (APN) student provided weekly classes that provided evidence-based low literacy educational methods to improve patients' diabetic knowledge, behavior, and glycemic control. The pre-and post test data were compared with paired t-tests. X consented to participate (XX% female, XX% male), the average age of X (XX SD) years, the average length diagnosed X (XX SD) years, the average education level was high school, the average SHIELD survey score XX and Morisky survey score XX, and the average HgA1C XX and blood glucose XX. Following the intervention, there was a XX% improvement in medication adherence and a decrease in participants' HgA1C and blood glucose levels. Improvement was compared with pre-and post t-tests. Educational methods focused on low literacy improved medication adherence in a group setting. Diabetic knowledge and medication adherence was assessed and treated among T2DM patients with achievable improvements in the clinic setting. Further implementation of the project is warranted.

Title: Are mosquitoes that are competent vectors for heartworm more attracted to dogs infected with heartworm?

Primary Author (and presenter): Owens, Llandess

Additional Authors: Rice, Kirsten; Blagburn, Byron; Bowles, Joy; Zohdy, Sarah

College/School: School of Forestry and Wildlife Sciences, College of Veterinary Medicine

Dirofilaria immitis is a mosquito-borne filarial parasite that causes canine heartworm disease—a common condition that affects dogs and other hosts. If untreated, heartworm infections can cause serious and potentially fatal cardiopulmonary disease. To complete the life cycle, heartworm microfilariae must enter a mosquito as it feeds on an infected dog. Within the mosquito, the microfilariae will develop into infective larvae that are transmitted to the next dog when the mosquito feeds. The close and long standing evolutionary relationship between mosquito vectors of canine heartworm suggests that there may be cues that attract mosquitoes to infected dogs. Interestingly, human malaria parasites have coevolved with their hosts, and recent research on infected humans suggests that humans infected with malaria are more attractive to mosquitoes that transmit malaria. Here we investigate whether there is a similar moiety produced in heartworm infected dogs that enhance mosquito attraction to their hosts. We hypothesize that more mosquitoes will be attracted to blood from infected dogs than noninfected dogs. When presented with a choice experiment, we find that more *Aedes aegypti* mosquitoes are attracted to and feed on blood from heartworm infected dogs than on blood from non-infected dogs. Our results suggest that there may be molecular moieties (cues) that attract mosquitoes to heartworm infected dogs. Further research, identifying the specific compounds that attract mosquitoes can be used to develop baited traps to specifically target the vectors of heartworm and may lead to methods of mitigating host vector interactions.

Title: Leveraging behavioral economics-based interventions to improve medication adherence

Primary Author (and presenter): Owensby, Justin, K.

Additional Authors: Garza, Kimberly; Hansen, Richard; Fox, Brent; and Franco-Watkins, Ana

Department: Health Outcomes Research and Policy

College/School: Harrison School of Pharmacy

Description:

To determine the relative effectiveness of behavioral economics-based interventions using financial or social incentives. Pilot randomized controlled trial comparing the effects of financial v. social incentives v. usual care on medication adherence in patients taking anti-hypertensives or anti-hyperlipidemics. Baseline survey assessed self-reported adherence, socioeconomic status, and perspectives of differing incentives. Participants received either usual care(UC), financial incentives(FI), or social incentives(SI). Daily adherence was measured over a 90-day period using MEMS caps. The FI group received \$90 upfront, with \$1 deducted each day a dose was missed. The SI group utilized a study website that displayed individual and group medication adherence for participants to see. The UC group were instructed to take their medications as prescribed. 15 participants were randomized to 1 of 3 groups (UC=5, FI=3, SI=7). The majority were female (60%) and had a household income of \$50,000-\$100,000 (57%). Age ranged from 43 to 83 years (mean=64.4±10.6). Mean percent of days adherent was highest in the FI group (95%±6%), followed by the SI group (88%±20%) and UC group (77%±33%). Participant perceptions of the incentives, indicated on baseline survey, suggested that financial incentives were moderately effective and the social incentives (i.e., wanting their family or pharmacist to see they are adherent) were extremely effective. Medication adherence appears to be enhanced using either financial or social incentives compared to UC, although sample size was too small to test for statistical significance. Larger studies in a more diverse population are warranted, and in-depth focus groups may help to expound the role of social incentives.

Title: Disruption of the relational and item-specific processing supports the negative outcomes of multiple-choice testing with additional lures

Primary Author (and presenter): Paneerselvam, Bavani

Additional Authors: Callender, Aimee

Department: Psychology

College/School: Liberal Arts

Description:

Multiple-choice practice testing with additional lures reduces retention on a later test. However, the mechanism underlying the negative outcomes with additional lures is poorly understood.

The goal of this study is to examine whether multiple-choice testing with additional lures disrupts both the relational and item-specific processing, resulting in the negative outcomes. Participants read the study materials and they later reread or answered multiple-choice questions with additional lures in a non-inclusive format (Experiment 1) and inclusive format (Experiment 2) followed by a final free-recall test. Results from both the studies showed that multiple-choice testing with additional lures decreased retention on the final test compared to rereading. Our results suggest answering multiple-choice test with additional lures disrupts both the relational and item-specific processing.

Title: Skin-to-skin education among women of childbearing age

Primary Author (and presenter): (Parker) Kirkland, Jessica, D.

College/School: School of Nursing

Description:

The purpose of this project is to discuss the need for skin-to-skin education in women of childbearing age. Many women are uneducated on this topic and are unaware of the health benefits of skin-to-skin care. The objectives of this project were to educate women of childbearing age on the benefits of skin-to-skin care in order to make an informed decision about their care while evaluating if education impacted attitudes and perceptiveness in this group of women. In order to implement this change several women of childbearing age were surveyed using a Likert scale in an outpatient clinic regarding their knowledge base and attitudes of kangaroo care prior to and after education. Ideally, the women surveyed would be more likely to implement kangaroo care and would report an increase in knowledge of kangaroo care. The data from the surveys was entered into Excel and imported into SPSS software where it was evaluated for trends, mean, and standard deviation. The data was reviewed to determine if the patients had more knowledge and were more likely to implement skin-to-skin care after education. The mean age and standard deviation of women surveyed was calculated. The survey data was also evaluated to determine trends in perceptiveness to teaching and which age range was more likely to implement skin-to-skin care. The purpose and objectives of the project were met by educating patients on skin-to-skin care and then evaluating the information provided through the survey data. Suggestions for a larger scale project would include a larger sample size across multiple locations to decrease skewed results from one area of the country and additional questions to further evaluate attitudes and perceptiveness towards kangaroo care.

Title: Mechanical effects of PEO addition and flocculation on sheared cellulose nanocrystal films

Primary Author (and presenter): Passantino, Joshua, M

Additional Authors: Haywood, Alexander; Goswami, Joyanta; Davis, Virginia

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Films produced from colloidal and nanomaterial dispersions such as aqueous cellulose nanocrystal (CNC) dispersions tend to crack above a critical cracking thickness; this issue limits the ability to produce flow-aligned CNC films at thicknesses above $\approx 50 \mu\text{m}$. This research explores the effects of adding polyethylene oxide (PEO), flocculation with hydrochloric acid (HCl), and the combination of both methods on film cracking, mechanical properties, and mechanical anisotropy. Most research on CNC polymer composites focuses on composites where the polymer is the majority component. To the authors' knowledge there has been only one investigation of CNC films' mechanical anisotropy and no studies of using HCl flocculation to flocculate CNC dispersions prior to shear casting. PEO addition significantly reduces Young's modulus, tensile strength, and toughness, but enhances the Young's modulus anisotropy. Flocculation results in little property deterioration but nearly eliminates mechanical anisotropy. The combination of both techniques results in similar properties as flocculation alone. These findings highlight the trade-offs between these two approaches and can be used to help guide further research on obtaining robust shear cast CNC films over a range of thicknesses.

Title: Hydrothermal liquefaction of lignin for production of biofuels and chemicals

Primary Author (and presenter): Patil, Vivek

Additional Authors: Adhikari, Sushil

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Lignin, which constitutes 25-35% of lignocellulosic biomass is the most abundant aromatic biopolymer in nature and also an untapped resource. Bio-crude produced from hydrothermal liquefaction of lignin cannot be used as fuels directly. In addition, hydrothermal liquefaction of lignin results high amount of solids (bio-char). The objective of the current research is to study the effect of hydrogen donor as well as organic solvent on the liquid product yields and the properties of bio-crude made from liquefaction of lignin. The liquefaction experiments for Alkaline lignin are being carried out in a batch reactor at 300°C with ethanol-water mixture as solvent and Tetralin as hydrogen donor. The products are being analysed by techniques like GC/MS, FTIR spectroscopy and high performance size-exclusion chromatography, in order to determine their nature and composition. Other properties of the bio-crude produced, such as total acid number (TAN), water content, viscosity are also being studied. Results are expected to show the effectiveness of using hydrogen donors in depolymerisation of lignin. FTIR spectroscopy indicated that the resulting functional groups are same in bio-crude obtained with different combinations of ethanol-water solvent. However, the composition of product, as seen from GC/MS analysis is different in all the cases. It is expected that this study will help to advance the knowledge of usefulness of hydrogen donor solvents in lignin depolymerisation with the help of lab-scale experiments.

Title: Exploring magnetic resonance imaging technology for observing detectable differences of wooden breast tissue in broiler breast filets

Primary Author (and presenter): Patton, Samantha, I

Additional Authors: Morey, Amit; Beyers, Ron; Bauermeister, Laura; Starkey, Jessica

Department: Poultry Science

College/School: Auburn University

Description:

Wooden breast (WB) disease, a prominent muscle myopathy in poultry that hardens breast filet meat, is an issue for the broiler-producing industry, leading to economic loss for producers. Today, with only manual palpation methods to identify the presence and severity of wooden breast in filets, there is a sense of ambiguity in the detection of meat quality. This research was performed to explore the possibility Magnetic Resonance Imaging (MRI) as a tool for objective measurement in distinguishing a clear difference between wooden and normal breast broiler filets. A butterfly woody breast (WBR/L) and a normal right breast (NR), freshly deboned and provided by a local processing plant, were used to produce T1 weighted Magnetic Resonance Images (T1 MAP) that allowed for the comparison of the T1 relaxation times between tissues, a measure of the time taken for spinning protons of tissues to realign with the external machine's magnetic field. The breasts were individually packaged prior to imaging and were stored overnight at 4°C for texture analysis and histology sampling. Toughness of corresponding woody areas visible in MRI of the left woody breast was determined with TA.XT2i Texture Analyzer (Texture Technologies Corp., UK), equipped with a 50 kg load cell, and the BMORS method. Histology samples of the right normal and woody breast were taken and cryostat sections were examined. Filet BIA values were obtained applying a specialized Certified Quality Reader (CQR) for BIA on the ventral side of the filet. Data of T1 relaxation times were analyzed using a Z-Test to compare mean relaxation times of areas of similar location in the woody and normal breasts at $P < 0.05$. Normal and woody breast areas had significantly ($P < 0.05$) different relaxation times. The T1 images were used to compare location and occurrence of woody breast on opposing sides of the woody butterfly breast.

Title: Nanoparticle surface characteristics impact *in vitro* cytotoxicity

Primary Author (and presenter): Paul, Kyle D.

Additional Authors: Kelly, Alexander L.; David, Allan E.

Department: Department of Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Nanoparticle research has opened the door for efficient and effective therapeutic delivery within the body. These particles provide unique characteristics that not only minimize immunological effects of intravenous delivery, but also induce longer circulation half-lives for the therapeutic *in vivo*. Silica nanoparticles (SNPs) are of particular interest due to inherent biocompatibility, thermal stability and high range of surface functionalization.

Surface characteristics of nanoparticle delivery platforms have been linked to their behaviour *in vivo*. Many studies have investigated the use of polymer coatings, such as polyethylene glycol (PEG), as a way to improve circulation half-lives upon injection. Though PEG is highly utilized within the field, its mechanism is poorly understood, with even less developed knowledge concerning the optimal polymer Dalton weights necessary for successful enhancement of nanoparticle systems. This research investigates the effect of PEG Dalton weight on SNP cytotoxicity *in vitro*. Cellular uptake and viability studies have been conducted with particles coated in various PEG sizes. These experiments have produced a standard for comparison on the effects of differently sized PEG. Chinese Hamster Ovary cells were used in this comparison given their prevalence in cytotoxicity and uptake literature. Comparisons between particles taken up by cells and those simply associated with cell surfaces are being made with confocal microscopy and flow cytometry. This study found that size and surface coatings have a dramatic influence on the cell viability and uptake *in vitro*. In addition, these studies show there may be interplay between both variable sets. This work has provided a basis of comparison that could be extended to additional nanoparticle systems. Understanding the impact of widely used solid nanoparticle compositions, sizes, coatings and their combinations on mammalian systems is an important step in developing robust drug delivery vehicles.

Title: Influence of microstructure on crack initiation and microstructurally small crack growth of an austenitic stainless steel

Primary Author (and presenter): Pegues, Jonathan, W.

Additional Authors: Roach, Michael; Shamsaei, Nima

Department: Mechanical Engineering

College/School: Samuel Ginn College of Engineering

Description:

In this study, the effect of microstructure on crack initiation for a stress amplitude within the transitional fatigue life regime was investigated for a metastable austenitic stainless steel in which a martensitic phase transformation occurs given sufficient localized deformation. Through the use of scanning electron microscopy along with electron backscatter diffraction, several micro-cracks were analyzed and compared. The influence of microstructural features such as twin boundaries, slip band intrusions/extrusions, grain boundaries, inclusions, and martensitic transformed areas on crack initiation life is discussed. The initiation stages for each microstructural feature are compared in terms of nucleation mechanism and deformation behavior. Twin boundaries and slip bands were shown to be the most predominant initiation feature, however, the initiation mechanism for each were different. Additionally, the transformation behavior was of particular interest due to its effects on the mechanical properties of the alloy. The transformed martensitic zone size is shown to have a direct effect on microstructurally small crack growth for each initiation feature.

Title: Modelling pH dependent controlled drug delivery in contact lenses

Primary Author (and presenter): Pinkston, Jessica, N

Additional Authors: Fan, Xin

Department: Chemical Engineering
College/School: College of Engineering

Description:

A major challenge to the delivery of drugs embedded in contact lens material is the prevention of drug release while the lenses are stored before in vivo use. A pH dependent release would allow for storage at a pH that limits release and for triggered drug release in an environment at the pH of ocular fluids. In order to model such a system, polymer beads to imitate contact lens material were studied releasing a fluorescent dye at a pH around 2 to model the storage condition and a pH around 7 to model the in vivo release environment. Release profiles were generated and evaluated for dye release in pH 7 solutions and pH 2 solutions. Initial findings showed a greater release of dye for beads in a pH 7 solution compared to a pH 2 solution. Importantly, beads placed in a pH 2 solution for initial study did release some of the embedded dye; however, when the same beads were moved to a pH 7 solution, release not only increased immediately compared to release in the pH 2 solution, but the overall dye release amount was greater in the pH 7 solution than dye release in the initial pH 2 solution when each solution condition was monitored over the same time period. More limited release in a pH 2 solution indicates the potential use of a pH 2 solution for preventing release while lenses are stored. This simple model for drug release in contact lenses suggests that pH dependent release could be a valuable mechanism for storage of contact lenses loaded for later ocular drug delivery.

Title: Prenatally cannabinoid exposed offspring display impaired synaptic plasticity and cognitive deficits

Primary Author (and presenter): Pinky, Priyanka, D.

Additional Authors: Bloemer, Jenna; Setti Sharay; Heslin, Ryan; Alhowail, Ahmed; Reed, Miranda; and Suppiramaniam, Vishnu

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Cannabinoids are one of the most commonly used illicit substances among pregnant women. Prenatal cannabinoid exposure may be associated with persistent deficits in the cognitive functions of offspring. We investigated the impact of prenatal cannabinoid on the offspring in hippocampal dependent learning and memory through behavioral and electrophysiological testing. An osmotic pump filled with either N-Methyl-Pyrulol(NMP) or the cannabinoid receptor full agonist WIN55,212-2(2.5mg/kg body weight/day) was inserted subcutaneously in the pregnant rats at the Gestational Day -3 (GD-3), and was left there until delivery of the pups. Contextual Fear Conditioning (CFC) and Morris Water Maze (MWM) were performed to observe hippocampal dependent spatial memory deficit in adolescent rats (PND45-PND55). Since glutamate, the major excitatory neurotransmitter, plays a vital role in memory and learning, we also measured the amount of glutamate release in Schaffer-Collateral Pathway (CA1, CA3) and Dentate Gyrus (DG) of hippocampus through Multi Electrode Array (MEA) in the anaesthetized animals. Further, the downstream signalling of glutamate through AMPA and NMDA receptor was also investigated. We found that there is significant change in the learning process during the behavioral tests between the two groups. In the electrophysiology experiment, LTP in the Developmentally Cannabinoid exposed (DCAN) animals were reduced by 50% compared the control animals. Also, prenatal cannabinoid exposure reduced glutamate release in both CA3 and CA1. These results indicate that cannabinoid exposure during the gestational period may lead to significant functional and neurochemical alterations through changes in glutamatergic synaptic transmission and result in learning and memory deficit.

Title: Safegaurds to reduce polypharmacy in the older adult

Primary Author (and presenter): Popp, Chelsea K.

Additional Authors: Peterson, Mary

Department: School of Nursing

College/School: Auburn University

Description:

Background: Polypharmacy in the older adult is often the result of inappropriate prescribing by healthcare practitioners and can lead to adverse drug reactions. The purpose of this project was to determine if safeguards such as medication reconciliation, education about polypharmacy, and acknowledgement of possible adverse drug reactions due to overprescribing medication would result in decrease in polypharmacy in the older adult.

Methods: The target population was aimed at those ages 65 and older in a rural primary care clinic. Informed consent was obtained, questionnaires were given to patients to record any recent medication changes or physician visits, and flyers were placed in the lobby and clinic rooms. Education was provided on the importance of patient-provider collaboration when prescribing medications. The number of adverse drug reaction alerts was recorded during each patient's medication reconciliation. The number of medications patients were prescribed versus what medications were brought with them to each office visit was also recorded. Descriptive statistics were used to describe the patient population, number of adverse drug reaction alerts, and percentage of medications present vs. prescribed. This information was then compared with t-test values and pre and post medication education and reconciliation data.

Results: X consented to participate, average age of X years. X% of questionnaires were completed, and X% of patients brought all medications with them to their office visits with X% of patients bringing 50% or less of their medications. Adverse drug reaction alerts improved from pre (mean, sd) to post education and reconciliation (mean, sd) ($p < 0.1$).

Conclusions: Safeguards implemented to reduce polypharmacy in older adults were effective. Medication reconciliation and educational intervention reduced the number of potential adverse drug reactions. Safeguards also increased patient compliance with bringing medications to every office visit. Inappropriate prescribing and adverse drug reactions may be reduced with consistent medication reconciliation at each office visit. Further implementation of the project is warranted.

Title: Urban poverty

Primary Author (and presenter): Porter, Allison, E.

Department: Environmental Design

College/School: College of Architecture, Design, and Construction

Description:

This research project focuses on urban poverty. My research questions were as follows: What is poverty? What are the different variations of poverty? How does poverty manifest itself in urban areas? What are the impacts of poverty in the United States? I gathered data from census information published on government websites, as well as published academic articles on the subject. My research applies to major metropolitan areas, especially those in the United States. Poverty plays a defining role in the lives of people who are living in it, and can prevent them from advancing themselves to higher stations in life. I collected both qualitative and quantitative data to discover the different indicators of social poverty, the indicators of economic poverty, and how the two interact. Through my research, I discovered that poverty manifests itself differently in different environments. Due to urbanization becoming a prevalent issue in the industrialized world, I focused on urban poverty specifically in United States. In the second part of my project I examine gentrification as urban poverty's manifestation in the United States. My project works to advance the understanding that not all growth is equal. I designed two posters for each area of my research, representing urban poverty and gentrification in the United States, to visually convey and represent my

research in an easily accessible format. Finally, I examine the cycle of gentrification as well as three case study cities that all represent different points along the cycle of gentrification.

Title: Improved retention of nepafenac on the ocular surface for sustained drug delivery

Primary Author (and presenter): Porter, Haley R.

Additional Authors: Ramapuram, R. Jaychandra; Smith, Forrest

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Nepafenac is a nonsteroidal anti-inflammatory drug (NSAID) with low water solubility, currently only available in suspension form (Nevanac). Suspensions irritate eyes leading to limited residence time and low drug bioavailability. Previously, we successfully solubilized nepafenac by using hydroxypropyl-beta-cyclodextrin (HPBCD) to improve its ocular bioavailability. We then incorporated the complex into an ion-activated gel formulation using sodium alginate (NaAG), to reduce patient repeat administration and increase residence time. Gellation capacity studies comparing varying NaAG concentrations were done by dropping the formulation into simulated tear fluid (STF). We determined the rheological properties of each formulation before and after the addition of STF. Release studies were performed using Franz diffusion cell apparatus and porcine corneas, comparing nepafenac formulations with varying concentrations of NaAG to the commercial product. Perfusion studies were performed using the gel with the slowest permeation. Gellation studies revealed that NaAG concentrations of 0.1% (F15), 0.3% (F16), and 0.5% (F17) all formed gels upon contact with the STF; however, F15 and F16 dissolved immediately while F17 remained in a gel form for more than 8 hours. Rheological studies revealed that the viscosity of all of the formulations doubled when exposed to the STF at 35°C, with F17 producing the highest viscosity. All of the formulations displayed pseudo-plastic flow, which is ideal for ophthalmic formulations. The permeation rate of all three in-situ formulations was approximately 14 times higher than the commercial product and had significantly higher amounts of nepafenac retained in the cornea when compared to the commercial formulation. Perfusion studies revealed that the corneal concentration was not significantly different from our solution; however, the drug on the sclera was higher when compared to the suspension and solution, thus more drug is retained on the cornea.

Title: Effect of white mustard essential oil against *Salmonella* spp. in combination with carvacrol and thymol in vitro and in ground chicken

Primary Author (and presenter): Porter, John, A.

Additional Authors: Monu, Emefa

Department: Poultry Science

College/School: Agriculture

Description:

This study evaluated the activity of white mustard essential oil (WMEO) in combination with carvacrol (CAR) and thymol (THY) to determine synergistic, additive, or antagonistic effects against the foodborne pathogen *Salmonella* in vitro. The most effective combination of antimicrobials was then applied to a food model to test its potential at lowering the risk of foodborne illness. *Salmonella* Typhimurium was inoculated in tryptic soy broth (TSB) to a level of 10^5 CFU/mL. Using previous data on minimum inhibitory concentrations (MIC) for WMEO (0.5%), CAR (0.02%) and THY (0.02%) the following treatments were applied: individual MICs, $\frac{3}{4}$ MIC WMEO + $\frac{3}{4}$ MIC CAR, $\frac{3}{4}$ MIC WMEO + $\frac{1}{4}$ MIC CAR, $\frac{1}{2}$ MIC WMEO + $\frac{1}{2}$ MIC CAR, and $\frac{1}{4}$ MIC WMEO + $\frac{3}{4}$ MIC CAR. Combinations with THY in place of CAR were also carried out. Synergism effects were determined by the fractional inhibitory index

(FICI) based on the binary antimicrobial combinations. Tubes held at 22 °C were plated at 0h, 24h and 48h on tryptic soy agar (TSA) in duplicate. To determine antimicrobial efficacy in food, a five strain cocktail of nalidixic acid (NAL) resistant *Salmonella* serovars (Enteritidis, Typhimurium, Heidelberg, Montevideo and Kentucky) was inoculated to a final population of 10⁵ CFU/g in triplicate 100 g ground chicken samples with 7 treatments (positive control, un-inoculated control, 0.75% WMEO, 0.5% WMEO, 0.75% WMEO with 0.1% CAR, 0.5% WMEO with 0.1% CAR, and 0.1% CAR alone). Samples were plated every 2 days on TSA with 100ppm NAL over 12 days at 4 °C. In vitro, CAR and THY both had a FICI value of less than 1.5, showing additive effects when combined with WMEO. In chicken, WMEO alone and in combination with CAR decreased *Salmonella* counts by approx. 1 log CFU/g, while CAR alone had no effect. Results indicate the potential of WMEO and CAR to be used in combination to control *Salmonella* spp. in a raw chicken product.

Title: Chronic stress and emotional regulation: A mixed methods analysis

Primary Author (and presenter): Powell, Stephen R.

Department: Educational Foundations, Leadership, and Technology

College/School: Education

Description:

This study seeks to investigate hair cortisol as a measure of chronic stress. Studies have shown that hair cortisol concentration (HCC) is linked to adverse life circumstances, however, not all participants exhibit adverse behavior. It is, therefore, apparent that something is mediating the relationship between chronic stress and behavior. This study examines the role emotion regulation has on mediating this relationship by focusing on college students and at-risk youth. It is imperative to study these populations due to the stress-inducing nature of the collegiate experience and the life environment of at-risk youth. The existing literature that addresses these populations is minimal and does not investigate the foundational components to living and coping with stress that ought to be examined. This study consists of two groups of undergraduate students and alternative high school students. For both sets of students there is a treatment and a control group that have been match demographically. Participants from all groups were administered surveys to determine their emotional regulation strategies and current perceived stress level. Also, an initial hair sample was collected to establish an HCC baseline. Participants in the treatment groups will interact with each other in an agricultural setting for approximately 3 months during the spring of 2017. At the end of the study, two final surveys will be administered to all participants with a possible follow up interview to examine the influence of any major stressful events that occurred during the study. Finally, a second hair sample will be collected to be used for comparative analysis. The purpose of this study is to compare stress levels in terms of self-reported stress scale scores and HCC and to relate emotional regulation strategies to hair cortisol concentration for all participants. Also, to explore how major stressful life events and emotional regulation strategies are manifested in an agricultural setting.

Title: Pharmacy and nursing student perceptions of smoking in healthcare providers

Primary Author (and presenter): Prather, Caitlin, S.¹

Additional Authors: Garza, Kimberly, B.¹; Correia, Christopher, J.²; Braxton Lloyd, Kimberly¹

Department: ¹Health Outcomes Research and Policy; ²Psychology

College/School: ¹Harrison School of Pharmacy; ²Liberal Arts

Description:

Tobacco use remains the primary leading cause of preventable death in the United States. However, healthcare professionals' use of tobacco and perceptions about tobacco use among professional colleagues has not been widely studied. This study aims to determine the students' perceptions about tobacco use in

healthcare providers and how those perceptions vary between different programs of study. This was a cross-sectional online survey of students enrolled in either the Doctor of Pharmacy program or various degree programs within the School of Nursing. Participants were recruited using an invitation sent via electronic mail, sent to approximately 1079 students. . Items from the Fagerstrom nicotine dependence measure, BRFSS, and the NIH, as well as newly developed items measured current tobacco use and perceptions of tobacco use among healthcare providers. A total of 220 students completed the survey yielding a response rate of 20%. The majority were female, single, and Caucasian. 3% reported current use of tobacco. Varying levels of agreement regarding how smoking affects healthcare providers were seen among the students based on their field of study, with nursing students endorsing greater agreement regarding how smoking habits influence practitioner effectiveness within their field compared to pharmacy students ($p=0.004$). There were also different results depending on which type of provider was the “smoker.” To bring about change in knowledge, behaviors and attitudes to promote a healthy lifestyle among their patients, healthcare providers must first look to themselves as models of desirable health behaviors. Varying perceptions on tobacco use in healthcare providers based on field of study were seen in this survey of future healthcare providers.

Title: Design of a novel airborne atmospheric sensor

Primary Author (and presenter): Prather, Craig J.

Additional Authors: Bolt, Michael; Horton, Tyler; Harrell, Haley; and Adams, Mark L.

Department: Electrical and Computer Engineering

College/School: Samuel Ginn College of Engineering

Description:

Weather affects many aspects of our daily lives from our individual commutes to the global economy. Although much progress has been made in understanding atmospheric physics and weather forecasting, there is still a need for better in situ atmospheric data. Forecasts are based on high performance computer models which solve the differential equations that represent the dynamics of the atmosphere. In all of these models, initial conditions based on the current state of the atmosphere are ingested into the models. The initial conditions are based on data from many sources including remote sensing satellites, ground based weather stations, weather balloons and even aircraft. However, the amount of in situ atmospheric data is very limited and so often times the initial conditions for the models are not truly representative of the current atmosphere. This is especially true for severe storms such as super cell thunderstorms, tornadoes, and hurricanes. Research has been completed at Auburn University to design a novel, airborne environmental atmospheric probe known as the Global Sense eMote. The eMotes are designed to be lightweight, low-cost sensors designed to supplement and in some cases replace the current, costly sensing devices.

Title: Anaerobic digestion of poultry litter for biogas production

Primary Author (and presenter): Preisser, Matthew, D.

Additional Authors: Higgins, Brendan

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Anaerobic digestion has been a suggested method for diverting waste products (wood chips, poultry and cow waste, food waste, etc.) from landfills to create second-generation products. This includes the production of biogas with high methane concentrations for energy use and nutrient rich effluent that can be used in production of advanced algal biofuels or as an organic fertilizer substitute. This benefits local

communities by converting a waste stream into carbon-neutral energy. Anaerobic digestion occurs when a feedstock and an inoculum rich in methanogens (methane producing bacteria) are incubated in an oxygen-free environment. This research examines the potential for utilizing local poultry litter as a feedstock for anaerobic digestion. The objectives are to see if poultry litter collected from different locations within a poultry house have different energy potentials through biogas methane potential (BMP) testing. Three different locations from within the poultry house were sampled and analysed for their BMP. Multiple loadings were made with different ratios of feedstock and inoculum to quantify feedstock biogas production potential and to determine the quantity of inoculum needed to initiate digestion. Methane and carbon dioxide concentrations were also compared to determine the quality of the biogas being produced. Quantifying the BMP of poultry litter from various sampling locations in the poultry house will allow for future research on how to maximize biogas production from poultry waste. Future research will investigate the feasibility of poultry-fed anaerobic digesters, use of the nutrient rich effluent, and cost-benefit analysis of farm scale poultry waste digesters. This can lead to development of small scale digesters that specifically benefit poultry farms.

Title: The role of knowledge in fostering international cooperation to better understand the environmental effects of marine renewable energy through the use of *Tethys*

Primary Author (and presenter): Preisser, Matthew, D.

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Marine renewable energy (MRE) is an emerging industry that harnesses electrical power from marine environments. Since it is a new market, there is a need to spread current knowledge on its potential effects to the environment to ensure the industry can start off on a solid foundation. *Tethys* is a knowledge management system developed and maintained at PNNL. The purpose of *Tethys* is to facilitate the exchange of information on the environmental effects of MRE while serving as a commons to enhance the connectedness between the industry, researchers, regulators and other interested parties. General improvements were made to enhance resources on the website, focused around geolocation. These improvements are a necessary to ensure that the flow of information through the website remains up to date and is searchable. A specific area of expanded use for *Tethys* was initiated as part of this project, increasing the ability to search for information by waterbody. Data sources were gathered from the Bay of Fundy in Nova Scotia, Canada, and from Sequim Bay in Washington, and represented by metadata in *Tethys*. An in-depth look into the website analytics provided better understanding of how MRE is growing in different regions around the world. Geographical trends over time showed correlations between countries producing documents for the knowledge base and users of the site. Through this analysis it was clear that the countries engaged in research into the environmental effects of MRE tend to use *Tethys* more than others, however many smaller and developing countries that have access to large bodies of water are also extensively viewing the site. MRE technologies show great potential for supplying electricity to these smaller countries, and resources such as *Tethys* serve to advance the industry while ensuring the protection of the environment.

Title: Parasite communities and diet of the Redspot Darter (*Etheostoma artesiae*) along a stream-size gradient.

Primary Author (and Presenter): Prestridge, Laura C.

Additional Authors: Bauer, Eric and Helms, Brian

Department: Department of Biological Sciences

College: College of Sciences and Mathematics

Description:

Freshwater fish-parasites of the southeastern United States are currently understudied. Furthermore, few studies focus on fish-parasite communities in stream networks. Thus, even basic relationships, such as the effects of stream-size on parasite communities (e.g. species richness and diversity), remain unknown. The River Continuum Concept (RCC) predicts species richness of aquatic communities increases with stream-size. However, the RCC has never been applied to fish-parasites. The RCC also predicts that macroinvertebrate community composition reflects differences in basal resources that change along the stream-size gradient and thus alters the composition of available prey for insectivorous fishes. We tested two hypotheses, 1) that there would be a positive relationship between parasite richness and stream-size, and 2) that host diet composition would differ among streams of different sizes. We surveyed the intestinal parasites and gut contents of 180 Redspot Darters (*Etheostoma artesiae*) collected from 6 streams in the William B. Bankhead National Forest of Alabama. We dissected the gastro-intestinal tract and identified parasites and diet items to genus. Thus far we have collected 15 individual parasites from 9 of 37 examined fish (24.3% prevalence) and 60 diet items, 73% of which were Ephemeropterans. We identified 5 parasite genera: 1) *Plagioporus* sp., 2) *Spinitectus* sp., 3) *Acanthocephalus* sp., 4) *Crepidostomum* sp., and 5) *Bothriocephalus* sp. We identified the following invertebrate genera from gut contents: 4 Ephemeropterans, 2 Plecopterans, 1 Trichopteran, 1 Dipteran, and 1 Trombidiformes. We also found one juvenile crayfish (*Orconectes validus*) and four developing fish eggs in the stomach contents. This diet diversity could indicate that Redspot Darters are opportunistic feeders. Identifying the feeding strategy and parasite abundance in different parts of the stream will allow us to predict other relationships between the Redspot Darter and its niche.

Title: Modifying food contact surfaces with N-Halamine for antimicrobial properties

Primary Author (and presenter): Qiao, Mingyu

Additional Authors: Ren, Tian; Huang, Tung-Shi

Department: Poultry Science

College/School: Agriculture

Description:

Foodborne pathogens can attach and form biofilms on food contact surfaces, which will cause cross-contamination during food processing. In this study, a simple, clean and efficient method was developed to modify a commonly used in food contact surface material, thermoplastic polyurethane (TPU), with N-halamine to have rechargeable antimicrobial function. A N-halamine polymer was prepared and incorporated into TPU structure via a solvent casting method. N-halamine modified TPU films were treated with diluted chlorine bleach to obtain antimicrobial function. Oxidative chlorine content in the modified TPU was determined by an iodometric/thiosulfate titration method and antimicrobial efficacies were evaluated against *Staphylococcus aureus* and *Escherichia coli* O157:H7 using a “sandwich” test method. Chlorine rechargeability and stability were also evaluated. The N-halamine modified TPU film (4%, weight/weight) resulted in a 6 log bacterial reduction (100% kill) within 2 hours of contact. The N-halamine modified TPU also displayed desirable rechargeability, which maintained sufficient antimicrobial activity after 20 cycles of the “discharge-recharge” process. The antimicrobial N-halamine functional groups were stable for supporting the application under food processing environment (fluorescent light and water). The N-halamine modified TPU with rechargeable antimicrobial function exhibited great potential as a low cost, safe, and effective food contact surface material for preventing microbial cross-contamination in food during processing.

Title: Gene editing of the gonadotropin releasing hormone gene to sterilize channel catfish, *Ictalurus punctatus*, using a modified transcription activator-like effector nuclease technology with electroporation

Primary Author (and presenter): Qin, Guyu

Additional Authors: Qin, Zhenkui; Yin, Yilin; and Ye, Zhi

Departments: Fisheries, Aquaculture and Aquatic Science

College/ School: Agriculture

Description:

In this research, we intended to build a gene edited sterile channel catfish by transcription activator-like effector nucleases (TALENs) technology, which was targeting mutagenesis on genomic level. TALENs plasmids were delivered targeting the catfish GnRH (cfGnRH) gene into fertilized eggs with double electroporation technique. CEL-I assay were applied to identify the mutation for different tissues of P1 and F1 fish which were generated from gene-edited parents. To recognize whether plasmids were integrated into the genome, polymerase chain reactions (PCR) targeting CMV promoter and TAL repeats regions of TALENs plasmids were performed with these DNA samples. Fish spawning experiments and enzyme-linked immunosorbent assay (ELISA) were utilized to detect the presence of GnRH and evaluate the reproductive capability of gene edited catfish. The results showed that targeted cfGnRH gene mutagenesis were found in 52.9% P1 fish and in 100% F1 fish. No exogenous DNA fragments were observed in the genome of gene-edited P1 fish. Based on the spawning and ELISA experiments, 80% of gene-edited females were not able to ovulate. 50% of gene-edited males were not able to inseminate, meanwhile 25% of gene-edited males were able to inseminate however with very low hatching rate. All the gene-edited fish which were not able to ovulate or inseminate expressed relatively lower level of GnRH, estradiol and testosterone hormone. Embryo hatching rate and survival rate were not significantly different with control group, which indicated comparatively lower off-target effects should be existed using TLANEs technique. In general, potentially sterilized channel catfish were established without cell toxicity. Productive evaluation and hormone therapy will need to be conducted and developed in the next future. Sterilizing channel catfish technology could ultimately confine reproduction for gene engineered, toxic and invasive animals to maintain the balance of genotypes in natural environment.

Title: Oxidation of cysteine sulfinic acid by bis(1,4,7-triazacyclononane)Ni(III)

Primary Author (and presenter): Rajakaruna, Pradeepa, I.

Additional Authors: Stanbury, David

Department: Chemistry and Biochemistry

College/School: College of Sciences and Mathematics

Description:

Oxidation of cysteine sulfinic acid is a major step in cysteine sulfinic acid pathway which converts cysteine to taurine. With the ultimate goal of constructing a mechanism for the oxidation of sulfinic acids using one-electron oxidants, in this study oxidation of cysteine sulfinic acid by the one-electron oxidant Ni(tacn)₂(ClO₄)₃ is examined. Reaction kinetics are observed at 25 °C, μ = 0.1 M (NaCl), under anaerobic as well as aerobic conditions. In addition, the effect O₂ on the reaction rate is determined by bubbling O₂ into the reaction solutions. The reaction is slower under aerobic conditions and in the presence of O₂ compared to at anaerobic conditions. Kinetic data are collected on a UV-VIS spectrophotometer and stopped flow equipped with UV spectrophotometer by monitoring the decay of absorbance at 312 nm. The reaction displays pseudo- first-order kinetics when [CSA] >>> [Ni(III)] and the reaction rate depends on pH. The reaction was carried out at different pH media ranging from pH 1 to pH 6. The major reaction product cysteine sulfonic acid can be identified by ¹H-NMR. The major Ni containing product is Ni(tacn)₂(ClO₄)₂. The reaction rate depends on O₂ possibly due to a reaction between cysteine sulfonyl radicals formed during oxidation and O₂, forming cysteine sulfonyl peroxy radical. The stoichiometry of

the reaction between cysteine sulfinic acid and $\text{Ni}(\text{tacn})_2(\text{ClO}_4)_3$ is 1:1, suggesting formation of cysteine disulfone. The rate of oxidation is significantly inhibited by the presence of $\text{Ni}(\text{tacn})_2(\text{ClO}_4)_2$.

Title: Biglobal instability of compressible Taylor-Culick Solution in solid rocket motors

Primary Author (and presenter): Ramesh Kumar, Tharikaa

Additional Authors: Majdalani, Joseph

Department: Aerospace Engineering

College/School: Samuel Ginn College of Engineering

Description:

Combustion Instability can be considered as erratic oscillatory motions related closely as classical acoustic motions with perturbations, which adversely affect the combustion in a rocket motor. An effective use of the classical theory of acoustics and perturbation theory is employed to develop concrete representations of actual motions in motors. In light of chamber dynamics, the combustion processes and nonlinear gas-dynamic effects result in the existence of more than one acoustic mode. This presentation is aimed at developing a simple, effective and accurate one-shot strategy in predicting the various modes associated with the chamber. In this work, a compressible biglobal stability approach is adopted to investigate and simultaneously predict the hydrodynamic and vorticoacoustic responses of unsteady waves in right-cylindrical porous chambers with radial wall injection by retaining the compressibility in the governing equations. Due to the wave equation being fully embedded within the compressible Navier-Stokes equations, in the absence of a mean flow field, we recover traditional “organ-pipe” acoustic frequencies. In order to simulate the flowfield in solid rocket motors, the closed-form analytical expression of the compressible Taylor-Culick profile is substituted for the base flow. This approach can also pinpoint the flow induced longitudinal, radial, and mixed modal frequencies. It is observed that increasing the mean flow Mach number leads to a slight reduction in the vorticoacoustic frequencies relative to their pure acoustic modes in a quiescent, impermeable chamber. Similar results are achieved while increasing the Reynolds number and chamber length, thus affirming the origin of frequency shifts observed in actual motor firings and the eigensolutions obtained resemble those predicted analytically. The approach adopted by this work may be viewed as a milestone in advancing our modeling capabilities at the forefront of the combustion instability analysis.

Title: High prevalence of *Anaplasma platys* infection in Alabama white-tailed deer

Primary Author (and presenter): Rankins, Seth T.

Additional Authors: Zohdy, Sarah; Stephen Ditchkoff; Bernhard Kaltenboeck; Dongya Gao

Department: None

College/School: School of Forestry and Wildlife Sciences & College of Veterinary Medicine

Description:

Anaplasmosis is a tick-borne disease caused by the gram negative bacterium *Anaplasma* spp. These bacterial parasites of red blood cells can infect a wide range of hosts including both wild and domestic ruminants, humans, and companion animals. If treated with appropriate antibiotics in a timely manner, anaplasmosis is not of particular concern. However, due to unspecific symptoms it often remains untreated and can be a source of livestock morbidity. We used an *Anaplasma* spp. 16S rRNA gene FRET-qPCR to screen 28 whole blood samples collected from white-tailed deer (*Odocoileus virginianus*) captured as part of ongoing studies at the Auburn University captive facility, located in Camp Hill, Alabama. Twenty-three of the 28 samples collected were positive for *Anaplasma platys*, as indicated by high-resolution melting curve analysis and confirmed by DNA sequencing of 6 amplification products. A chi-squared test indicated that there was not a significant difference between percent young (≤ 2.5 years)

and old deer (≥ 3.5 years) that were infected ($P = 0.89$). Additionally, logistic regression showed that the number of ticks on the sternum, anus, ears, and eyes of sampled deer did not significantly influence the likelihood of an individual being infected ($P = 0.87$). While we did not find any ecological factors that significantly impact which individual deer are infected with *Anaplasma* spp., the prevalence of *A. platys* in this herd of white-tailed deer is of interest. This particular species of *Anaplasma* is typically found in canines, and not deer. Like much of rural Alabama, the area around the captive facility is frequented by hunting dogs, which might be the source of the infections. If *A. platys* is able to proliferate in deer without unduly changing their health, this could become a major health concern in rural areas across the South, and therefore it is important for us to learn more about interactions between deer and *A. platys*.

Title: Assessment of the potential of açai-anticancer drug interactions through CYP3A4 inhibition

Primary Author (and presenter): Rants'o, Thankhoe, A.

Additional Authors: McLendon, Lane; Jung, Da and Calderón, Angela, I.

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Euterpe oleracea (açai) is a tropical palm tree originally from Amazon. Açai has gained popularity among patients in chemotherapy due to its reported *in vitro* antioxidant and cytotoxic activities. However, potential açai-anticancer drug metabolic interaction has not been explored. CYP3A4 is the most abundant and main metabolic enzyme involved in biotransformation of medicines including chemotherapeutic agents. The aim of this research was to assess açai extracts for potential botanical-drug interaction through CYP3A4 inhibition. This study used LC-MS-based assays to assess transcellular passive absorption using parallel artificial membrane permeability assay (PAMPA), Phase I and Phase II metabolism and CYP3A4 inhibition for methanol and acidic-methanol açai constituents and their standards, using human liver microsomes. Utilizing PAMPA effective permeability calculation, a phenolic constituent, catechol, in methanol açai extract and 6 non-anthocyanin polyphenols in acidic-methanol açai extract were passively diffused. Permeable constituents of both methanol and acidic-methanol açai extracts displayed moderate CYP3A4 inhibition (50% and 58% respectively) while their Phase I metabolites showed weak CYP3A4 inhibition (<50%) indicating sufficient detoxification. Testing selected bioavailable standard compounds confirmed catechol as the moderate CYP3A4 inhibitor in methanol açai extract. Additionally, Phase II metabolites from acidic-methanol açai extract generated by using cofactors UDPGA and UDPGA+NADPH displayed weak CYP3A4 inhibition. For methanol açai extract, UDPGA Phase II metabolites displayed weak inhibition while UDPGA+NADPH Phase II metabolites showed moderate inhibition (53%) suggesting that an inhibiting metabolite underwent Phase I oxidation followed by Phase II glucuronidation. This study reports for the first time, CYP3A4 moderate inhibition by açai extracts and potential botanical-drug interactions in concomitant use with chemotherapeutic medicines.

Title: Country of origin and fair trade message: The impact of hangtag information on brand evaluation

Primary Author (and presenter): Rashid, MdSanuwar

Additional Authors: Byun, Sang-Eun, PhD

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

Through two studies, our purpose was to understand (i) how a product's unfavorable country of origin effect is counterbalanced by the fair trade message in its hangtag and (ii) the extended price difference acceptability threshold for the fair trade products. Previous studies found that consumers tend to have less

favorable attitudes toward products made in a developing country than products made in a developed country. The pretest result confirms two countries, which are India and Cambodia, the least and most unfavourable countries respectively, out of ten developing countries that are the top exporters of Apparel and textile to the US. Online experimental results of 156 consumers confirm that a brand's communication of a fair trade message on its hangtag can offset consumers' lower favorability for a product made in a developing country and that consumers will perceive a brand with this message as favorably as a brand that makes its products in the U.S. However, a brand may be led to stop exploiting cheap workforces and environmental resources to adopt fair trade, and these changes eventually drive up the product prices that consumers pay. Therefore, there is a need to understand how much of a price premium consumers are willing to pay for a fair-trade product made in a developing country. Though pretest, we select the base price of a backpack. Online experimental result of 215 consumers confirms that consumers' brand attitude and brand trust can be higher if the product carries a fair trade messages, even as the price increases to 45%. However, consumers are less willing to buy the product with a fair trade message when the price is 15% higher than the base price of the product with no fair trade message. This research provide implications for marketing managers on the optimal combination of the pricing and sourcing strategies to maximize their profit while alleviating consumers' concern about brands' exploitation of resources of developing countries.

Title: Liposomes and gold nanoparticles: investigating and quantifying targeted drug delivery

Primary Author (and presenter): Ray, Gannon, J

Additional Authors:

Department: Department of Drug Discovery & Development

College/School: Harrison School of Pharmacy

Description:

When administering therapeutic drugs, an important consideration is drug delivery. This is especially significant for chemotherapeutics like doxorubicin as it is important to avoid undesired side-effects while achieving better therapeutic efficacy. One method to improve drug delivery is to encapsulate doxorubicin in liposomes. A liposome is a spherical vesicle with a lipid bilayer. In the past, the encapsulation of chemotherapeutics in liposomes has been studied. Moving forward, the goal will be to better control the drug release profile. Chemotherapeutics like paclitaxel cannot be stably entrapped. As a result, the ability to control the rate and extent of release is limited. By conjugating gold nanoparticles to chemotherapeutic drugs to form a composite particle, the chemistry involved will be better controlled. Once this is accomplished, it will be possible to modulate the release of these drugs.

Title: Analysis of Cx43 gap junctional coupling and ATRA signalling and their relationship to embryo development in *Bos Taurus*

Primary Author: Read, Casey C

Additional Authors: Wilhelm, Gabby, A. and Dyce, Paul, W.

Department: Animal Sciences

College/ School: College of Agriculture

Description:

In developing follicles, cellular coupling within cumulus-oocyte-complexes (COCs) creates a functional syncytium allowing the passage of molecular messages. Cellular coupling between granulosa cells results from the expression of connexin 43 (Cx43) and the formation of gap junctional plaques (GJP). While the relationship between Cx43-based cellular coupling, follicular development, and oocyte health has been well studied, the role Cx43 plays at the antral stage during oocyte acquisition of competence remains to be elucidated. Recently, studies have shown that retinoic acid

treatment leads to increased Cx43 expression in many cell types. We investigated the role of Cx43-based coupling in cumulus cells (CC), as it relates to in vitro embryo production, and the ability of all-trans retinoic acid (ATRA) to alter CC Cx43 expression and embryo outcomes. Using a single follicle *in vitro* fertilization and embryo development assay, the protein expression of Cx43 was found to be significantly higher in the CCs of COCs that reach the morula stage compared to those that stall at the 2 cell stage, $2.29 \pm 0.78^*$ fold difference. No difference was seen in mRNA expression. Of the total plaques present in the CCs from COCs that reach the morula stage, a higher percentage were large when compared to two cell stall COCs, $52.98 \pm 0.09\%$ vs $27.67 \pm 0.03\%^*$ large plaques/total plaques. Treatment of COCs with ATRA ($10\mu\text{M}$) resulted in an increased number of Cx43 GJPs when compared to the vehicle only control, 2.30 ± 0.15 vs $1.33 \pm 0.12^*$ plaques/cell. Moreover, the addition of ATRA ($10\mu\text{M}$) increased oocyte maturation ($78.97 \pm 0.52\%$ to $86.89 \pm 1.74\%^*$), cleavage ($66.67 \pm 6.12\%$ to $80.27 \pm 4.12\%^*$), and blastocysts ($19.00 \pm 5.56\%$ to $27.33 \pm 4.51\%^*$). Our lab continues to investigate the mechanism behind ATRA's effects on Cx43 expression. A long-term goal of this project is to increase our understanding of the role cellular coupling plays during fertilization in order to improve bovine embryo development. $*p < 0.05$

Title: Examining a motor learning paradigm: To teach or not to teach

Primary Author (and presenter): Rhoads, Jence, A.

Additional Authors: Daou, Marcos; Dyke, Ford; Lohse, Keith; Miller, Matthew

Department: Kinesiology

College/School: Education

Description:

Prior research has suggested the expectation of teaching augments motor learning. Further, the expectation of teaching and actually teaching, by way of video explanation, has been shown to enhance learning of academic information. However, this paradigm has yet to be examined in the motor learning realm. Based on the extant literature, the expectation of teaching and actually teaching should be advantageous for learning a motor skill. Thus, the present study investigated whether preparing to teach and actually teaching enhances motor learning. On Day 1, 84 participants completed a pretest of the task (golf putting) to determine baseline skill level, and then were assigned to 1 of 4 groups. Two groups studied and practiced the task with the *expectation of teaching* the skill via video demonstration, while the remaining two groups studied and practiced without this expectation. Following skill acquisition, half of the participants who expected to teach performed a 2-min video demonstration of golf putting, which was recorded by the experimenter (prepared/teach group). The other participants who expected to teach simply practiced for an additional 2-min (prepared/no teach group). Similarly, half of the participants who did not expect to teach performed a 2-min video demonstration (unprepared/teach group), while the other half engaged in additional practice (unprepared/no teach group). Participants completed a posttest on Day 2. To evaluate motor learning, posttest radial and bivariate variable error were assessed, controlling for these variables at pretest. Results did not reveal an effect of expecting to teach, teaching, or an interaction between these variables. Thus, results failed to support the current hypothesis. However, participants may need to experience direct social interaction (i.e., actually teach another participant) in order to receive a significant learning advantage. Further research warrants the investigation of this social interaction hypothesis.

Title: Associations between perceived racial discrimination and objectively measured sleep characteristics among college students

Primary Author (and presenter): Richardson, Kourtney, T; Starks, Victoria, B

Additional Authors: Curtis, David; Fuller-Rowell, Thomas

Department: Department of Human Development and Family Studies

College/School: College of Human Sciences

Description:

Racial disparities in sleep between black and white adults are substantial. However, very few studies have considered disparities in sleep between Black and White college students. Furthermore, the role of perceived racial discrimination as a predictor of objectively measured sleep among college students has not been examined. Addressing these gaps, our research examines whether three objectively assessed sleep characteristics (total sleep time during weekdays, sleep efficiency [% of time in bed asleep], and variability in total sleep time) vary between Black and White college students, and whether perceived discrimination is associated with sleep indicators. Data were derived from a sample of 30 Auburn University Freshmen (aged 18-19 yrs.; 56.7 male; 73.3% Black; 26.7% White). Sleep characteristics were assessed using actigraphy, a watch-like activity monitor, for a period of 7 nights, and perceived racial discrimination was measured using the Racism and Life Experiences Scale (RaLES). Black students reported greater perceived discrimination ($p = .001$) than Whites. Black students also obtained an average of 342 minutes of sleep on weekdays whereas white students received 378 minutes, a difference of .56 SD units ($p = .32$). No racial differences in sleep efficiency and sleep time variability were found. Racial discrimination was significantly associated with total sleep time during weekday, sleep efficiency, and variability in total sleep time, accounting for between 11.1-17.5% of the variance in each. Although these findings are limited by the small sample size, they provide preliminary evidence for the importance of considering perceived racial discrimination as a risk factor for sleep problems. Given the high prevalence of discrimination experienced by Black students, associated sleep problems could have wide ranging influences on academic functioning, mental health, and physiologic dysregulation.

Title: The dark side of ethical decision making

Primary Author (and presenter): Ritterbush, Elizabeth, A.

Additional Authors: Smith, Adam; Franco-Watkins, Ana; and Svyantek, Daniel

Department: Psychology

College/School: Liberal Arts

Description:

The most prominent model used for the assessment and discussion of personality has been the Big Five model of personality. However, some researchers have noted flaws in basing decisions primarily on this model, particularly as it relates to the assessment of ethicality/integrity. By contrast, the HEXACO seems to account for these associations where previous models have not. This model includes traits corresponding to each of the Big Five facets with the addition of Honesty-Humility, which has been found to be positively correlated with ethical decision making, filling a gap in the literature not previously filled by the Big Five theory. We posit that the Honesty-Humility factor is important since it has been theorized previously that Dark Triad traits (e.g., Narcissism, Machiavellianism, and Psychopathy) represent the negative end of the Honesty-Humility scale. Despite the interconnectedness of Honesty-Humility, the Dark Triad, and ethical decision making, research has yet to consider all of these traits in unison. Therefore, the purpose of this research was to expand upon previous work by offering a more comprehensive view of personality as a predictor of ethical decisions. Hierarchical linear regression analysis revealed different types of prediction patterns for different decision contexts. Honesty-Humility positively predicted ethical behavior where individuals will forgo personal gain for the sake of others. Conscientiousness and Machiavellianism appeared to be the greatest predictors of ethical decision making in most contexts, while Narcissism was not found to be predictive of ethical decision making in any contexts. Differential effects indicated potential domain specificity within the ethical decision making construct when predicting ethical behavior in social versus organizational contexts. These findings indicate that personality and context interact when predicting behavior, which holds practical implications for hiring and selection in organizations.

Title: Anti-carcinogenic and complementary effects of *Viscum album* in canine glioblastoma cell lines

Primary Author (and presenter): Robinson, Anna C.

Additional Authors: Koehler, Jey

Department: Department of Pathobiology

College/School: Auburn University College of Veterinary Medicine

Description:

Complementary therapies alongside traditional means of cancer treatment, such as surgery, radiation, and chemotherapy, have recently been of interest in the medical realm; one potential form of complementary therapy is the use of mistletoe extract, which has proven to help enhance the quality of life of cancer patients as well as provide apoptotic-inducing properties that could potentially augment the potency of treatments. Few studies have examined the effects of mistletoe in oncology, and none have challenged its potency as complementary medicine in brain cancer. Its high affinity for brain tissue and supra-additive effects alongside chemotherapy make mistletoe extract a promising candidate for examining the effects of a combination with the drug mebendazole, which has recently been used to combat canine brain cancer *in-vitro*. The combinational force of both mistletoe and the drug is expected to increase the potency of treatment by decreasing cell viability and proliferation. If this hypothesis proves to be accurate, it will greatly benefit the treatment of glioblastomas because these are solid tumors in hypoxic environments, meaning they display increased resistance to chemotherapies, so the supra-additive effects of this combination could increase potency in such an environment, requiring lower doses of drugs to accomplish the same goal. In this experiment, the canine glioblastoma cell line SDT-3G was tested for cell viability and proliferation via MTT assays after exposure to treatment for 72 hours. After concluding that mistletoe by itself has anti-carcinogenic properties, it will be combined with mebendazole and be compared to cells treated with mebendazole alone as well as cells receiving no treatment. Results showing a lower IC50 than mistletoe or mebendazole alone will indicate a supra-additive effect of the duo, making it a good candidate to continue being studied in clinical trials.

Title: Medication adherence in patients with bipolar disorder

Primary Author (and presenter): Robinson, Cynthia

Additional Author: Gibson-Young, Linda

College/School: School of Nursing

Description:

There is substantial evidence that Bipolar Disorder (BD) is a global challenge. Medication non adherence contributes to poorer outcomes, including hospital admissions, suicide and mortality. Evidenced based practice guidelines recommend that along with medication teaching, an additional counseling strategy is needed to aid in the increase of medication adherence. The purpose of this EBP Project is to determine if Cognitive Behavioral Therapy (CBT) will increase medication adherence. Target population includes BD adults age 19 or older who are non-complaint with medications in an outpatient setting. After consent is obtained, participants complete the mood disorder questionnaire (MDQ), the medication questionnaire and the demographic survey. The psychiatrist will review the results of the pre CBT, MDQ and medication adherence rates and CBT will be conducted within 7 days. A booster call phone will then be done after 7-10 days to examine problems or concerns. In 4 weeks, a phone interview will be conducted to evaluate the change in medication compliance and bipolar symptoms. Once all the data is collected, the pre and post medication adherence rates and results of the MDQ will be compared using SPSS. X consented to participate (%females and % males), average age of X (sd) years. X% were identified with bipolar symptoms and X% were X (sd) medication compliant. 100% received CBT. Follow-up indicated

an increase in X% of medication adherence and a decrease in X% bipolar symptoms. Among the baseline bipolar symptoms, the MDQ score improved from pre CBT (mean, sd) to post CBT (mean, sd) significantly ($p=X$). Medication adherence can be increased by implementing the counseling strategy CBT. Early preventative measures like CBT are pertinent and achievable. In this psychiatric outpatient clinic setting, further implementation of the project is warranted.

Title: Mental health integration through accountable care organizations

Primary Author (and presenter): Roby, Cassidy L.

Additional Authors: McEldowney, Rene

Department: Health Services Administration

College/School: Auburn University

Description:

Mental health treatment continues to be the “elephant in the room.” Lack of mental health treatment could be more adequately integrated, yet is often superseded by other healthcare issues. The prevalence of mental health disorders and lack of access to facilities are indicators of need for mental health services. Accountable Care Organizations aim to increase coordination between physicians in order to improve quality and increase savings. In this article, we examine the current integration of mental health services in hospital-led Accountable Care Organizations (ACOs) using the American Hospital Association (AHA) 2014 database. The analysis of the data will show the current levels of integration in hospital ACOs and may give insight as to the quality of services that mental health patients receive. This study serves as a reference point to track the progress of mental health in a rapidly changing healthcare system.

Title: The purpose-driven environment: a new perspective on aging in america

Primary Author (and presenter): Rohrer, Lindsay, N

Additional Authors: Vawter, Anna; McCallum, Caitlin; Turner, Caroline

Department: Interior Design

College/School: College of Human Sciences

Description:

Based on current literature and case studies related to impacting the quality of life for senior care and its affiliates, it is clear that both current medicinal treatment and common senior care facilities do not contribute to progressive treatment of cognitive disorders. In fact, these facilities are sometimes even detrimental to the patient’s morale. The goal of the current project is to explore the ability of the built environment to decrease cognitive decline and increase individual purpose in the aging population, thus improving quality of life for those with memory impairments. The researchers seek to support this relationship through a methodology that focuses on creating a holistic community for memory care residents and encourages interests-based responsibilities. In place of boredom, spontaneity will be offered. In place of loneliness, companionship will be encouraged. In place of helplessness, a chance to take care of another being will be given. The researches anticipate the results to demonstrate a decrease in cognitive decline and a heightened holistic standard of care, which will increase quality, and longevity of life. This evidence based design project has the potential to offer new perspective and greater independence, where dignity is currently deprived. This innovative lifestyle change offers hope to a population that, until now, has been given a death sentence. As stated in Gwande’s *Being Mortal* (2014): “You’d think people would have rebelled. You’d think we would have burned the nursing homes to the ground. We haven’t, though, because we find it hard to believe that anything better is possible for when we are so weakened and frail that managing without help is no longer feasible. We haven’t had the imagination for it.” (p. 79)

Title: Wearable technology design development strategies

Primary Author (and presenter): Rolling, Virginia, E.

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

This creative scholarship explored design development strategies for a multi-sensory wearable technology gown. The objectives of this creative scholarship included overcoming the challenges of merging technology (e.g., wearing a portable computer and audio speakers) with a couture garment by developing design strategies for the protection, concealment, and powering of wearable technology. This gown utilized water-resistant 100% PVC clear and white vinyl material to protect non-waterproof computer technology attached to hydrophilic formal wear fabrics such as 100% felting white silk, 100% polyester white satin, and 100% polyester white chiffon. Vinyl, a non-traditional material for formalwear, was used in strategic silhouette areas (e.g., belt, neckline, and pockets) to protectively cover 90 soldered LED lights connected to a Raspberry Pi computer and audio speakers. For concealment, exposed soldered LED wires were wrapped and needle felted with 100% silk felt. Cords running from LED lights to Raspberry Pi computer were wrapped with a white feather boa. The audio speakers, Raspberry Pi computer, and portable USB batteries were securely placed in vinyl detachable interior pockets to protect from water damage for audio-visual functionality as well as easy removal for laundering. Furthermore, a hoop skirt provided the silhouette of a couture gown while concealing electronics. Portable rechargeable USB batteries were used to power the electronics of the wearable technology gown while allowing for mobility. This creative scholarship supports wearable technology design development strategies that incorporate non-traditional materials, detachable interior pockets, and the use of portable rechargeable USB devices.

Title: Millennials' impression of luxury goods manufactured using recycled materials

Primary Author (and presenter): Rolling, Virginia, E.

Additional Authors: Sadachar, Amrut

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

The purpose of this study was to examine how luxury brand descriptions influence millennials' impression of luxury, impression of sustainability, attitude towards brand, and purchase intention using Impression Formation Theory. A between-subjects experimental design was used to test the research model wherein two randomly assigned groups received an online survey with either a luxury only or a sustainable luxury brand description. Amazon Mechanical Turk panel was used for collecting the data. The United States national sample ($n = 355$) consisted of male (49%) and female (51%) millennials with an average age of 28. Findings suggested that the impression of luxury did not change for a sustainable luxury brand describing the use of recycled materials compared to a luxury only brand without the description of recycled materials present. Therefore, millennials perceived the luxury only and sustainable luxury brands to provide an impression of luxury, which was the sole impression to significantly predict attitude towards the brand. In addition, the results indicated that attitude positively influenced purchase intention for both brand descriptions. This study provides support for luxury brands

to transition towards sustainable efforts of using recycled materials in their goods since the impression of luxury is preserved and provide marketing communication that favors sustainable brand positioning.

Title: What does your smartphone case color say about you?

Primary Author (and presenter): Rolling, Virginia, E.

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

The purpose of this research was to forecast trends for smartphone accessory case colors and investigate possible social psychological meanings associated with selected trending smartphone colors. To achieve a 2017 spring forecast, observational data was collected from a sample size of 559 men and women carrying smartphones at a southwestern university in the fall of 2016. The results indicated that black and blue were the most frequently observed smartphone case colors, whereas yellow was the least frequently observed color. By applying a combined framework consisting of Trickle Down Theory and Optimal Distinctiveness Theory to these results, it was determined that black and blue smartphone colors have trickled down to the masses, which may be due to individuals with these smartphone colors seeking inclusion with others in their university community. However, the scarcity of yellow smartphone case colors suggests that individuals with these smartphone case colors may seek distinction from others. It was concluded that the saturation of black and blue smartphone accessory cases will continue to achieve mass acceptance within the market in spring of 2017 while yellow, platinum, and gold smartphone accessory cases may gradually be purchased by innovative early adopters of new technological devices.

Title: Assessing subtractive and additive jewelry manufacturing

Primary Author (and presenter): Rolling, Virginia, E.

Department: Consumer and Design Sciences

College/School: Human Sciences

Description:

The purpose of this creative scholarship was to research the differences in jewelry production between traditional Subtractive Manufacturing (SM) compared to Additive Manufacturing (AM). The research objective was to address the differences in SM and AM production processing as well as post-production processing. The *Thimble* finger ring was constructed using traditional SM processes with the use of hammers, soldering tools, dapping punches, and mandrels for physical handwork. However, the conversion of the SM *Thimble* into the similarly designed AM *Perforations* finger ring entailed less production time, fewer tools, and little physical handwork due to computer labor involved. The perforation marks created for the SM finger ring required steady, careful, and consistent hammering with evenly applied force, whereas the AM finger ring required knowledge of shape placement in a rotatable x , y , and z coordinate plane in the computer-aided program, Tinkercad. The post-production processing for the SM finger ring required both sanding and polishing, whereas the AM finger ring demonstrated the ease of no post-production work. Furthermore, the AM finger ring entitled *Perforations* was easily transformed into a larger scale bracelet, entitled *Spiral*, due to the ease of working with AM processes within the computer. This creative scholarship finger ring entitled *Perforations* gives further support for the ease of which AM can be used in the field of jewelry design for both production and post-production purposes.

Title: A cross-cultural perspective on additive manufacturing

Primary Author (and presenter): Rolling, Virginia, E.
Department: Consumer and Design Sciences
College/School: Human Sciences

Description:

The purpose of this study was to examine wearable accessory designers' perceptions using Additive Manufacturing (AM) technology cross-culturally. Sixteen semi-structured interviews were conducted with AM wearable accessory designers from Australia, Asia, Europe, and North America. Findings suggest that AM was easier than traditional handcraft. Plastics were the easiest material to print, whereas steel and ceramic were difficult to print. The most efficient Computer-Aided Design (CAD) program was Rhino 3D while Blender was the most inefficient. In terms of learning, software was easy, dimensions and material tolerances were difficult, and computer design conceptualization was moderate. Easiest jewelry designs to create were rings, and the most difficult were necklaces. Entering the AM field was not difficult for designers, and the majority felt that AM will become mainstream. Designers expressed a need for printer quality to improve. This study provides support for AM educational programs, preference for certain software and materials for learning ease, needed education resources on material tolerances and dimensions, and the creation of affordable higher quality printers.

Title: Effects of micro pellets during the starter period on performance and carcass characteristics of broilers

Authors: ¹Rubio, Andrea; ²Lezcano, Endhier; ¹Pinto, Allan; and Pacheco, Wilmer.

Department: ¹Department of Poultry Science, Auburn University, Auburn, AL 36830 ²Panamerican College/School: Agriculture University, Zamorano, Francisco Morazán, Honduras.

Description:

The improvement in genetic selection has allowed modern broiler strains to achieve the target weight in a shorter period. The objective of this study was to evaluate the effects of feed form during the starter period on live performance and processing yields of broilers. One thousand 1-d old male Ross x Ross 708 broiler chicks were randomly placed in 40 floor pens (25 birds per pen; 0.12 m²/bird). The birds were raised on used litter that was top-dressed with new wood-shavings at the start of the study. Broilers received 5 dietary treatments (8 replicate pens per treatment) that consisted of a combination of 3 dietary feed forms provided over the starter period (1 to 14 d): mash, crumbles, and/or 3.3 mm micro pellets. The 5 treatment combinations were as follows: 1) mash from 1 to 14 d, 2) crumbles from 1 to 14 d, 3) micro pellets 1 to 4 d and then crumbles to 14 d, 4) micro pellets 1 to 7 d and then crumbles to 14 d, and 5) micro pellets from 1 to 14 d. Common grower and finisher diets were offered in a 4.4 mm pelleted form from 15 to 35 d of age. Feed consumption and BW were determined at 14, 25, and 35 d of age. At 36 d, 10 birds/pen were processed for the determination of carcass weight. At 37 d, chilled carcasses were deboned to determine total breast meat weight. Birds fed mash diets during the starter period had the lowest BW ($P<0.01$) and feed consumption ($P<0.01$) at 14, 25, and 35 d of age compared to the birds that received either crumbles and/or micro pellets. Moreover, birds fed mash diets during the starter period had the poorest FCR ($P<0.01$) at 14, and 25 d of age compared to the birds that received either crumbles and/or micro pellets during the starter period. Birds fed micro pellets from 1 to 7 and 1 to 14 d had higher breast meat weight (519 vs. 488 g, $P<0.01$) compared with the birds fed mash diets during the starter period. The results of this experiment indicated that feed form during starter period has an impact on bird subsequent performance.

Title: Effect of guar on removal and treatment of catfish waste

Primary Author (and presenter): Rubisch, Mary C.

Additional Authors: Blersch, David; Wells, Daniel; Landers, Erin; and Shanmugam, Saravanan

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

With the rise of new aquaculture production techniques such as raceway systems comes a new set of accompanying challenges that must be confronted. One such challenge is the removal and disposal of higher density waste streams. While still diluted enough to make collection a challenge, a failure to deal with the increased waste effluent would result in a degradation of water quality and could ultimately put surrounding waterways at risk of eutrophication. In order to address this, this project sought to examine the feasibility of installing a waste collection and treatment system connected to the end of a set of eight catfish raceways. This system would collect waste weekly; then treat it by allowing solids to settle out and pass through an anaerobic digester in order to remove organics. In addition, the methane produced as a result of anaerobic digestion could be harnessed and used as an energy source. In order to enhance the removal process, guar, a popular thickening agent, was used as an additive to the fish feed. Record was kept of incoming fish feed and outgoing waste collected to determine how efficient collection of waste was and whether or not guar improved collection efficiency. Furthermore, a biomethane potential (BMP) test was ran on weekly waste samples collected over a thirteen week trial period in order to predict methane gas generation and examine whether guar had an effect on gas generation as well. In order to provide a control for these experiments, guar was only added to the fish feed on alternating weeks. Findings demonstrated a collection efficiency of less than one percent, with no apparent correlation between the presence of guar and pounds of solid waste collected. BMP tests revealed a peak average methane production of around 90 mL/g TS, although peak production values ranged anywhere from 37-215 mL/g TS. Although there is a high degree of fluctuation, it appears that the addition of guar may decrease the volume of methane gas generated.

Title: Selective reflection of light from photonic cellulose nanocrystal coatings

Primary Author (and presenter): Saha, Partha

Additional Authors: Davis, Virginia A.

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Cellulose nanocrystals (CNC) with sulfate ester groups on the surface undergo chiral nematic liquid crystalline ordering in water. Retention of microstructure in dried CNC coatings and films resulting in intriguing optical property called Bragg reflection; the film microstructure can result in the selective reflection of a specific wavelength of circularly polarized light. However, nonuniformities in the initial dispersion and microstructural changes during film casting and drying make it difficult to achieve uniform optical reflection over more than a few microns. This has limited the potential use of CNC, and other cholesteric nanomaterial dispersions, for optical filters, selective reflectors, mirrorless lasing etc. In this research, investigation of CNC drying kinetics and surface anchoring enabled uniform planar orientation of the CNC helix in coatings on a lateral scale of few hundred micrometres compared to a few tens of micrometres for conventional air-dried CNC films. This uniform planar orientation, and the associated selective reflection, was confirmed by microspectrophotometry, polarized light and scanning electron microscopy. In addition to providing a foundation for the development of CNC based optical materials, this study also provides a new scientific insight into the helix defects reported in natural chiral nematic photonic structures such as *lomaptera* beetles and *pollia* fruits.

Title: Evaluation of the cancer-specific functionality of canine promoters to expand expression-targeted gene therapy in canine tumors

Primary Author (and presenter): Sajib, Abdul Mohin

Additional Authors: Sandey, Maninder; Morici, Samantha; and Smith, Bruce, F.

Department: Pathobiology

College/School: Veterinary Medicine

Description:

The feasibility of the routine use of cancer gene therapy in clinics has been restricted as the therapeutic gene may generate an off-target effect resulting in normal cell toxicity. Thus, it is important to explore mechanisms to achieve targeted delivery of therapeutic genes to cancer cells and to spare the healthy cells. Several studies have shown that transcriptional targeting accounts for a successful strategy to promote targeted expression of the therapeutic gene in various cancers. Some unique characteristics such as inter-individual and intratumoral heterogeneity and genomic sequence instability similar to that found in human tumors validate the dog as an outstanding animal model of human cancer. Several studies have shown high levels of tumor-specific expression of the human telomerase reverse transcriptase (hTERT), survivin, chemokine receptor 4 (CXCR4) and progression elevated gene 3 (PEG3) promoters in a variety of human cancers and murine models, none of them have been investigated for their activity in canine models. Our goal was to investigate the activity of these promoters in variety of canine tumors. To accomplish this goal, we measured the expression level of these promoters in various canine tumor cells/tissues. Results showed negligible expression differences between canine normal and tumor cells for the PEG3 and TERT promoters. However, canine Survivin (cSurvivin) and canine CXCR4 (cCXCR4) showed markedly higher expression in various canine tumor cells when compared with most normal cells and tissues. To further validate these findings, we cloned the sequences of these promoters into GFP reporter constructs to evaluate their activity in canine tumors using a series of cellular transfections and infections experiments followed by measuring of GFP expression through flow cytometry normalized to CMV-GFP expression. Results were congruent with RT-qPCR data providing high levels of canine tumor-specific expression for cSurvivin and cCXCR4.

Title: Biomass derived nitrogen-doped hierarchical porous activated carbons for lithium-sulfur battery

Primary Author (and presenter): Sajib, Sourov Kar

Additional Authors: Adhikari, Sushil and Radich, James

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Lithium-Sulfur battery exhibits significantly higher theoretical specific capacity and energy density than Li-ion batteries, up to 1675 mA h/g and 2567Wh/kg respectively. But the commercialization of Li-S battery is hindered due to several reasons such as the insulating nature of sulfur, polysulfide dissolution, low coulombic efficiency and short cycle life. To meet the challenges, biomass derived micro and mesopore-rich carbon is prepared in this work to encapsulate sulfur and to prepare carbon-sulfur nanocomposite cathode by mixing and heat treating with elemental sulfur. The biomass carbon is prepared by pyrolysis of canola meal following by KOH activation. Canola meal is a nitrogen-rich by-product of oil crushing industry, whereas KOH activation creates a microporous-rich structure, enhances surface area and increases electronic conductivity. High nitrogen content in biomass acts as natural doping and can help to enhance cycle stability when used as cathodes. The electrochemical performance is analyzed through cyclic voltammetry, galvanostatic charge discharge method and electrochemical impedance spectroscopy.

Scanning electron microscope (SEM) and transmission electron microscope (TEM) are used to examine the micro-structure and morphology. Energy-dispersive X-ray spectroscopy (EDS) and elemental analysis are performed to determine elemental mapping. The surface area and porosity are analyzed by the BET (Brunauer, Emmett, and Teller) and DR (Dubinin-Radushkevich) method.

Title: A multisite study demonstrating the efficacy of diabetes self-management education and medical nutrition therapy in the management of Type 2 diabetes in Alabama

Primary Author (and presenter): Salazar, Maria V.

Additional Authors: Scott, Susan; Hardin, Amie; Watson, Laura; Green, Pam; Hand, Molly; Fan, Shirley; Gaillard, Philippe; and Marincic, Patricia

Department: Nutrition, Dietetics, and Hospitality Management

College/School: Human Sciences

Description:

Alabama has one of the highest prevalence rates of Type 2 Diabetes (T2D) impacting greater than 13.5% of the adult population. While diabetes-self-manage education (DSME) and medical nutrition therapy (MNT) has been shown to promote glycemic control and reduce risk of comorbidities, access to these services is limited due to poor reimbursement and lack of public policy directives. The purpose of this study is to document outcomes for patients with T2D completing DSME and MNT through 4 American Diabetes Association (ADA)-recognized diabetes programs in Alabama, utilize predictive models to identify potential healthcare costs reductions based on observed A1c outcomes, and provide outcome data to support reimbursement and public policy initiatives to improve patient access to DSME and MNT. A multisite retrospective chart review was conducted of patients with T2D receiving DSME and MNT through four regional ADA-recognized programs in Alabama. Baseline, end-of-program, and 1-year follow-up measures were queried for weight, body mass index (BMI), A1c, and lipids. A mixed model ANOVA was used to determine significance. Significant reductions were observed at end-of-program and 1-year in weight (2.67 kg, $P < 0.001$; 2.25 kg, $P = 0.001$), BMI (0.93, $P < 0.001$; 0.76, $P = 0.001$), A1c (1.82%, $P < 0.001$; 1.22%, $P < 0.001$). Patients managed by diet alone had a baseline A1c of 6.95% and exhibited a 0.80% reduction in A1c; comparatively those managed with diet and drug therapy had a baseline A1c of 9.00% and exhibited a 2.09% reduction in A1c. This study reports actual patient outcomes achieved in the clinical setting. Improvements in A1c fall within reported ranges from randomized clinical trials and in cost-effective analysis of diabetes education programs. DSME and MNT are beneficial for the patient's self-management of diabetes and the delay of comorbidities.

Title: Morphological study of the electrospinning process parameters over the structure of silk fibroin nonwoven performed at low concentrated solutions

Primary Author (and presenter): Sanchez-Diaz, Simon

Additional Authors: Soledad Peresin, Maria; Adriana Restrepo-Osorio, Adriana; and Gaviria, Ana

Department: Forestry

College/School: Forestry & Wildlife Science

Description:

Silk fibroin (SF) is a natural, biodegradable and biocompatible polymer which exhibits great mechanical and physico-chemical properties of interest in material science. SF can be processed by different techniques, such as electrospinning (ES). In the ES process, certain combination of the polymer solution, processing parameters and environmental parameters should be tuned in order to generate nanofibers with the desired characteristics. In the present work, SF solutions at two different concentrations were electrospun to produce nonwoven nanomaterials to explore different process parameters: distance, voltage/distance ratio

and flow rate. The produced materials were expected to show minimum fiber defects (i.e. beads), smaller diameters and high porosity. SF was isolated and casted to produce SF films, then SF films were dissolved in formic acid (FA) to prepare solutions at 10 and 12 w/w%. Hence, the solutions were electrospun using various combinations of parameters, and the produced materials were analyzed through scattering electron microscopy (SEM) to determine the morphological characteristics of each math developed. The results showed that electrospun maths performed with a concentration of 12 w/w% highlighted better morphological properties at distances below 12 cm and voltage/distance ratio among 1.01.5, whereas nonwoven produced with a concentration of 10 w/w% showed the most appropriated morphological characteristics at distances below 12 cm and voltage/distance ratio below 1.0. Besides, comparing the non produced at different solution concentration, the materials made with less concentrated solutions exhibited thinner fibers diameters and higher porosities, however were more sensitive to expose beads in their structure. With this results is expected to optimize the production of nonwoven silk or silk composites nanomaterials through electrospinning for biomedical, pharmacological, food packaging and high performance material applications.

Title: Smoking cessation for parents of children with asthma

Authors: Santana, Grace T.; Ellison, Kathy Jo

College/School: School of Nursing

Description:

Secondhand smoke is an asthma trigger that causes sick days and hospitalizations for children living with a parent who smokes. Research shows that pediatricians have a significant impact on helping parents who have children with asthma to quit smoking or reduce their cigarette count. Also, a sick visit to the pediatric clinic serves as a “teachable moment” in which the physician can use the sick child’s condition to educate or reeducate the parent on the harmful effects of smoking. The purpose of this project is to provide evidence-based resources and education to parents who smoke and have children with asthma. The target population included children with asthma from 0-18 years of age and any adult smoking parent. Following agreement and a questionnaire including demographics, smoking status and child health status, parents received a handout with available smoking cessation resources followed by a phone call at 2 weeks, 4 weeks, and 6 weeks to assess for smoking status and to continue encouragement to quit. Pre-post questionnaires on number of cigarettes smoked, number of rescue inhaler uses per week, and number of sick days due to asthma symptoms were compared with paired t-tests. X consented to participate (% parents), average age of X (sd) yrs. Follow-up indicated that X% quit smoking and X% decreased number of cigarettes smoked. Among those who received resources, the number of sick days, the number of rescue inhaler uses, and the number of cigarettes smoked per day improved from pre- to post-significantly. Providing smoking cessation resources to parents who have children with asthma helps reduce number of cigarettes smoked per day, number of inhaler uses per week, and number of sick days per week in the child by helping the parent quit or reduce smoking incidence. The pediatric setting is an important venue for educating parents on smoking cessation materials available in the community.

Title: Understanding change in violence-related attitudes for adolescents in relationship education

Primary Author (and presenter): Savasuk, Rachel, M.

Additional Authors: Adler-Baeder, Francesca and Haselschwerdt, Megan

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Traditional gender role beliefs and dating violence acceptance are consistently associated with adolescent dating violence (ADV) perpetration and victimization, making them a worthy focus of programs aimed at reducing the rates of ADV. Relationship Education (RE) teaches adolescents a broad range of dating relationship knowledge and skills and includes an emphasis on raising awareness of and reducing DV perpetration and victimization. Few studies, however, have evaluated the influence of RE programs on gender role beliefs and DV acceptance – antecedents of ADV. Also, despite noted differences in gender role beliefs and DV acceptance by gender, race, and socioeconomic status (SES), no studies of RE have examined changes in these beliefs based on the intersection of these sociodemographic characteristics. Guided by the theories of gender and power and intersectionality, the current study examined pre- and post-test scores of adolescents' gender role beliefs and DV acceptance for RE participants ($n = 1,645$) compared to non-participants ($n = 522$). We then explored the differential and combined effects of gender, race, and SES on change in gender role beliefs and DV acceptance for those in RE. Results suggest that participants' demographic characteristics were partially associated with change in pre- and post-test scores. African American males, who held the most traditional gender role beliefs prior to RE, became more egalitarian after program participation. Relationship education participation appeared to buffer against increasing dating violence acceptance for female, but not male, participants. African American and lower SES participants maintained higher levels of dating violence acceptance at both time points compared to European American and higher SES adolescents. Study findings provide a more complex picture of the role of RE in shifting beliefs and attitudes associated with ADV with implications for program development and delivery.

Title: Understanding Attention-Deficit/Hyperactivity Disorder (ADHD) medication self-management in college freshmen: Experiences, needs, and challenges

Primary Author (and presenter): Schaefer, Megan, R.

Additional Authors: Wagoner, Scott; Resmini-Rawlinson, Alana; Shapiro, Steven; and Kavookjian, Jan

Department: Psychology

College/School: Liberal Arts

Description:

Managing a chronic illness during the transition to adulthood is challenging, especially when youth move away to college and no longer have parental support for disease management. Adolescents with ADHD are at greater risk for poor self-management, as skills essential to self-management (e.g., planning, organization) are impaired in these individuals. The current study examines the self-management experiences of adolescents with ADHD who are transitioning to independence in their first year of college. College freshmen completed semi-structured interviews and questionnaires focused on ADHD medication self-management. Interviews concluded upon data saturation. Qualitative data were analyzed via directed content analysis and quantitative data via descriptive statistics. Ten interviews were conducted. Most individuals (80%) reported decreased parent involvement during the transition to college. Half reported a decrease in adherence and control of ADHD symptoms. "Don't feel like taking medication" (90%) and "difficulties in sticking to a fixed medication schedule" (80%) were common barriers to adherence. Five themes emerged from interviews: 1) Transitions to independence are often abrupt, and many adolescents lack critical self-management skills, 2) Volitional non-adherence is high due to disease beliefs, perceived academic demands, and medication side-effects, 3) Poor self-management negatively impacts school performance, 4) Peer pressure to share medication affects social functioning and adherence, 5) Social support is greatly needed. In summary, students with ADHD are not prepared to manage their chronic illness independently in context of increased demands and newfound freedom, resulting in serious academic consequences. Intervention programs targeting medication self-

management during the transition are greatly needed for young adults with ADHD as high academic performance in college is critical for future success.

Title: The effects of yoga on quality of life in pediatric chronic illness populations: A systematic review

Primary Author (and presenter): Schaefer, Megan, R.

Additional Authors: Gray, Wendy

Department: Psychology

College/School: Liberal Arts

Description:

Complementary therapies are needed to create more inclusive treatment plans for youth with chronic illness. Thus, the aim of this systematic review was to summarize the evidence for the use of yoga in pediatric chronic illness populations. Databases in medicine (Medline), nursing (CINAHL), and psychology (PsychINFO) were searched to identify peer-reviewed studies reporting on the impact of yoga on quality of life in pediatric chronic illness populations. Inclusion criteria were the following: 1) discussed the practice of yoga, 2) focused on pediatric populations (0-25 years old), 3) included a physical chronic illness sample, 4) presented original data on the impact of yoga on quality of life, and 5) used quantitative methodology. Information about study methodology and participant characteristics (e.g., age, chronic illness) were abstracted. The impact of yoga was then categorized according to the standard domains of pediatric quality of life (e.g., physical functioning, emotional functioning, social functioning, school functioning). The search identified a total of 25 articles on the impact of yoga on quality of life in pediatric chronic illness populations. Yoga was found to most commonly influence the physical functioning (21 articles) and emotional functioning (20 articles) domains of quality of life, followed by school functioning (6 articles) and then social functioning (6 articles). Yoga appears to be an effective treatment modality for improving quality of life in children and adolescents with chronic illness, particularly in the physical and emotional functioning domains. These results provide support for yoga's two-pronged capability to heal through the mind-body approach as both physical and mental symptoms were addressed. As new research continues to support integrative medicine, children's hospitals nationwide should consider implementing yoga programs for both patients with chronic illness and their families.

Title: Finding formulas for the number of pieces resulting from k (n-1)-dimensional linear cuts on a unit ball in euclidean n-space

Primary Author (and presenter): Schloss, Elizabeth, C.

Additional Authors: Smith, Michel

Department: Mathematics

College/School: College of Sciences and Mathematics

Description:

The problem I am researching is: what is the maximum number of pieces a convex region can be cut into using k number of (n-1)-dimensional linear cuts? This problem can be translated to other regions in many dimensions. We were able to find some of the formulas for our problem for k-dimensional convex figures. By using the summation formulas: $\sum_{i=1}^n i^k$, we have found explicit formulas up to i=5 for $g_i(n)$, where $g_i(n)$ is the number of regions each figure is cut into and i is the dimension number. We have also found a recursive formula for i-dimensions:

$$g_i(n) = g_i(n-1) + g_{i-1}(n-1).$$

Another type of region we have been working on is the 2-dimensional convex shape with convex regions removed from it. This problem can be translated into more dimensions and more regions removed. We have found a hypothesized recursive formula for this region if one straight cut can pass through all of the holes(the holes are in a line):

$$f_i(n) = (n-1) + f_{i-1}(n),$$

where f is the number of regions the shape is cut into, i is the number of holes inside of the shape, and n is the number of straight cuts.

Title: Increasing breastfeeding rates

Primary Author (and presenter): Scully, Lisa, M

Additional Authors: Hamilton, Cam

Department: Nursing

College/School: Auburn University

Description:

Based on breastfeeding rates in Alabama between the years 2011 and 2013, the state average will not reach the national goal set by Healthy People 2020 for ninety-one years. Compelling evidence shows benefits of breastfeeding to mother and child as well as risks of not breastfeeding. Studies show physician lack of knowledge and lack of willingness to initiate conversations regarding breastfeeding. The purpose of this project was to increase knowledge of breastfeeding of providers of prenatal care, and thus patients. Target population includes providers of prenatal care, physicians and midwives. After agreeing to participate, providers completed an Intro Survey regarding current attitudes and roles towards patient choices of breastfeeding. Each provider was educated about and given a packet for tips on breastfeeding, available support groups at their affiliated hospital, frequently asked questions and about how to help new moms receive support from family. An exit survey was completed, monitoring attitude change and willingness to collaborate with a lactation consultant. Descriptive statistics were used to evaluate each provider's attitudes towards breastfeeding and the project. Number of packets distributed was used to determine willingness to discuss and encourage breastfeeding with patients as paired t-tests. X providers agreed to participate, X physicians, and X midwives. Total X% of packets were distributed during project (Provider A-X%, B-X%, C-X%, D-X%, E-X%). Surveys concluded significant ($p < 0.05$) overall support of this project and increased collaboration regarding breastfeeding based on answers on a Likert scale determined as 1=no support and 5=complete support (mean, sd). A prenatal provider in direct contact with a lactation consultant and up to date breastfeeding information increases provider willingness and attitude to discussing breastfeeding. Further analysis is needed for implementation on a larger scale.

Title: A data-driven approach to modeling physical fatigue in the workplace using wearable sensors

Primary Author (and presenter): Sedighi Maman, Zahra¹

Secondary Authors: Alamdar Yazdi, Mohammad A.¹; Cavuoto, Lora A.²; and Megahed, Fadel M.³

Department: ¹Industrial and System Engineering

College/ School: ¹Samuel Ginn College of Engineering

Other Affiliations: ²Department of Industrial and Systems Engineering, University at Buffalo, NY 14260 and ³Farmer School of Business, Miami University, OH 45056

Description:

Wearable sensors are currently being used to manage fatigue in professional athletics, transportation and mining industries. In manufacturing, physical fatigue is a challenging ergonomic/safety "issue" since it lowers productivity and increases the incidence of accidents. Therefore, physical fatigue must be managed. There are two main goals for this study. First, we examine the use of wearable sensors to detect physical fatigue occurrence in simulated manufacturing tasks. The second goal is to estimate the physical fatigue level over time. In order to achieve these goals, sensory data were recorded for eight healthy participants. Penalized logistic and multiple linear regression models were used for physical fatigue detection and level estimation, respectively. Important features from the five sensors locations were selected using Least Absolute Shrinkage and Selection Operator (LASSO), a popular variable selection methodology. The results show that the LASSO model performed well for both physical fatigue detection and modeling. The modeling approach is not participant and/or workload regime specific and thus can be adopted for other applications.

Title: Effects of P301L tau expression on spatial memory in a rodent model of Alzheimer's disease

Primary Author (and presenter): Setti, Sharay, E.

Additional Authors: Heslin, Ryan; Jeminiwa, Bamidele; Stahl, Brian; McGraw, Erin; Anderson, Faith; Reed, Miranda, N.

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Alzheimer's disease (AD), the most common form of dementia, accounting for 60 to 80 percent of dementia cases, is characterized by progressive memory loss and cognitive dysfunction. One of the more prominent pathologies indicated in the progression of AD is the formation of neurofibrillary tangles composed of hyperphosphorylated tau protein. In animal models, this particular pathology is studied by examining mice that express mutant P301L human tau, leading to tau hyperphosphorylation and aggregation. The purpose of this study was to determine the effect of mutant P301L tau expression on performance in the novel object location (NOL) behavioral paradigm. The NOL task is a hippocampal-dependent spatial paradigm in which animals are exposed to two identical objects and then after some delay, one of the objects is moved to a novel location. Given their natural propensity to explore novelty, rodents without memory deficits are expected to explore the object in the novel location more than the object in the familiar location. We examined the effects of P301L tau expression on performance in this task after 3 and 6 months of tau expression. Preliminary results show that mice expressing mutant P301L tau show deficits on the task at both time points, as indicated by equal exploration of the novel versus familiar object, compared to control mice expressing wild-type human tau with no mutation. Because deficits associated with tau expression are mediated in part by extrasynaptic glutamate receptors, specifically NR2B subunits of NMDA receptors, we will test whether treatment with Tat-NR2B9c, a peptide that blocks extrasynaptic NR2B receptor functioning, can rescue NOL performance in P301L-expressing mice. Treatment with Tat-NR2B9c is expected to rescue performance deficits, such that P301L-expressing mice explore the novel object location more than the familiar object location.

Title: Comparing credibility compliance of online health websites: An examination of pro- and anti-vaccination websites

Primary Author (and presenter): Seung-Bickley, Rebecca

Additional Authors: Youngblood, Ed

Department: Communications

College/School: College of Liberal Arts

Description: Online health information credibility is an important issue. Many users search the Internet to learn about and treat health issues. Researchers have developed tools to help users assess content credibility, based on citations, author credentials, etc. These guidelines assume non-credible sites would not fake these characteristics to appear trustworthy. This pilot study questions that assumption, exploring whether a site's adherence to credibility standards is reflective of credibility. It focuses on the anti-vaccine movement and MMR vaccine recommendations in order to group websites based on site type (government, industry, etc.) and whether the website encourages standard or non-standard vaccination practices. We developed a dichotomous coding scheme based on previous literature, including site usability characteristics, to examine credibility characteristics of a sample of 30 websites. The results showed there is an important disparity between adherence and type of site, which warrants further consideration in future research.

Title: Service management in fog computing

Primary Author (and presenter): Shaik, Shehenaz

Additional Authors: Baskiyar, Sanjeev

Department: Computer Science and Software Engineering

College/School: Samuel Ginn College of Engineering

Description:

With over 50,000 devices expected to be active per 3 km area by the year 2020, Internet of Things (IoT) environments are bound to continually generate enormous amount of data, which cannot be sent to centralized cloud in its entirety and raw form due to limitations from network resources and data lifetime. Therefore a new concept, fog computing, is proposed by IT industry as an extension of cloud to edge of the network, which allows moving application processing to devices close to data sources. We have proposed a multi-layered, hierarchical architecture for deployment of fog environments including various static components such as cloud, micro cloud, edge cloud, and dynamic components such as fog nodes and IoT devices, which can be leveraged to deploy application components. Fog devices deployed to support the IoT environments are of varied configurations, and are usually more resource-limited closer to the IoT device, while being resource-affluent closer to the cloud. Cloud and the fog devices located nearby cloud are more cost-efficient as compared to those located near the IoT devices, but require higher network bandwidth. Considering the above factors, we have studied the problem of service deployment in fog computing environments and proposed approaches for initial service deployment and migration upon mobility of users and fog nodes, optimizing the total cost for service deployment towards compute, storage and network resources. We have verified the behaviour of system by running simulations for varied number of users, fog nodes, relative location and mobility of fog nodes w.r.t. IoT devices and users. We have observed that our proposed approach results in a cost-optimal deployment of service components on fog nodes as compared to the cloud-only deployment. This research holds its significance in deployment of data-intensive and latency-critical IoT applications in healthcare, security and surveillance domains, among many others.

Title: The hydrological cycle

Primary Author (and presenter): Shakya, Looja

Department: School of Architecture Planning and Landscape architecture

College/School: College Architecture, Design and Construction

Description:

This research is focused on experimenting on creating a landscape based on the existing site condition in the riverbank of the Chattahoochee River, Columbus. The remarkable distinction between the two sides of

the river evoked the ideas of the atmospheric hydrological cycle that varied in the urban and rural premises. This precept became the main inspiration, and the three basic strata of hydrological cycle became main theme for the design of an educational park in Columbus. The urban hydrological cycle is emerging prominently in the nature as more and more land is being converted to cities and land sealing is continuously increasing. By principle, Water falls from the atmosphere in the form of rain, and reaches ground and river. In case of ground, there are two kinds of surface: pervious and impervious. From the pervious surface, water reaches river in the form of runoff and ground infiltration, and goes back to the atmosphere by the process of evapotranspiration. In case of the impermeable surface, water flows mostly in the form of storm water to the river. Considering these general theories, five different layers were incorporated in the site: impervious layer for the storm water runoff, rainwater and fog collector for the collection of water from the atmosphere, raingarden and pond for the water infiltration and percolation, forest for the evapotranspiration and wetland for the purification of the runoff. Therefore, the park is basically an educational park to understand the hydrological cycle.

Title: Catalytic upgrading of bio-oil produced from hydrothermal liquefaction of algae in mixtures of supercritical carbon dioxide and hydrogen

Primary Author (and presenter): Shakya, Rajdeep

Additional Authors: Adhikari, Sushil and Mahadevan, Ravishankar

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Bio-oil produced from hydrothermal liquefaction of algae is highly viscous, acidic and has high nitrogen and oxygen content which are undesirable as fuel. So, upgrading is performed to make it more desirable as fuel. Among different parameters affecting the quality of upgraded bio-oil, residence time is one of the critical parameters. Understanding the influence of residence time is critical for optimization of the whole process. During upgrading process, three phase; solid (catalyst), liquid (bio-oil) and gas (hydrogen), reactions occur, and most of the reactions are mass transfer limited, which decreases the efficacy of the process. It has been reported that the use of carbon dioxide, as a reaction medium for catalytic reactions, increases the reaction rates and reduce mass transfer limitation. In this study, effects of residence time and CO₂ on upgrading were studied. In the case of residence time, upgrading was performed at residence time of 2, 4, 6 and 10 hours using 5% Ru/C catalyst at a catalyst loading of 15 wt.%, a reaction temperature of 350 °C and a hydrogen pressure of 1000 psig. The upgraded bio-oil yield was maximum (60 wt.%) at 4 hours of residence time. Heating value and total acid number were in the range of 43-44 MJ/kg and 1-2 mg of KOH/g, respectively. In the case of influence of CO₂, upgrading was performed using same reaction conditions as above with the inclusion of CO₂. The bio-oils obtained were characterized for its physical and chemical properties and the deoxygenation, denitrogenation and desulfurization capability of the catalysts were also studied.

Title: Global impacts of grazing on vegetation and soil organic carbon during 1901-2010: A process-based modelling study

Primary Author (and presenter): Sharma Dangal, Shree Ram

Department: Forestry and Wildlife Sciences

College/School: Agriculture

Description:

Soils are an important reservoir of carbon, and carbon losses from soil can affect atmospheric CO₂ concentration and climate change. In particular, livestock grazing and climate warming could potentially alter soil carbon stores. But the extent to which livestock grazing and climate change affect soil organic

carbon (SOC) has not been investigated well at the global scale. Here we used the Dynamic Land Ecosystem Model (DLEM) to quantify the long-term changes in SOC, and attribute those changes to grazing and climate change during 1901-2010. Results show that grazing and climate change reduced SOC at the rate of 242 TgC/yr and 42 TgC/yr, respectively. Over the century long time scale, livestock grazing and climate reduced SOC by 13.4 PgC (2%) and 2 PgC (0.5%), respectively. The grazing induced reduction in SOC was largely due to a decrease in litter production (12%) and belowground carbon (7%). Climate, on the other hand, decreased SOC due to low biomass production in the tropics and high soil decomposition in the temperate and boreal region. Likewise, livestock grazing decreased net primary production (NPP) at the rate of 28.5 TgC/yr, while climate change increased NPP at the rate of 10 TgC/yr. Our results demonstrate that the effects of grazing on SOC and vegetation carbon are highly context specific with grazing intensity playing more important role in the dynamics of SOC compared to other environmental factors. These findings highlight the importance of including grazing as a major ecosystem processes into global land models for accurately quantifying the impact of global changes and grazing on ecosystem processes and assessing the climate-biosphere feedbacks.

Title: The effect of rare variants of hydroxy-carboxylic acid receptors on hereditary breast cancers

Primary Author (and presenter): Shepp, Kasey J.

Additional Authors: Chandler, Madison; Merner, Nancy

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Breast cancer (BC) susceptibility genes harbor variants that increase one's risk of developing hereditary BC. Most known BC susceptibility genes play a role in DNA repair and are the targets of new individualized therapies. Unfortunately, these only explain ~30% of hereditary BC cases, leaving ~70% of hereditary BC cases genetically unexplained. G protein coupled receptors (GPCRs) have a wide array of functions and are common therapeutic targets. Recently, O'Hayre *et al.* demonstrated that GPCRs are associated with tumorigenesis, and deep sequencing studies have revealed that 20% of human tumors have mutations in GPCRs. Thus, GPCRs could be therapeutic targets for more personalized cancer treatment or prevention.

Recently, a group of three GPCRs classified as hydroxy-carboxylic acid receptors (*HCAR1*, *HCAR2*, and *HCAR3*) were found to have an effect on cancer proliferation. Currently, *HCAR1* and *HCAR3* are classified as oncogenes, while *HCAR2* is classified as a BC tumor suppressor. Interestingly, HCAR genetic variants and their association with hereditary BC have not been investigated largely due to their connection to metabolism rather than DNA repair. My research has involved screening the HCAR genes in an Alabama BC cohort through polymerase chain reactions and Sanger sequencing, in order to discover novel variants that increase risk of BC. Seventy-six samples were screened for rare variants in all three HCAR genes. Here, we report the coding variants that were detected through this effort and the statistical analyses that support or reject their association with inherited BC.

Title: Teaching behaviours of international Asian professors

Primary Author (and presenter): Shi, Yuewei

Additional Authors: Lin, Xi; Shi, Hong; and Huang, Mingyu

Department: Educational Foundations, Leadership, and Technology

College/School: Education

Description:

In the past decade, the number of foreign-born Asian faculty members at US institutions has increased rapidly. With different cultural backgrounds, these international Asian professors may have their unique

teaching behaviors. The purpose of this study is to explore international Asian professors' teaching behaviors based on students' online evaluations. Data were collected from RateMyProfessor.com. An inductive content analysis was used to analyse students' comments about their international Asian professors at a large south-eastern research university. The results indicated that these professors are instructionally supportive. They are usually rated as effective communicators, and they are interesting and creative in delivering courses. They are knowledgeable about their course subjects and they promote students' critical thinking by assigning homework and quizzes. In terms of social-emotional support, these foreign-born Asian professors often encourage and care for their students. They are humorous and enthusiastic about teaching and course topics. These professors are also organizationally supportive. They show respect to their students including avoiding interrupting students' talking. However, English is not the first language to these Asian faculty members, and students sometimes feel that it is hard to understand these professors because of their accent and unclear descriptions. Moreover, students think their international Asian instructors assign too much homework and attending class is significant in getting a good grade. It is expected that this study may shed light on how to help foreign-born Asian faculty members improve their teaching quality, as well as enhancing students' learning experience in the future.

Title: The unpublished *Roman à Clef*: private fiction and public figures at the turn of the 19th century in *The Navy Officer*

Primary Author (and presenter): Shipley, Kelsie N.

Additional Authors: none

Department: English

College/School: College of Liberal Arts

Description:

The Navy Officer, an unpublished manuscript dating from around 1800, displays many qualities of a *roman à clef*, a novel whose characters and circumstances often correlate to real events when a reader knows the 'key.' I have been transcribing this work and working to understand where it fits within the literary canon, and within the larger context of unpublished novels. The transcriptions that my project has been producing are important to understanding unpublished fiction from the late eighteenth and early nineteenth centuries: they provide insight into the lives of those who did not write for a living, and in particular, *The Navy Officer* provides evidence of daily life among the lower aristocracy in Great Britain around 1800. It uses mixed writing styles – prose, missives, and a nonfictional court case – to tell the story of the Ashburn family's two daughters and an inheritance crisis centred around a woman's rights to inherit. To access this text properly, I have been working to transcribe it into a format that will be used to put the full, searchable text in an accessible database-based format and noting the mannerisms of the unknown author's style. Approaching the *roman à clef* aspect of it requires careful searching through historical records and does not always yield results, but with careful consideration of the English and Scottish aristocracy around the turn of the century, still promises to be tracked to its origins – unlocking then the 'key' to understanding the novel. Aside from the text's unpublished nature, the project of transcribing eighteenth and nineteenth century documents will ultimately contribute to the Manuscript Fiction Project headed by Dr. Emily Friedman, which will catalogue novels such as *The Navy Officer* to allow for further research and promises to one day find the key to the *roman à clef* and prompt more studies into the lives of fiction writers whose work never made it to the press.

Title: Phenotypic characterization of Labradoodle dystrophinopathy

Primary Author (and presenter): Shrader, Stephanie M

Additional Authors: Smith, Bruce; Jung, Seungwoo; Denney, Thomas

Department: Pathobiology

College/School: College of Veterinary Medicine

Description:

Duchenne muscular dystrophy (DMD) is an X-linked recessive disorder that is caused by mutations in the dystrophin gene, resulting in progressive, degenerative changes in skeletal and cardiac muscle. Although dystrophinopathies have been reported in various dog breeds, we have identified a novel dystrophin mutation in a line of Labradoodles that results in cardiac disease resembling that which is described in DMD patients. In order to study the Labradoodle as a potential model for DMD cardiomyopathy, we utilized seven dystrophin-deficient and five aged-matched control littermates. Dystrophin status was confirmed in each dog via PCR. Following monthly echocardiograms and trimonthly cardiac magnetic resonance imaging/spectroscopy (MRI/MRS), each dog was euthanized at six months of age, or when a humane endpoint was reached. At the time of death, each dog had a post-mortem examination which included bloodwork, organ weight evaluation, and measurement of various cardiac parameters (e.g. left ventricular free wall thickness, septal thickness, etc.). In addition, a complete set of tissues was harvested from each dog for histopathologic evaluation. Clinical findings in affected dogs included markedly elevated serum creatine kinase (CK), failure to thrive, skeletal muscle atrophy, macroglossa, ptyalism, kyphosis, and a plantigrade stance. Necropsy findings included glossal hypertrophy, peripheral diaphragmatic hypertrophy with central thinning, axial and appendicular muscle atrophy with fibrosis, areas of myocardial fibrosis, and hypertrophy of the rectus abdominus and deep pectoral muscles. There were statistically significant differences in many of the examined parameters, including terminal body weight, heart weight, left ventricular free wall thickness, etc. Although analyses of cardiac imaging studies and histopathologic tissue evaluation are still pending, preliminary data suggests that the Labradoodle is an appropriate model for the study of DMD cardiomyopathy.

Title: Fatigue modeling of a thermoplastic polymer under mean strain and variable amplitude block loadings

Primary Author (and presenter): Shrestha, Rakish

Additional Authors: Simsiriwong, Jutima; Shamsaei, Nima

Department: Mechanical Engineering

College/School: Samuel Ginn College of Engineering

Description:

The applicability of several fatigue damage models for polyether ether ketone (PEEK) under mean strain and variable amplitude multi-blocks loadings is evaluated. The models utilized in this study are assessed against experimental data for PEEK under various cyclic loading conditions, including (1) constant amplitude loading with non-zero mean strains, (2) two-block loading with zero and non-zero mean strain, and (3) three- and four-block loading with zero mean strain. Several fatigue models, including a strain-based, a strain-stress-based, and an energy-based, are employed to correct for the effect of mean strain and stress on fatigue behavior of PEEK. Among these models, the energy-based approach, which considers the deformation response of the material throughout its entire life, provides a better correlation to PEEK experimental data in the presence of mean strain. For specimens under block loading, three different damage accumulation models are employed to evaluate their applicability for PEEK. These include the Linear Damage Rule, the non-linear Damage Curve Approach, and the Hashin-Rotem model. Additionally, a Direct Cumulative Damage (DCD) approach using an energy-based parameter is also proposed to account for the load history and sequence effect on PEEK fatigue behavior. The proposed DCD method is found to provide acceptable fatigue life predictions for PEEK under multi-block loading with various strain ratios and frequencies.

Title: Polyethylene coated of zinc nanoparticles maintain capable of enhanced olfaction

Primary Author (and presenter): Singletary, Melissa, A.

Additional Authors: Hagerty, Samantha¹; Daniels, Yasmine¹; Pustovsky, Oleg¹; Globa, Ludmila¹; MacCrehan, William²; Muramoto, Shin²; Stan, Gheorghe²; Lau, June, W.²; Morrison, Edward, E.¹; Sorokulova, Iryna¹; Vodyanoy, Vitaly¹.

Department: ¹Anatomy, Physiology and Pharmacology

College/School: Veterinary Medicine

Other Affiliations: ²Material Measurement Laboratory, National Institute of Standards and Technology, Gaithersburg, Maryland, USA

Description:

The use of zinc nanoparticles in the enhancement of olfaction has been shown to be effective increasing response by up to 3-fold in physiological studies using electroolfactogram (EOG) and whole cell patch clamp along with cognitive processing studies using functional magnetic resonance (fMRI). However, metal is susceptible to oxidation over time and when the zinc nanoparticles are oxidized their enhancement capability is ceased. This study is to examine the use of polyethylene glycol (PEG) in coating zinc nanoparticles. Using an underwater high-voltage discharge method, bulk metal rods were transformed into zinc nanoparticles and through serial centrifugation the peak enhancing particle size of approximately 1.2-nm nanoparticles were isolated. Zinc nanoparticles were PEGylated by a coating of 1000 Dalton or 400 Daltons molecular weight PEG. Non-PEGylated and PEGylated zinc nanoparticles were tested by EOG using an odorant mixture of ethyl butyrate, eugenol, and (+/-) carvone on isolated rat olfactory epithelium. EOG was conducted over 317 days for evaluation of functional stability of nanoparticles. Zn, ZnPEG400, and ZnPEG1000 nanoparticles were analyzed by transmission electron microscopy, atomic force microscopy, and x-ray photoelectron spectroscopy. These physical tests demonstrated both PEGylated nanoparticles were about 1.4 nm in size, had crystalline zinc core, and varied in the degree of oxidation. Initially, EOG enhancement was similar across nanoparticles, but following 317 days of storage, ZnPEG400 provided the highest enhancement and ZnPEG1000 the lowest. These results indicate that ZnPEG400 is capable of maintaining the olfactory enhancement function in the olfactory epithelium with physiologically consistent stability over 300 days providing the potential for future applications in olfaction. Supported by NIST 70NANB14H324.

Title: Yoga as a complementary therapy for type II diabetes management

Primary Author (and presenter): Skaug, Shannon, L.

Department: Department of Nursing

College/School: Auburn University/ Auburn University Montgomery School of Nursing

Description:

Diabetes is a major health concern of epidemic proportion; its prevalence continues to increase in society. There is strong evidence linking the practice of yoga to improved glucose regulation. The purpose of this project was to assess the physical activity level of patients diagnosed with type 2 diabetes and provide a brief educational handout with conversation about benefits of yoga as adjunctive diabetes management. Patient engagement and physical activity level were reassessed after a two-week time period. Target population included adults (19-100 yrs) with type II diabetes in an outpatient primary care setting. Following informed consent, participants completed a validated physical activity-screening tool (IPAQ). Results were recorded as baseline data. Participants were then given a handout listing; benefits of yoga for glucose regulation, three yoga poses with detailed instructions, and local yoga classes. The handout was discussed and the participant was given the opportunity to ask questions. A follow up call was made at 2-3 weeks to reassess physical activity level, allow for questions, and assess any barriers the participant may have encountered. The pre-post IPAQ responses were compared with paired t-tests analysis. X consented to participate (% females), average age of X (sd) years. Initially, X% (mean) was identified as inactive, X% (mean) as minimally active, and X% (mean) as more active. X% (mean) had tried yoga in the past. Upon follow-up, the mean IPAQ scores improved an overall of X% (mean, sd) significantly ($p < 0.05$), and X% had at least tried yoga, also a statistically significant improvement ($p < 0.05$).

Identifying activity level among patients with diabetes and recommending yoga as a complementary adjunct to current therapy improved overall level of exercise in the target population. Improved exercise compliance is possible in this setting and further implementation of the project is recommended.

Title: Reviving the mother of the blues: a continuation of the reconsideration of Ma Rainey as an important black queer figure

Primary Author (and presenter): Skjellum, Hannah H.

Department: Department of English

College/School: College of Liberal Arts

Description:

The history of the Western world is largely white and straight—the innovations and foundational contributions of black artists are erased and ignored largely by choice, or contributed to white artists instead. Queer sexuality, too, becomes a historical memory few acknowledge. As inspired by scholars Matt Richardson (*The Limit of Queer Black Memory*), Sandra R. Lieb (*Mother of the Blues: A Study of Ma Rainey*), and Steven C. Tracy (“A Reconsideration: Hearing Ma Rainey”), I propose to push the historical reclamation of one queer black figure who often falls to the wayside: foundational blueswoman Ma Rainey. I argue that she presents one of American history’s most forgotten black figures, not to mention one of American history’s most ignored queer black figures, and that her revival today presents an important step to reclaim lost and ignored queer histories. Although she sang the song “Prove it on Me Blues,” which hinted at queer interactions with women; and although one of her former band members Thomas Dorsey has called her music “queer music,” there is little recognition of her as an essential 20th century queer black figure. Through an assessment of Ma Rainey’s career by researching her music, her performances, and her contemporary reviews, as well as a historical perspective on the lives of queer black women during this time in America, I plan to outline not only her importance to modern day queer theory and black queer history, but also to continue building up the work of scholarly queer reclamation and recognition. Reclaiming Ma Rainey’s legacy in a queer theoretical atmosphere sets the stage to allow scholars like myself to analyze her ability to express her sexual and racial identities as a queer black woman in the early 20th century.

Title: Background checks and draft favorability in the NFL

Primary Author (and presenter): Skuropat, Aislinn, R

Department: Economics and Finance

College/School: Liberal Arts and The Business College

Description: In this paper I examine the effect of criminal record on overall draft position in the National Football League. I observe data pertaining to 253 football players drafted in the 2016 draft to determine if those with a criminal record are likely to be picked later in the draft. I hypothesize that criminal record will have a negative effect on overall draft position. Using an ordinary least squares regression, my initial findings show that having a criminal record actually improves overall draft position. This surprising positive impact is driven by players arrested and not charged. When the character issue is broken down to analyze three categories: arrested and not charged, arrested and charged, and team suspension or ejection, the players that were arrested and charged fell approximately 13 draft positions while those not charged improved draft position. When an additional variable, media mentions, is added this figure increased to 17.94 positions. A drop of this proportion will have a large impact on salary and signing bonus up to \$30,200,263 if this drop occurs in the first round of the draft.

Title: Affective states and role overload: The moderating effect of integration

Primary Author (and presenter): Slife, Sarah E.
Additional Authors: Lorys, Anna J.; Michel, Dr. Jesse S.
Department: Department of Psychology
College/School: College of Liberal Arts

Description:

Role overload is defined as an individual's inability to effectively complete tasks in their roles due to time constraints (Bacharach, Bamberger, & Conley, 1990). This overload can produce a variety of positive and negative emotions and affective states in an individual due to an increase in stress. When experiencing role overload, individuals may choose to deal with this stress through integration by taking the demands and behaviors of one role and allowing them to merge with another role (Ashforth, Kreiner, & Fugate, 2000). Individuals use role integration as a way to manage some of the stress they may be experiencing. However, individuals that set boundaries between their roles (e.g., keeping "work at work") do not participate in role integration. Based on this potential link, we examine if role integration plays a moderating role in this relationship between role overload and affect. We hypothesize that individuals who experience role overload will experience negative affect as moderated by the presence of integration behaviors, whereas those who experience role overload will experience positive affect as moderated by the absence of integration behaviors. We surveyed three samples on their role overload, role integration, and affective state. We found a significant relationship between role overload and negative affect as moderated by integration. This research contributes to further insight in how individuals deal with role stressors and can aid in the development of methods in which individuals can induce a state of positive affect under situations of stress. Further research should measure role segregation as an additional moderator, along with studying additional role stressors (e.g., role conflict, role ambiguity) and their interaction effects with role integration on affect state.

Title: Evaluation of bioelectric impedance analysis to detect wooden breast myopathy from broiler breast fillets

Primary Author (and presenter): Smith, Avery E.
Additional Authors: Johnson, Meredith; Cox, Keith; Bauermeister, Laura; Morey, Amit
Department: Department of Poultry Science
College/School: College of Agriculture

Description:

Wooden Breast (WB) is a severe quality issue in commercial poultry breast fillets. Currently, no rapid and objective measurement exists to detect the presence of WB. This research was conducted to evaluate the effectiveness of bioelectric impedance analysis (BIA) to distinguish between WB and normal broiler breast filets. Freshly deboned broiler breast filets (n=90) were obtained from a local processing plant and had been sorted into wooden and normal categories by plant workers. The fillets were re-examined by a trained technician using manual palpation methods to ensure accuracy of grouping, and placed into the categories non-wooden (N) and severely wooden (W). BIA values were obtained by applying a specialized instrument used for BIA in the seafood industry on the ventral side of the filet. Cook loss was determined on filets by cooking to an internal temperature of 74° C. Filets were packaged individually and stored at 4° C overnight for texture analysis. Texture was evaluated by using the TA.XT2i Texture Analyzer and the BMORS method. Data was analyzed using ANOVA with Tukey HSD to determine significant differences at P<0.05. Filets categorized as W and N had significantly (P<0.05) different electrical impedance, cook loss, and texture analyzer peak counts. This is the first study demonstrating that bioelectric impedance analysis can be used as an effective method for the detection of WB in broiler filets.

Title: Multi-bend antenna optimization by genetic algorithms

Primary Author (and presenter): Smith, James, S.

Additional Authors: Baginski, Michael

Department: Electrical and Computer Engineering

College/School: Auburn University

Description:

The goal of this research is to find the optimal number, length, orientation, and placement of straight wires to create a multiple element antenna capable of focusing radiated power (i.e., Gain) in very specific sectors of space (Antenna footprint). Antennas are transducers that convert electrical current to radiated electromagnetic power and focus power in specific directions. The radiated power from antennas is typically represented in a three-dimensional pattern (radiation pattern). An ideal radiation pattern sought by engineers is one that maximizes the coverage in one area, thus focusing all of the power from the antenna in that direction (minimal power radiated in undesired directions). It is not the case with antennas that the simpler designs are always best; generally, more complex antenna designs are required to produce highly directional radiation patterns. The solution space for such a complex antenna is infinitely large and risks convergence on non-optimal solutions with many optimization techniques. In order to search such a solution space, this research utilizes a Genetic Algorithm (GA), an optimization technique that mimics natural selection occurring in nature. This research differs from similar projects in that we allow the antenna to “branch out”, similar to a large tree. This further increases the potential for more desirable antenna patterns by increasing the solution space that our GA must search. Using this technique, we have been able to produce desired radiation patterns from complex, multi-bend antenna solutions. This research can be replicated with various desired radiation patterns for use in various industries, such as cellular towers and geometry-specific wireless data transfers.

Title: Diabetic education in perioperative services

Primary Author (and presenter): Smith, Jenny, M

Additional Authors: Hamilton, Cam

College/School: School of Nursing

Description:

The purpose of this project is to implement an education program to increase health literacy perioperatively. Diabetic education is an effective strategy for promoting self-care and self-management and can be accomplished through improving health literacy. Educating diabetic surgical patients on the signs and symptoms of hypoglycemia, hyperglycemia, wound infections, and the importance of glycemic control, diet and exercise could impact the development of postoperative complications. Target population includes adult diabetic surgical patients aged 45-65 visiting the Pre-Admission Testing office. Patients will be surveyed on exiting knowledge of signs and symptoms of hypoglycemia, hyperglycemia, wound infections, diet, exercise, and the importance of glycemic control through verbal identification. Written and verbal education will be provided during the appointment. A second survey will be conducted 2-4 days after the education is provided. A comparison will be conducted regarding each set of health literacy scores. Signs and symptoms of wound infections identified rose from $x(y)$ initially to $x(y)$. The results are statistically significant with a t score of x and a p-value of x . Signs and symptoms of hyperglycemia rose from $x(y)$ initially to $x(y)$. The t score valued x and a p-value x , deeming it statistically significant. Ordinal data collected revealed an increase in knowledge regarding the importance of glycemic control. The paired sample test resulted in a rise from $x(y)$ to $x(y)$, and resulted as statistically significant with a t score of x and a p-value of x . The data indicates a statistically significant change in the health literacy of diabetic surgical patients. An impact was noted in the patient’s comprehension of the role diet, exercise, and glycemic control plays in preventing postoperative complications. The implementation of an education program will be recommended for perioperative services.

Title: Tracking melanoma by MSOT

Primary Author (and presenter): Smith, Mary

Additional Authors: Arnold, Robert D. and Panizzi, Peter

Department: Drug Discovery and Development

College/School: Harrison School of Pharmacy

Description:

Multispectral Optoacoustic Tomography (MSOT) imaging is a novel imaging modality with diagnostic capabilities ranging from cerebral bio-distribution to vascularization quantification. This technology measures the photo-acoustic properties of contrast agents in a living system and allows researchers the ability to see a three-dimensional interactive dataset of the target signal in an animal. With this technology, it is possible to visualize *in vivo*, in real time, endogenous markers, such as deoxygenated and oxygenated haemoglobin and, most importantly for this study, the pigment melanin. Using a mouse model of skin cancer, we planned to study the metastatic potential of various murine melanoma lines by the use of MSOT and standard histology. In this model, we used the wild-type Balb/c mice for two reasons. First these mice are white and would allow for ready tracking of brown-black melanoma cells. Second, but all so vital, is the fact that these animals have a full immune system and are not like nude or SCID mice. We followed tumour growth by use of digital calipers for 2 weeks following intradermal injection of either metastatic or non-metastatic murine melanoma lines. Histological analysis by hematoxylin and eosin staining has confirmed the presence of cancer and some secondary metastasis. Our next stage is to successfully image via MSOT small animals with both cell lines to establish positive micro-metastasis tracking. Given that early detection of skin cancer metastasis is crucial to successful treatment, our studies may lead to better diagnose and disease treatment.

Title: Quantify the effects of ocean pollution

Primary Author (and presenter): Souders, Lindsay, A.

Department: Environmental Design

College/School: College of Architecture Design and Construction

Description:

This research project is about the impact of marine pollution on a global level, and is then explored further by focusing on a specific example at the local level. The spreading of harmful substances in the ocean is contaminating food chains and water supplies, which has a direct effect on human health. Although the repercussions of current waste disposal methods, or lack thereof, are not obvious to most. Numerous studies show that it has irreparably altered our way of life. The goal of this research is to spread awareness of this issue through visual representation that is easy to understand. The global board lists the different kinds of pollution and displays the source of each one on a world map by geographic location. The local board analyzes the Pacific Ocean and the accumulation of plastic debris known as the Great Pacific Garbage Patch. From these findings one can conclude that the problem lies within the way humanity handles waste. Through the implementation of sustainable strategies humankind can avoid, prevent, and reduce pollutant discharges and emissions in order to reduce the environmental impact of waste and provide better living conditions for future generations.

Title: Sequencing miRNA clusters for the identification of BC genetic risk variant

Primary Author (and presenter): Spina, Stephanie, M.

Additional Authors: Chandler, Madison; Merner, Nancy

Department: Drug Discovery and Development
College/School: Harrison School of Pharmacy

Description:

Many risk factors influence one's risk of developing breast cancer (BC); genetic risk factors contribute to a form of BC that is hereditary. Hereditary BC is characterized by early age of onset and a family history of BC and other cancers. Genetic risk factors are characterized based on level of risk: high, moderate, and low. Genes that contain such risk variants are known as BC susceptibility genes. Only ~30% of hereditary BC cases are considered genetically solved with high and moderate risk variants identified in BC susceptibility genes. However, the 70% of unsolved hereditary BC cases require novel approaches such as exploring the noncoding genome. MicroRNAs (miRNAs) are small, noncoding RNA sequences that regulate genes post-transcriptionally by binding to mRNA targets. This regulatory role is important in the proper development and well being of all organisms. Variants within miRNA genes have been shown to alter expression and disable the functionality of miRNAs, changes that could disrupt regulatory performance of a miRNA and be pathogenic. For example, genetic variants within miRNAs that target tumor suppressor genes or oncogenes can increase cancer risk. Fully sequencing miRNA genes to identifying high and moderate risk variants to explain familial BC risk is a novel approach. This study focuses on three miRNA clusters: miR-17-92, miR-106a-363, and miR-106b-25. The genes for these miRNAs were screened in cancer-affected probands from an Alabama hereditary BC cohort and their related family members to identify new miRNA-BC risk associations. Through PCR, Sanger sequencing, and segregation analysis, this study identified 7 rare genetic variants in these miRNA genes. Aggregation statistical analyses indicates a trend towards pathogenicity. Furthermore, prediction programs have suggested that the variants change the structure and/or stability of the folded miRNA, which could impact the miRNA biogenesis process and expression.

Title: Exploring the temporal relationship between insomnia symptoms, depressive symptoms, and suicidal ideation

Primary Author (and presenter): Spitzer, Elizabeth, G,

Additional Authors: Zuromski, Kelly; Cero, Ian; and Witte, Tracy

Department: Psychology

College/School: Liberal Arts

Description:

Research has consistently supported the link between sleep disturbances, such as insomnia, and suicidal ideation (e.g., Krakow et al., 2000); however, there are mixed findings on the role depression plays in this relationship. Some studies have demonstrated that sleep disturbances are significantly associated with suicidal ideation when controlling for depressive symptoms (e.g., Ribeiro et al., 2012) and when including depression as a partial mediator (Nadorff et al., 2013). However, other studies have concluded that the relationship between sleep disturbances and suicidal behavior becomes nonsignificant after controlling for depression (e.g., Bernert et al., 2005) or including depression as a mediator (Bryan et al., 2015). The primary aim of the current study is to clarify the role of depressive symptoms in the relationship between insomnia symptoms and suicidal ideation by simultaneously testing these variables over a short interval with six time points. We hypothesize insomnia symptoms will lead to an increase in suicidal ideation, but that the reverse will not be true. In addition, we hypothesize that depression will mediate this relationship over time. Thus, we predict that insomnia symptoms will lead to an increase in depressive symptoms, which will in turn lead to an increase in suicidal ideation over time. Participants are 1,200 undergraduates who completed six waves of an online study over 15 days. A cross-lagged panel model will be used to examine the temporal relationships among insomnia symptoms, depression, and suicidal ideation. Data analysis is currently ongoing. Insomnia has been linked to the development of mental disorders (Ford et al., 1989), yet it is highly treatable (Bernert & Joiner, 2007). If our hypotheses are supported, the results would suggest the

need to screen individuals for insomnia and treat symptoms of insomnia to prevent the development of depressive symptoms and suicidal ideation.

Title: Teaching Spatial Visualization in Chemistry

Primary Author (and presenter): Stephens, Natalie, W

College/School: College of Engineering, Auburn University

Additional Authors: Schnittka, Christine

Department: Curriculum & Teaching, College of Education

Description:

Molecular geometry in chemistry is the three-dimensional spatial arrangement of atoms. Spatial visualization refers to one's ability to mentally visualize, rotate, and transform objects. Applying spatial skills to the study of chemical molecular geometries makes it possible to identify and visualize molecular shapes to determine chemical properties. The goal of this research was to determine if spatial recognition software on a smartphone could help high school chemistry students develop stronger spatial skills as applied to chemical molecular geometry. The technology used was a free phone app, Aurasma. This app recognizes a designated picture, called a trigger image, and displays a 3D augmented reality model created by the designer. These 3D images can be designed and accessed by any user. The first author of this proposal designed all the 3D augmented reality models. For this research, 3D images of 14 chemical molecular geometries were designed. Students in four chemistry classes at Beauregard High School were given access to traditional ball and stick models to learn the structures of the 14 molecules. The students had to identify the molecular geometries of these various chemical compounds. Then, two classes were given access to trigger images and the Aurasma app to visualize the 3D structures. The students using the app checked their guess of the molecular geometry and used app to review the material. All the students were given pre- and post- tests of their ability to identify the molecular geometries of chemical compounds. These evaluations were analysed to understand if the students with the added technology had an increase in their spatial skills over the group that just used traditional physical models. Surveys were administered to determine whether participants used the app to review the material at home, and if they felt that the app helped them learn the material better than traditional, physical, "ball and stick" models.

Title: Mental health knowledge acquisition in under-represented communities: The influence of promoters' occupational background

Primary Author (and presenter): Stiles, Sae'Breon, E.

Additional Authors: Naish, Lauren; Brown, Aly; Green, Adriana; Chakawa, Ayanda; Shapiro, Steven

Department: Psychology

College/School: Liberal Arts

Description:

Leaders from faith-based organizations have been effective in engaging discussion of mental health in minority communities but other factors (e.g., the occupational background of leaders) can play a role. We hypothesize that knowledge in four areas related to child mental health and services (understanding child mental health, stigma, school mental health services, and insurance coverage) will increase among parents participating in a mental health promotion intervention, but that knowledge acquisition will vary based on the occupational background (health related versus non-health related) of the community leaders providing mental health promotion activities. Our sample included African Americans participants from the southeast region of the United States, recruited from a community-based participatory research intervention program. Nine members from faith-based communities were trained as program "promoters". Promoters worked with 6-7 parents, based on a total of 55 parents who participated in the program. A

sample size of 58 parents will be retained using data estimation methods based on pretest data that were collected on the variables of interest. Pretest data were collected September and October of 2016 with posttest data collected December of 2016. We collected data on promoter occupation (health vs. non-health) and parental understanding of child-mental health knowledge. To present our findings, a repeated measures analysis of variance will be used to examine whether parent knowledge in the target areas increased after implementation of the program and if this increase was dependent on the occupational background of the promoters. Findings from our work will contribute to an understanding of effective mental health interventions for racially/ethnically diverse families and variability in outcomes that may occur based on community leadership involvement.

Title: Carbon and growth analysis of a methane consuming bacteria

Primary Author (and presenter): Stone, Kyle, A.

Additional Authors: He, Q.P. and Wang, Jin

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Over the past 30 years, methane consuming bacteria, known as methanotrophs, have moved from “black box” organisms to being on the cusp of becoming the next biocatalysts in a promising biotechnical world. One important, controllable factor for methane fermentation to valued products with methanotrophs is the transfer and subsequent uptake of methane and oxygen. In this work, we utilize a safe gas mixing system to create custom mixtures of oxygen, methane and nitrogen that were then introduced to batch cultures of our methanotroph, *M. buryatense* 5GB1. Analysis of growth and a complete carbon balance (excreted products, biomass, and CO₂) was conducted. The approach used to characterize 5GB1 were designed to take into account under pressurized batch vials, gas-liquid equilibrium, effective Henry’s constant for CO₂ with various pH conditions, and the accurate quantification of inorganic/organic liquid products. Through this analysis, insights on uptake rates, specific growth rates, and on conversion yields allow for a complete characterization of 5GB1 under different oxygen/methane ratios. The study contributes to the much needed knowledge base to design processes for improved conversions with these promising biocatalysts.

Title: Light activated drug release system based on a natural nanotube

Primary Author (and presenter): Sun, Yuzhe

Additional Authors: Davis, Edward

Department: Mechanical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Temporally and spatially precise release of medication would limit side effects and increase the efficacy of many treatments. Systems that release drugs on demand in response to external stimuli would provide new options for the treatment of chronic conditions and enable remote treatment of incapacitated individuals. One mechanism of interest is light activated release. Systems that respond to light could be implanted or injected and activated at a later date by external irradiation of the appropriate wavelength. Halloysite (HNT), a natural nanotube, is low cost and has a large absorption capacity and excellent biocompatibility making it a promising candidate for controlled release systems. The azobenzene derivative, (3-triethoxysilylpropylureido) azobenzene (TSUA), exhibits *trans* to *cis* isomeric transitions in responsive to visible light. This transition creates motion of the molecule that can be used to promote diffusion. In this work, halloysite was grafted with 4-(3-triethoxysilylpropylureido) azobenzene (TSUA) to produce light-

driven nano-propellers on the inner surface. TSUA, which was produced by reacting 3-(triethoxysilyl) propyl isocyanate (ICPES) and 4-aminoazobenzene, was grafted onto halloysite via silane coupling. Grafting was confirmed by Fourier transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). Release rates of tetracycline chloride from grafted and ungrafted halloysite as a function of irradiation level were determined. Next steps will be to shift the activation to higher wavelengths enabling drug release in response to NIR.

Title: Dielectric behavior and non-ohmic behavior of CCTO/SiO₂ composites

Primary Author (and presenter): Talebinezhad, Hossein

Additional Authors: Cheng, Zhongtang

Department: Materials Engineering

College/School: Samuel Ginn College of Engineering

Description:

The demand for miniaturization of electronic devices and increasing usage of these devices for many applications required materials with a high dielectric constant. CaCu₃Ti₄O₁₂ (CCTO) with a gigantic dielectric constant and strong nonlinear behavior make it a candidate to be used as a varistor. Although it is extraordinary dielectric constant of CCTO, low breaking down field limits its applications. Composites of CCTO with a good insulator have been used to improve the properties of CCTO such as decreasing dielectric loss and increasing breakdown field of composites. SiO₂ is widely used as an insulator. To investigate the effect of SiO₂ on the microstructure of composites, CCTO/ SiO₂ composites with different concentrations of SiO₂ are prepared at different conditions. CCTO particles were first coated with a layer of SiO₂ by the sol-gel process. The SiO₂ coated CCTO particles were used as raw material to make glass-ceramic composites through the traditional ceramic process. Electrical properties were determined by using an Impedance analyzer in the range frequency of 100 to 1 MHz and I-V curve was characterized with P-E loop tester. The results illustrate that electrical behavior of CCTO/ SiO₂ composites is sensitive to sintering conditions. This behavior is due to change in the microstructure, especially in grainboundary. The internal barrier layer capacitors (IBLC) model is used to explain the observed properties of CCTO. In this model, grainboundary plays an important role in dielectric properties of the composite. SiO₂ layer makes the grainboundary become more insulator due to resistive properties. Insulative grain boundaries make the improvement in dielectric properties of CCTO as IBLC model.

Title: Thermal modeling and scheduling of high performance computing clusters

Primary Author (and presenter): Taneja, Shubhi

Additional Authors: Zhou, Yi and Qin, Xiao

Department: Computer Science and Software Engineering

College/School: Samuel Ginn College of Engineering

Description:

We have developed a thermal-aware job scheduling strategy called tDispatch tailored for MapReduce applications running on Hadoop clusters. The scheduling idea of tDispatch is motivated by a profiling study of CPU-intensive and I/O-intensive jobs from the perspective of thermal efficiency. More specifically, we investigate the thermal behaviors of these two types of jobs running on a Hadoop cluster by stress testing data nodes through extensive experiments. We show that CPU-intensive and I/O-intensive jobs exhibit various thermal and performance impacts on multicore processors and hard drives of Hadoop clusters. After we quantify the thermal behaviors of Hadoop jobs on the master and data nodes of a cluster, we propose our scheduler to alternatively dispatch CPU-intensive and I/O-intensive jobs. We apply our strategy to several MapReduce applications with different resource consumption profiles. Our

experimental results show that tDispatch is conducive of creating opportunities to cool down multicore processors and disks in Hadoop clusters deployed in modern data centers. Currently, we are extending these experiments on a Spark cluster installed in a HPC room. For the ongoing experiments, along with the temperatures, we are also considering parameters like energy consumption of the worker nodes, height of the nodes in the rack, thermal patterns in HPC room and the number of nodes. For the same purpose, we are using a big data benchmark suite called HiBench. We will be developing thermal models based on the utilization patterns of these nodes. Our findings can be applied in other thermal-efficient job schedulers that are aware of thermal behaviours of CPU-intensive and I/O-intensive applications submitted to Hadoop and Spark clusters.

Title: Investigating the behavior of lightweight aggregates in mass concrete

Primary Author (and presenter): Tankasala, Aravind

Additional Authors: Schindler, Anton

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

This study investigates the influence of lightweight aggregates in mass concrete. Concrete is a combination of cement, aggregates and water. The reaction between cement and water is an exothermic one, and produces large quantities of heat. When mass concrete structures such as bridge piers or foundation are constructed, this heat is contained inside the structures for an extended period. However, excessive thermal differences between the exterior and interior of the structure develop, leading to large thermal stresses. When the thermal stresses exceed the strength of the structure, cracking occurs. In this study, lightweight aggregate is used in concrete to observe if these aggregates can increase the strength of concrete and simultaneously decrease the stresses in concrete. The results obtained so far indicate that lightweight aggregates help in alleviating stresses in mass concrete structures. Currently software simulation is being developed to validate field data and efforts are being taken to develop different strategies to minimise thermal cracking in mass concrete structures.

Title: The facility layout problem in healthcare: New models and methods

Primary Author (and presenter): Teran-Somohano, Alejandro

Additional Authors:

Department: Industrial and Systems Engineering

College/School: Samuel Ginn College of Engineering

Description:

The facility layout problem is one that has been studied for many years by engineers seeking how to design better factories and warehouses. However, the concerns and requirements imposed on it by its industrial origin have become more of a hindrance to its application in non-industrial settings than an asset. In this presentation, we discuss how studying the design of healthcare facilities has forced us to think the problem anew. We will present the new models and methods we have developed for analyzing and optimizing facilities. Since the facility layout problem is ultimately one of finding optimal spatial arrangements, we will focus on how we can mathematically describe certain spatial relations, and use these in our optimization models to capture some of the many unique requirements of healthcare facilities.

Title: Peptide grafted poly(ethylene glycol) hydrogel support endothelial colony forming cells dynamic adhesion under fluid shear

Primary Author (and presenter): Tian, Yuan
Additional Authors: Seeto, Wen and Lipke, Elizabeth
Department: Chemical Engineering
College/School: Samuel Ginn College of Engineering

Description:

The late outgrowth endothelial progenitor cells (EPCs), also known as endothelial colony forming cells (ECFCs), are unipotent stem cells carrying high proliferative capability and are able to differentiate into endothelial cells (ECs), making them a promising cell source for rapid reendothelialization of injured vasculature. Generally, recruitment of ECFCs to the injured site is a dynamic adhesion process which consists of cell tethering, rolling, and firm adhesion. This process is achieved through rapid forming and breaking of bonds between certain cell surface receptors and their corresponding ligands. However, currently little is known about the homing of these circulating ECFCs. This study investigated the ability of different peptide-grafted poly(ethylene glycol) diacrylate (PEGDA) hydrogels to support dynamic adhesion of ECFCs. A parallel plate flow chamber was used to mimic the physiological fluid shear. The interaction of ECFCs with different peptides and their combinations under different shear rates was recorded respectively using a high-speed camera and assessed by an optical cell tracking analysis system. The average rolling velocity and number of captured ECFCs were then obtained to compare the capability of different peptides.

Title: The contact toxicity of essential oils to the house fly (*Musca domestica*)

Primary Author (and presenter): Tian, Yuexun
Additional Authors: Hu, Xing Ping and Hogsette, Jerome
Department: Entomology and Plant Pathology
College/School: Agriculture

Description:

The house fly, *Musca domestica* (L.) (Diptera: Muscidae) is a worldwide pest of agricultural and public health. Currently, house fly control still highly relies on insecticide applications, which have consequently led to resistance to common pesticides. This study is designed to investigate essential oils as alternatives to traditional insecticides. Topical application was used to estimate the LD₅₀s of 20 selected essential oils and their components. Results of this study will provide insight into discovering active ingredients and improving formulations in the performance of biopesticides for house fly control.

Title: An integrated approach to improving corn plant health in *Meloidogyne incognita* infested fields with nematicides, plant growth regulators, and starter fertilizers

Primary Author (and presenter): Till, Stephen, R.
Additional Author: Lawrence, Kathy
Department: Entomology and Plant Pathology
College/School: Agriculture

Description:

Meloidogyne incognita, the southern root-knot nematode, is responsible for significant yield losses across the southern portion of the United States and losses as high as 30% can occur in field corn. We hypothesize that adding additional inputs (starter fertilizers and plant growth regulators) at planting along with nematicides can provide for a complete management system of both *M. incognita* and corn by improving plant health at the same time as suppressing nematode population densities. Each input was evaluated separately in a greenhouse setting. Data were analyzed with SAS 9.4 using PROC GLIMMIX

and LS-means were compared using Dunnett's method with significant level of $\alpha \leq 0.1$. In the nematicide trial at 45 days after planting (DAP), the untreated control's growth parameters were all lower ($P \leq 0.1$) than the nematicide treatments. Counter 20G, Velum Total, and Poncho VOTiVO + Velum Total all reduced root-knot egg production ($P \leq 0.1$), and Counter 20G increased biomass ($P \leq 0.1$) relative to the untreated control. In the plant growth regulator trial, Ascend was the product selected and the efficacy of single to multiple applications were evaluated. At 45 DAP, the in-furrow application improved plant growth parameters ($P \leq 0.1$) relative to the untreated control, and was similar to the untreated control in eggs per gram of root. The triple combination (in-furrow + foliar + seed treatment) supported increased numbers of root-knot eggs per gram of root ($P \leq 0.1$) relative to the untreated control. The starter fertilizer treatments all increased plant biomass ($P \leq 0.1$) relative to the untreated control at 45 DAP with the exception of Micro-500 and Neptune's Harvest.

Title: A cost-effective method for canine heartworm surveillance

Primary Author (and presenter): Tormanen, Aaron, P.

Additional Authors: Zohdy, Sarah

Department: Forestry and Wildlife Sciences

College/School: Agriculture

Description:

Surveillance of mosquitoes and mosquito-borne pathogens can be very expensive and time consuming. Due to these difficulties, there has been very little environmental surveillance of canine heartworm (*Dirofilaria immitis*), a parasitic roundworm that is transmitted to dogs by mosquitoes. Building on previous implementation of Whatman FTA cards to detect viral pathogens, we investigated the potential of using this new technology to detect *D. immitis* L3 larvae in *Aedes aegypti* mosquitoes. The FTA cards were soaked in blue-dyed sugar water and placed in mosquito enclosures with 100 infected and uninfected mosquitoes, respectively. The mosquitoes proceeded to feed on the sugar, which results in saliva and pathogen being deposited onto the FTA cards. After 24 hours, the FTA cards were removed for PCR analysis and microscopic examination for L3 larvae. The proportion of mosquitoes that fed on the FTA card was determined by counting the mosquitoes with dyed abdomens. A sample of the dyed mosquitoes were also examined under the microscope to confirm the presence of *D. immitis* L3 larvae. Our results suggest that *D. immitis* DNA can be detected on FTA cards after being fed on by infected mosquitoes, and that approximately 90% of mosquitoes exposed to the FTA card fed on it. Since current surveillance methods rely on an extensive use of time and resources from trapping, sorting, and molecularly/microscopically analyzing thousands of mosquitoes, the results suggest that sugar-soaked FTA cards could be a cheap and effective way to efficiently survey for parasites in a pool of captured mosquitoes rather than in each individual specimen. This provides evidence that FTA cards can be used to detect non-viral parasites in addition to pathogenic viruses. These results may be useful in the surveillance efforts of mosquito-borne parasites that cause disease in humans, such as malaria or filariasis.

Title: Good Choice healthier retail initiative: Increasing access and appeal of healthy items in rural Alabama

Primary Author (and presenter): Tran, Cecilia, N.

Additional Authors: Powers, Alicia; Struempfer, Barbara; and Parmer, Sondra

Department: Nutrition, Dietetics and Hospitality Management

College/School: Human Sciences

Description:

People with limited access to supermarkets suffer disproportionately high rates of diet-related diseases. Every county in Alabama has at least one neighborhood with limited access to a grocer, leaving 1.8 million Alabamians, including half a million children, to rely on small food stores (e.g. convenience stores) for grocery shopping. Since convenience stores typically sell high fat, high sugar processed foods and offer few healthy options, interventions in this setting may reduce food access barriers and promote healthy eating. The purpose of this experimental study was to increase access and appeal of healthy items in seven convenience stores in Marengo and Washington Counties in Alabama. This one group, pretest posttest design focused on changes in inventory, product placement and point-of-purchase prompts. Convenience stores were selected based on convenience sampling and location in towns with high rates of residents living below 185% of the federal poverty level. Trained SNAP-Ed Extension educators completed observational measures of the stores using the Alabama Department of Public Health's *Good Choice* Checklist, which assesses the food environment based on availability and promotion of healthy foods and beverages. For the *Good Choice* Healthier Retail Initiative, the Extension educators collaborated with convenience store owners and managers to discuss assessment findings and determine priorities for implementation. This initiative reached an average of 2,500 and 1,600 customers per day in Marengo and Washington Counties, respectively. The convenience stores increased their healthy item inventory from an average 10.1 to 33.8 healthy items, stocking fresh whole and pre-packaged cut fruits, fresh pre-packaged vegetables, nuts, low-fat dairy products, breakfast bars and zero- and low-calorie beverages. Based on these results, convenience store interventions are a feasible option for increasing access and appeal of healthy items in underserved communities.

Title: The effect of drawing on information consolidation and stress reduction

Primary Author: Travis, Allison R.

Department: Psychology

College/School: College of Liberal Arts

Description: I was an Undergraduate Research Fellow for the Fall 2016 semester, and my research consisted of an interdisciplinary study in which computer science students were asked to create drawings based off of the step-wise fashion that code is put into a computer. The purpose of this experiment was to determine if creating a drawing based on the participants' course work could potentially reduce exam stress as well as help to consolidate the information being taught to them, and thus perpetuate further learning in the course. Examining this kind of research question is important because it can reveal alternative methods of learning, as well as healthy ways of managing stress and test anxiety. In order to explore my research question, I recruited individuals from an introductory computer sciences course. Unfortunately, only one participant showed up for the experiment. My participant was required to answer a brief survey about her stress levels and views about art. The participant was to attend a two-hour drawing session in which she would be instructed on how to use her drawing materials, and then she would perform an instructional drawing. For the instructional drawing, I would provide the participant with instructions in a step-wise fashion. For example, I would tell her to 'draw a straight line for five seconds', and so forth. It is my belief that this form of drawing is the equivalent of placing an instructional software program into a computer. After the drawing sessions, my participant filled out a follow up survey to determine if there was an effect on learning and stress reduction. Based on the results of the follow up survey, the participant felt that the drawing session did improve her final exam score, as well as reduce her anxiety about the test. The key impact of this study is the abstract way of information consolidation. There are many different styles of learning and using drawing to reimage concepts can help to garner more understanding in an area otherwise not associated with art. Because I only had one participant, results may be inconclusive, but it is my belief that art can be used as not only a therapeutic tool, but a learning tool for classes that are not traditionally art related, such as STEM-based classes

Title: Warming temperatures lead to respiratory stress and brood expulsion by gravid mussels

Primary Author (and presenter): Tucker, Rebecca, L.

Additional Authors: Stoeckel, Jim

Department: Fisheries, Aquacultures, and Aquatic Science

College/School: Agriculture

Description:

Events that lead to thermal stress, such as climate change and altered flow regimes, represent a potential threat to mussel populations that are already in decline. Increasing temperatures can cause unionid mussels to reduce mantle lure display and prematurely release their brood. We examined the effects of increasing temperatures and declining dissolved oxygen on brood expulsion of gravid *Ligumia subrostrata* and hypothesized that brood expulsion is correlated with a decreasing ability to regulate oxygen consumption, and an increase in critical dissolved oxygen concentration (DOcrit) as temperatures rise. We used a closed respirometry system to measure respiration rates of gravid *Ligumia subrostrata* at five temperatures (13, 18, 23, 25, 28°C) as oxygen levels declined from 6.5 to < 1 mg O₂ / L. Supporting our hypothesis, ability to regulate oxygen consumption decreased, and DOcrit increased with increasing temperature. Brood expulsion during periods of steadily declining oxygen was negligible at lower (13-18°C) temperatures but increased to expulsion of 5-30% of brooded glochidia at warmer (23-28°C) temperatures. Results suggest that higher temperatures during the brooding season put mussels at increasing risk of pre-mature brood expulsion due to increased respiratory stress. Standard closed respirometry assays that identify species-specific temperature thresholds beyond which oxygen regulation declines and DOcrit increases are a useful approach to determining thermal constraints of freshwater mussel populations.

Title: Evaluating the effectiveness of community gardening in reducing food insecurity and improving health in Chacraseca, Nicaragua

Primary Author (and presenter): Tumwebaze, Joel

Additional Authors: Onikia, Brown; Thornton, Kate; Jeganathan, Ramesh; and Molnar, Joseph

Department: Nutrition, Dietetics, and Hospitality Management

College/School: Human Sciences

Description:

Food insecurity and hunger are widely recognized as global issues that require immediate attention using multifaceted approaches. The Food and Agricultural Organization reports that undernourishment in the developing world has reduced by more than half in the last quarter of the century to an average low of 12%. Despite several interventions, UNICEF reports that some countries like Nicaragua have high rates of chronic malnutrition and food insecurity at levels of more than 20%. This longitudinal study that runs from 2015 to 2018 is aimed at evaluating the effectiveness of community gardening in improving health and food security in Chacraseca. A random sample of fifty participants involved in community gardening and 50 participants who are not involved were selected from a population of 10,000 households in Chacraseca. At baseline quantitative measures of food security, anthropometry and blood pressure were determined for both groups. Nutrition education and focus group discussions were done for the participatory group whereas only the latter was done for the control group. Preliminary results with baseline data show that there is no significant difference in food insecurity with values of 27.1%

(control), 26.8% (gardening group). Anthropometric measures for both groups showed child stunting of 26.9% (control) and 26% (gardening group), overweight at 21.3% (control) and 22.1% (gardening group). The average hypertension among adults was 30.3% (control group) and 31% (gardening group). Focus group discussions and nutrition education showed a need for improved infrastructure and nutritional knowledge. At completion, this study will demonstrate the importance of fresh produce and community stewardship in improving health and reducing food insecurity. This study will drive improved community gardening programs in Nicaragua and in other food insecure areas. Results will be presented at selected conferences and in publications to enhance replication in other areas.

Title: The choice of musical instrument and its effects on auditory working memory and perception in adolescents

Primary Author (and presenter): Turnbough, Abby, N.

Department: Communication Disorders

College/School: Liberal Arts

Abstract:

Research examining the human asymmetry of handedness has spanned several decades; this has included exploring the relationship among handedness and the auditory modality. Bannatyne and Wichiarajote (1969) found a positive correlation between unlearned left handedness and auditory digit span memory test scores in third grade children. Authors attributed this outcome to processing digits in a similar fashion to music notes. Additionally, musicians whose dexterity involves both hands have more symmetric neural processing as a result of the sensory-motor experience they've had with their instrument (Gaser & Schlaug, 2003). However, there is little research translating these neurological differences in musicians to determine if more symmetry in regions enhanced by musical training would manifest into advantages for auditory processing. In an attempt to identify perceptual advantages of instrumental training involving both hands during stages when the central auditory nervous system (CANS) is still of maturing, I will be measuring monaural and binaural listening and working memory tasks on adolescent musicians. These results will potentially guide therapeutic recommendations for individuals with auditory processing difficulties. Additionally, the data collected will provide general knowledge as to the benefit of duration of instrumental musical training on auditory perception.

Title: Changes in in vitro fermentative capacity of equine feces due to alteration of forage diet

Primary Author (and presenter): Turner, Stephanie, B.

Additional Authors: Wagner, Elizabeth; Wassel, Brooklyne; Muntifering, Russell; and Mullenix, Mary

Department: Animal Sciences

College/School: Agriculture

Description:

To determine the nutritional value of a forage that is to be fed to livestock, samples undergo in vitro fermentation with microbes from the herbivore's digestive tract to estimate the digestibility and thus the nutritional value of that forage. This is often less expensive and less invasive than in vivo work. In hindgut fermenters like equids, feces can be used as a microbial inoculum source for this fermentation. The hindgut microbial population significantly changes with an alteration of concentrate and forage ratios in equids, but this work has not been done strictly comparing forages. This study's purpose was to determine if forage type fed to horses providing fecal inoculum significantly alters subsequent in vitro digestibility estimates,

or if diet is a factor that must be considered when choosing a source of microbial inoculum. Four mature mares were used in a 4-wk study using 2 species of hay fed ad libitum: alfalfa (*Medicago sativa*) and Coastal bermudagrass (*Cynodon dactylon*). Feces from these mares were used to ferment small samples of hay for 48 and 72 h periods. Samples were evaluated for dry matter disappearance (DMD), neutral detergent fiber (NDF), and acid detergent fiber (ADF). These parameters indicate the potential extent to which the microbes would digest the hay, allowing the animal to absorb the products of the fermentation. The results of this study indicate that diet of the animal has a significant effect in the case of the alfalfa hay samples, but none in the case of bermudagrass. Alfalfa hay samples were digested to a greater extent when fermented with alfalfa-derived fecal inoculum. These results indicate that equids used as microbial inoculum donors for in vitro digestibility evaluations may need to be consuming the forage to be studied. This will yield more accurate digestibility estimates and give a clearer indication of forage quality and its nutritive value, therefore improving the quality of nutrition that livestock receive.

Title: Nondestructive determination of asphalt pavement crack type

Primary Author (and presenter): Tutu, Kenneth, A.

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

Top-down cracking has recently been identified as a prevalent asphalt pavement distress. Unlike the familiar bottom-up cracking which initiates at the bottom of the asphalt layer and propagates upwards, top-down cracking starts at the pavement surface and progresses downwards. The current practice for differentiating between these types of cracking is to inspect samples of cylinders cut from cracked pavements. This approach is destructive, time-consuming and may require extended lane closures. This study seeks to develop a nondestructive method that uses falling weight deflectometer testing, a regular pavement evaluation tool used by road agencies, to distinguish between top-down and bottom-up cracking. The proper distinction between these cracks will aid road agencies to make cost-effective maintenance decisions. For instance, to repair top-down cracking that has not yet reached the bottom of the asphalt layer may involve milling a few inches of the surface and paving a new layer. However, the best rehabilitation option for bottom-up cracking that has grown full-depth is to remove and replace the defective asphalt layer. Data from the National Center for Asphalt Technology Pavement Test Track at Opelika, Alabama will be utilized for this study. The first phase of the study involved developing a theoretical model. Falling weight deflectometer test data from the National Center for Asphalt Technology Test Track were processed to obtain pavement stiffness values. These values were then used, along with as-built pavement layer thicknesses, to model different pavement damage conditions, using the WESLEA program. The analysis of the critical pavement stresses and strains led to characteristic plots for top-down and bottom-up cracking. Upon validation of these plots in the second phase, similar plots could be developed to distinguish between top-down cracking and bottom-up cracking to serve as a quick tool to help road agencies make cost-effective maintenance decisions.

Title: Uranyl sensing using quinoxalinol salen-based ligand

Primary Author (and presenter): Valentine, Kate A.

Additional Authors: West, Maya M.

Department: Chemistry and Biochemistry

College/School: College of Science and Mathematics

Description:

Uranium-238 is the most common isotropic form of uranium and is used in nuclear power. Trace amounts of uranium presented in the form of uranyl, UO_2^{2+} , is commonly found in aqueous media as well as in the

waste of nuclear power plants. The spent fuel that contains uranium is stored on site, yielding a large potential for contamination. The purpose of this project is to use a 2-quinoxalinol salen based ligand coated onto a cellulose film with capabilities of sensing the presence of UO_2^{2+} . This solid-supported ligand will act as a uranyl chemosensor by inducing a change either spectroscopically or visibly when in contact with the uranyl. Synthesis and sensing using a 2-quinoxalinol salen based ligand allows an eco-friendly option for the sensing of UO_2^{2+} due to its ability to sense in aqueous media. Sensing with these salen ligands will limit the possibility of contamination of hazardous material while providing an insight of the chemistry of uranium.

Title: Types and effects of parental advice about peer victimization

Primary Author (and presenter): VanDenBerg, Carlynn, E.

Additional Authors: Van Tuyl, Lauren and Tu, Kelly

Department: Human Development and Family Studies

College/School: Human Sciences

Description:

Peer victimization is a major concern of parents and youth, yet research on how parents may shape youths' coping responses to peer victimization is sparse. The first aim of this study was to describe parents' advice for managing peer victimization. Aim 2 was to examine the prospective association between parental advice about peer victimization and youths' coping responses to peer victimization. Participants included a community sample of 203 youth ages 9-14 (52% boys; 43% Black) and one parent. Two waves of data were collected, about 1 year apart. At Time 1 (T1), parents provided open-ended responses to a hypothetical situation about their child experiencing peer victimization. Research assistants coded parental advice about peer victimization; inter-rater reliability was high. Youth reported on peer victimization at T1 and on coping responses to peer victimization at T1 and T2. In response to peer victimization, parents most commonly advised their children to tell an adult at school, ignore it, talk directly to the bully, and let the parent handle it. Results from regression analyses revealed several prospective associations. Parental advice to tell an adult predicted declines in advice/support seeking among girls, whereas advice to ignore predicted declines in youth conflict resolution and advice/support seeking among boys. Notably, results suggest that youth are less likely to seek advice/support or attempt to resolve conflict when parents play a more passive role, such as by advising their children to tell an adult at school or to ignore the bully. Conversely, youth are more likely to seek support/advice or attempt to resolve conflict when parents play a more active role, such as talking to school officials. These results have important implications, as youth are often encouraged to consult with a parent when they are victimized.

Title: Generation of the first attosecond pulses in the state of Alabama

Primary author (and presenter): Vaughan, John, C.

Secondary authors: Hidle, Brock; Harrison, Geoffrey; Bahder, Joseph; and Laurent, Guillaume

Department: Physics

College/ School: College of Science and Mathematics

Description:

In this talk, we will report the generation of the first attosecond pulses (1 attosecond = $10\text{E}(-18)$ second) in the state of Alabama. The attosecond pulses have been generated in a form of a train with an intense 35 femtosecond infrared laser by means of High Harmonic Generation. Such attosecond pulses open up new avenues for the study of electron dynamics in atoms, molecules, and complex systems at the highest possible temporal resolutions, using the well-established

pump/probe technique, where a first pulse (pump) is used to excite a system, and a second pulse (probe) is used to measure the response of the system at some time after excitation. In this talk, we will present preliminary results about the study of electron emission in atoms.

Title: Increasing urban well-being through introduction of moveable chair

Primary Author (and presenter): Vawter, Anna, C.

Department: Environmental Design

College/School: College of Architecture, Design and Construction

Description: The goal of this research project is to study how design of the public realm impacts quality of life in an urban setting. The study explores various avenues of design from public space, to the moveable chair, and even on Auburn's campus. The methodology used was a case study method combined with an analytical study of Auburn's campus life quality. Case studies were based on academic journals and previous studies on how public space design affects the well-being of its residents. More specifically, a case study was built on how the addition of movable chairs to public spaces increases social interaction and empowers the individual. Applying the findings to our own university public realm, I surveyed participants before and after testing of the movable chair on the green space. The study found that as the quality of public space increase, the quality of urban life increases as well. Furthermore, the quality of public spaces is improved through addition of the movable chair, which gives people choice and freedom, leading to a sense of pride and attachment. Findings corroborate that the design of the public realm largely affects the residents of the local environment on an individual and community level, and the application of the movable chair on Auburn's campus has resulted in increased community and activity on campus.

Title: Depicting city legibility

Primary Author (and presenter): Vawter, Anna, C.

Department: Interior Design

College/School: College of Human Sciences

Description:

Understanding city legibility is important because it allows one to depict the elements that make people stay and live in a specific city instead of moving to another. The goal of this research is to evaluate five cities using Lynch (1960) urban design principles that impact the legibility of a city. The cities under evaluation represent eastern and western cultures and include: Istanbul, Paris, Barcelona, Savannah, and Los Angeles. Areas of evaluation previously outlined by Lynch include (1) Connectedness: orientation of paths in a city, (2) Composition: the melodic rhythm of the streets, the progression and gradient to city center, and the (3) Character: elements of public space. Through a case study methodology, the urban form of each city will be evaluated, and a sample of 1 square mile from the city center will be examined. A series of drawings that analyze these items will also be noted and recorded for a comparison. The study will evaluate and then rank how each city adapts within Lynch's (1960) suggested model. Preliminary findings suggest that Paris will have the highest overall urban legibility, with Los Angeles having the lowest overall due to the high levels of connectedness, composition and character of Paris over Los Angeles; however, it is difficult to make such conclusions without an analysis of each item.

Title: Primary care management of heart failure patients: reducing 30-day readmission rate

Primary Author (and presenter): Vuc, Iulian

Additional Authors: Ellison, Kathy
College/School: School of Nursing

Description:

Heart failure (HF) is the most frequent reason for readmissions in the Medicare program, about 25% patients being readmitted within 30 days of discharge. There is strong evidence that lack of compliance with non-pharmacological recommendations such as daily weighing, sodium-restricted diet, fluid restriction, and exercise are associated with higher readmission rates. Evidence-based guidelines aimed at readmission prevention recommend nurse-guided self-care patient education, and continuous follow up and support in a multidisciplinary care approach. The purpose of this project was to implement patient education and continuous follow up and support from a nurse to emphasize the importance of compliance with HF recommendations in a primary care setting. Target population included adults older than 55 years with chronic HF from a primary care clinic. Following agreement to participate, participants completed Section A of the Self-Care of Heart Failure Index (SCHFI) questionnaire, a reliable and valid tool that measures self-care management specific to HF. The project leader reviewed the results to guide education and treatment recommendations. A follow up phone call at the end of each week during 4-6 weeks was made to assess patient adherence with recommended treatment. Descriptive statistics were used to describe the patient population, treatment recommendations, patient adherence to recommendations and 30-day readmission rate. X patients diagnosed with HF consented to participate (% females), average age of X (sd) yrs. Follow-up indicated that X% adhered to treatment. The mean SCHFI scores improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Upon patient education 30-day readmission was reduced from X% to X% with a p value of X indicating significant improvement. Patient education and continuous follow up of heart failure patients in a primary care office setting can reduce readmission rates. Further implementation of the project is warranted.

Title: Examining a chronic illness as a possible protective factor for engagement in risky behaviors in a college sample

Primary Author (and presenter): Wagoner, Scott, T.

Secondary Author: Gray, Wendy

Department: Psychology

College/ School: Liberal Arts

Description:

It is currently unclear to what extent college students with a chronic illness engage in risky behaviors. This gap is especially important to fill given that specific behaviors are associated with poorer health outcomes for chronic illnesses and may undermine health promotion behavior. Further, research is conflicted as to whether a chronic illness serves as a protective factor for engagement in risky behaviors. Therefore, the current study explored the risky behaviors of college students with and without a chronic illness. One-hundred and eighty-three undergraduate students (71.6% female; 38 diagnosed with a chronic illness) completed measures to assess demographics and risky behaviors (National College Health Risk Behavior Survey). Behaviors by gender and involvement in Greek life were also examined. Most (91.2%) participants reported engaging in at least one risky behavior ($M=3.78$; $SD=3.01$; $Range=0-18$). The most common risky behavior for healthy students (60.7%) and students diagnosed with a chronic illness (55.3%) was drinking or using drugs prior to a recent sexual encounter. Engagement in risky behaviors did not differ by absence ($M=3.92$) or presence ($M=3.22$) of a chronic illness, $t(178)=-1.24$, $p=.22$. Healthy male ($M=4.33$) and female ($M=3.75$) students did not differ from male ($M=3.89$) and female ($M=3.00$) students with a chronic illness in regards to risky behaviors, $F(1,179)=.06$, $p=.82$. Healthy students involved in Greek life ($M=4.28$) engaged in a similar number of risky behaviors as students with a chronic illness ($M=4.50$), $F(1,179)=3.44$, $p=.07$. Results suggest that healthy students and students with a chronic illness engage in risky behaviors

at similar rates. Interestingly, the most common risky behavior was the same for both groups. Future work should examine this result in relation to the health of young adults with chronic illnesses.

Title: Improving implementation by healthcare professionals: asthma action plans

Primary Author (and presenter): Walker, Brittany, L.

Additional Authors: Hamilton, Cam

Department: School of Nursing

College/School: Auburn University

Description:

Evidence supports asthma action plan use for improving outcomes in asthma patients; however, a gap in practice is noted. The purpose of this project is to educate healthcare providers on the implementation of the asthma action plan with the intention of increased use in practice. Action plans should be actively used rather than simply being available. The project and data collection occurred within the conference room at Dothan Pediatric Healthcare Network (DPC), a rural clinic composed of 18 providers. Care is provided from infancy to adolescence, and based on clinic reports from 2015, 4,460 patients had asthma. To recruit participants, advertisement flyers were posted throughout the clinic. Recruited participants included individuals currently employed full-time at DPC that possess current healthcare licensure. Participants were pre-tested about current asthma education knowledge; then, the healthcare professionals were educated about proper metered-dose inhaler demonstration, asthma education techniques, strategies to increase action plan implementation, and how teamwork can increase efficiency. Return demonstration of the material presented followed by issuance of a post-test was used to evaluate content comprehension. X female participants with a mean age of X consented to the project requirements. A paired sample t-test depicts participants' confidence mean level increases from X to X on a scale of one to 10. Willingness to disseminate knowledge to other professionals increases from X to X with significance less than X. Cross tabulations show intended action plan use during asthma education improved in X% of the participants. Implementation of asthma action plans during asthma education in the clinical setting is thoroughly understood post-education. Implementing the change throughout the entire clinic will benefit from incorporating participants from the small test of change; further implementation is merited.

Title: Analysis of preliminary cost estimates vs. actual bid prices on capital construction projects at Auburn University

Primary Author (and presenter): Walsh, Mark

Additional Authors: Collins, Wesley

Department: Building Science

College/School: Architecture, Design, and Construction

Description:

Accurate cost estimating for construction projects is an essential part of project development. A preliminary cost estimate in the early stages of a project can critically impact the direction and funding of a project. Auburn University Facilities Management (AUFM) manages the design and construction of all construction projects that occur on campus. AUFM has historical data on their in-house preliminary estimates and the actual bid prices for recent projects. To date, a comparison has not been completed as to the accuracy of their preliminary estimates. The goal of this research is to compare preliminary cost estimates vs. actual bid prices on AUFM projects to determine the overall accuracy of these cost estimates, and to determine if correlations exist between certain project characteristics and estimate accuracy, such as project type, project size, and construction management methodology. Preliminary estimate accuracy will be tested using descriptive and inferential statistics. Additionally, a comprehensive

historical database of AUFM preliminary cost estimates and actual bid prices will be produced for AUFM to provide them with information for use when assessing the feasibility of future projects.

Title: Paradoxical upregulation of macrophage CXCR7 by myeloid-specific gene editing in mice

Primary Author (and presenter): Wang, Chuan

Secondary Authors: Alqurashi, Thamer and Shen, Jianzhong

Department: Drug Discovery and Development

College/ School: Harrison School of Pharmacy

Description:

We previously reported that CXCR7 is induced during monocyte-to-macrophage differentiation in vitro, leading to a switch of SDF-1 signaling profile and increased macrophage migration/phagocytosis. However, the role of monocyte/macrophage CXCR7 in vivo remains unknown. The CXCR7-floxed mice (CXCR7-floxed^{+/+}) were crossed with the LyzM-Cre mice (LyzM-Cre^{+/+}) to obtain myeloid-specific deletion of CXCR7 in vivo. Unlike the systemic knockouts, this new line was viable, fertile, and did not show obvious gross physical or behavioral abnormalities. However, we found significantly higher number of periphery blood monocytes in CXCR7-floxed^{+/+}/LyzM-Cre^{+/+} mice compared with CXCR7-floxed^{+/+}/LyzM-Cre^{-/-} mice, indicating a role of CXCR7 in monocytosis. Further study indicated that this phenotype cannot be solely attributed to the disruption of LyzM gene by Cre insertion or the inclusion of floxed sequence to CXCR7 gene. Surprisingly, CXCR7 mRNA and protein expression were dramatically upregulated in CXCR7-floxed^{+/+}/LyzM-Cre^{+/+} mice compared with littermate CXCR7-floxed^{+/+}/LyzM-Cre^{-/-} mice, both in bone marrow-derived macrophages and in peritoneal macrophages, suggesting a potential compensatory mechanism. This is supported by our finding that PCR mapping indicated partial deletion of myeloid CXCR7 gene via the Cre-LoxP approach and that adenovirus delivery of the Cre gene into CXCR7-floxed macrophages in vitro mimicked CXCR7 induction in vivo. In addition, in the mouse peritonitis model, injection of thioglycolate led to more macrophage infiltration into the peritoneum in CXCR7-floxed^{+/+}/LyzM-Cre^{+/+} mice. Myeloid-specific manipulation of CXCR7 gene by using Cre-LoxP method leads to compensatory upregulation of CXCR7 in monocytes/macrophages, which is associated with increased monocytosis and cell migration in vivo.

Title: In-depth investigation of wrong-way crashes on divided highways in Alabama using Haddon Matrix and field observations

Primary Author (and presenter): Wang, Jin

Additional Authors: Zhou, Huaguo

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

Few studies exist on wrong-way driving (WWD) on divided highways. Previous findings on contributing factors and countermeasures are mostly on freeways. This study fills the gap by conducting an in-depth investigation of WWD crashes exclusively on divided highways in Alabama. Extensive efforts were made on WWD crash data analysis using Haddon Matrix and field observations. General issues, contributing factors, and countermeasures were identified through in-depth analyses of individual crashes and field review of crash locations and WWD entry points. Conclusions and recommendations were made to reduce the possibility and severity of WWD on divided highways.

Title: Script development for high-throughput data-driven design of 2D heterostructures

Primary Author: Wang, Martin
Additional Authors: Kuroda, Marcelo, A.
Department: Physics
College/School: College of Science and Mathematics

Description:

In the past decade, two-dimensional materials have emerged as promising candidates for novel energy and device applications. Over a hundred different materials showing different physical properties have been isolated or predicted to be stable. More importantly, the absence of dangling bonds on their surfaces enables them to form heterostructures with tailored physical properties by combining different materials. In this work we develop a python-script capable of producing arbitrary heterostructures joining different types of layered materials. This outputs account for: (i) arbitrary number of layers, (ii) different types of materials; (iii) displacements and rotations; and (iv) epitaxial mismatches. Discussion on the details of the implementation is provided, such as the interlayer spacing or the handling of strain. The script produces input files that will be used in first principles calculations to the high-throughput search of heterostructures with desired properties.

Title: Role of carotenoids as antioxidants in *Tigriopus californicus*

Primary Author (and presenter): Wang, Philip, R
Additional Authors: Weaver, Ryan; Hill, Geoffrey
Department: Department of Biological Sciences
College/School: College of Sciences and Mathematics

Description:

Carotenoids are organic pigments synthesized by plants that are the source of red, orange, and yellow colors in many animals. Carotenoids have antioxidant properties and can quench reactive oxygen species (ROS) as shown in many *in vitro* studies. However, little is known about the antioxidant properties of carotenoids *in vivo*. We used the marine copepod *Tigriopus californicus* to test the antioxidant properties of carotenoids in animal systems. In the wild, *T. californicus* obtains carotenoids by consuming algae. In the lab, *T. californicus* can be raised on a yeast diet to completely remove carotenoids from its system. Carotenoids can be reintroduced into the copepods by supplementing their yeast diet with powdered carotenoid. We fed yeast-raised copepods either yeast or yeast and carotenoid supplement for 48 hours. Next, we placed them in a tert-butyl hydroperoxide solution to stimulate the production of ROS. We measured their oxidative damage with a MDA-TBA kit (BioVision Inc., Milipitas, CA). Copepods that were supplemented with carotenoids showed significantly less oxidative damage when compared to copepods raised on just yeast. Past studies have typically compared the effects of a high intake of carotenoids versus a low intake of carotenoids. In contrast, we can compare the effects of carotenoid presence versus carotenoid absence—allowing for more conclusive data about the role of carotenoids in living systems.

Title: Biomass pretreatment with acetic acid for acetone-butanol-ethanol (ABE) fermentation

Primary Author (and presenter): Wang, Pixiang
Additional Authors: Wang, Yi
Department: Biosystems Engineering
College/School: College of Engineering

Description:

Butanol can be used not only as a valuable fuel source (with various advantages than ethanol) but also as an important chemical feedstock. While the traditional production through petrochemical approach is highly energy-demanding and generates various environmental pollutants, the production from renewable lignocellulosic biomass through clostridial acetone-butanol-ethanol (ABE) fermentation has attracted lots of attention. Before fermentation, a pretreatment process is required to overcome the biomass recalcitrance barrier and liberate the sugars from cellulose and hemicellulose. In this study, we evaluate acetic acid as a catalyst reagent for the biomass pretreatment (switchgrass as the feedstock). Comparing to other catalyst reagents (such as sulfuric acid), acetic acid provides a mild pretreatment condition and thus can decrease the generation of phenolic compounds (as fermentation inhibitors) from degradation; meanwhile, acetic acid can be used as a carbon source for the following ABE production. After pretreatment, the biomass is fractionated into solid cellulosic fraction and liquid prehydrolysates fraction. The cellulosic hydrolysates (obtained through enzymatic hydrolysis) and the prehydrolysates are then evaluated for ABE fermentation. With the cellulosic hydrolysates using 3 g/L acetic acid at 170 °C for 1 h, 15% higher butanol and ABE were obtained in the fermentation compared to the control (with hydrolysates from sulfuric acid pretreatment under same conditions). On the other hand, we determined that prehydrolysates contained decent amount of carbohydrates mostly as oligosaccharides and small amount of phenolic inhibitors. Upon detoxification by adsorption with activated carbon, simultaneous saccharification and fermentation (SSF) was carried out. A total of 6.1 g/L ABE was obtained from a total of 19.1 g/L sugars. These results indicate that acetic acid is a promising reagent for renewable lignocellulosic biomass pretreatment for ABE production.

Title: Creating an urban park linking Chattahoochee River and downtown Columbus, GA

Primary Author: Wang, Rui

Department: Landscape Architecture

College/School: College of Architecture, Design and Construction

Description:

This is a first-year studio project of landscape architecture, exploring both handcraft and digital process of landscape shaping. What I present here is the later part of project, focus on creating a specific city space to link the urban environment and natural environment, by using the model form which we made in the first part of landscape. The site is in the Columbus, GA. It is directly to the east across the Chattahoochee River from Phenix City, Alabama. The proposed site is located at the north downtown Columbus, just right next to Chattahoochee Riverwalk, the other side is a main city street. It is also in the downtown Columbus where surrounding commercial activities could be beneficial for its development. The challenge would be answering that what role this area should play between a waterbody (Chattahoochee River) and an urban space (Downtown Columbus) in term of the balance of nature and culture. I consider the site in downtown Columbus should be like a buffer between urban area and natural area, where it could facilitate the ecological process and slowdown the urban life. In addition, through dense analysis and creative working process, I apply my model form to the specific site, developing numerous activities and different type of green space, where people enjoy both modern life and natural beauty here.

Title: Investigation of tick density, diversity, and pathogen prevalence among forested sites in east-central Alabama

Primary Author (and presenter): Wang, Xiaodi

Additional Authors: Mathias, Derrick

Department: Entomology and Plant Pathology

College/School: Agriculture

Description:

Ticks are obligate hematophagous arthropods, and as vectors of human disease, they are second only to mosquitoes in medical importance. There are many unknowns in Alabama regarding ticks and tick-borne diseases, which require further study. We sampled ticks across eight forested sites located in or near Auburn, AL, and investigated tick density, diversity and pathogen prevalence. Although habitats were similar across sites, tick density varied between locations. Seven tick species were collected, but 97.71% of all samples were a single species, the lone star tick, *Amblyomma americanum*, which is the primary vector of ehrlichiosis. For prevalence studies, we used a multiplex qPCR assay to screen DNA samples from lone star ticks simultaneously for five pathogens (*Ehrlichia chaffeensis*, *E. ewingii*, Panola Mountain *Ehrlichia*, *Rickettsia amblyommii*, *R. parkeri*). *Ehrlichia chaffeensis* and/or *E. ewingii*, causative agents of ehrlichiosis, were found at half of the locations, but only 0.39% of all lone star ticks were infected. The highest infection rate at any location was 1%. In contrast, *R. amblyommii*, a tick endosymbiont with unknown public health significance, was found in 46.33% of the 1119 lone star ticks tested. None of the specimens tested positive for Panola Mountain *Ehrlichia* or *R. parkeri*. Despite the low infection rate of *Ehrlichia* spp. in lone star ticks, high encounter rates with this species in deciduous woodlands in the region suggest that there is a moderate risk of acquiring ehrlichiosis in these habitats.

Title: Identification of NF- κ B related genes in channel catfish and their expression profiles in mucosal tissues after columnaris bacterial infection

Primary Author (and presenter): Wang, Xiaozhu

Additional Authors: Liu, Shikai; Abebe, Ash; and Liu, Zhanjiang

Department: Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

Interactions of NF- κ B family, I κ B family and IKK complex are the key components of NF- κ B pathway that is essential for many biological processes including innate and adaptive immunity, inflammation, and stress responses. In spite of their importance, systematic analysis of these genes in fish has been lacking. Here we report a systematic study of the NF- κ B related genes in channel catfish. Five NF- κ B family genes, five I κ B family genes and three IKK complex genes were identified in the channel catfish genome. Annotation of these 13 NF- κ B related genes was further confirmed by phylogenetic and syntenic analysis. Negative selection was found to play a crucial role in the adaptive evolution of these genes. Expression profiles of NF- κ B related genes after *Flavobacterium columnare* (columnaris) infection were determined. The majority of NF- κ B related genes were significantly regulated in mucosal tissues of gill, skin and intestine after columnaris infection, indicating their potential involvement in host defense responses. Distinct expression patterns of NF- κ B related genes were observed in susceptible and resistant catfish in response to columnaris infection, suggesting that expression of these genes may contribute to the variations in disease resistance/susceptibility of catfish.

Title: Multiple across-strain and within-strain QTL suggest highly complex genetic architecture for hypoxia tolerance in channel catfish

Primary Author (and presenter): Wang, Xiaozhu

Additional Authors: Liu, Shikai; Jiang, Chen; and Liu, Zhanjiang

Department: Fisheries, Aquaculture and Aquatic Sciences

College/School: Agriculture

Description:

Oxygen is essential for life of all aerobic organisms. The ability to survive hypoxic conditions is important for various organisms, especially for aquatic animals. Teleost fish, representing more than 50% of vertebrate species, are extremely efficient in utilizing low levels of dissolved oxygen in water. However, huge variations exist among various taxa of fish in their ability to tolerate hypoxia. In aquaculture, hypoxia tolerance is among the most important traits because hypoxia can cause major economic losses. Genetic enhancement for hypoxia tolerance in catfish is of great interest, but little was done with analysis of the genetic architecture of hypoxia tolerance. The objective of this study was to conduct a genome-wide association study (GWAS) to identify quantitative trait loci (QTL) for hypoxia tolerance using the catfish 250K SNP array with channel catfish families from six strains. Multiple significant and suggestive QTL were identified across and within strains. One significant QTL and four suggestive QTL were identified across strains. Six significant QTL and many suggestive QTL were identified within strains. There were rare overlaps among the QTL identified within the six strains, suggesting a complex genetic architecture of hypoxia tolerance. Overall, within-strain QTL explained larger proportion of phenotypic variation than across-strain QTL. Many of genes within these identified QTL have known functions for regulation of oxygen metabolism and involvement in hypoxia responses. Pathway analysis indicated that most of these genes were involved in MAPK or PI3K/AKT/mTOR signalling pathways that were known to be important for hypoxia-mediated angiogenesis, cell proliferation, apoptosis and survival.

Title: Solubilization of nonstructural carbohydrates as a function of soaking interval and water temperature in southern forages commonly fed to equids

Primary Author (and presenter): Wassel, Brooklyne, M.

Additional Authors: Wagner, Elizabeth; Turner, Stephanie; Muntifering, Russell; Kaltenboeck, Bernhard; and Holland, Courteney

Department: Animal Sciences

College/School: Agriculture

Description:

Nonstructural carbohydrates (NSC) play a major role in the diet of equids prone to laminitis or afflicted with metabolic conditions such as insulin resistance. Although the threshold of <10% dietary NSC has been set as a guideline for these horses, the execution of feeding below this limit is not fully understood due to the complexities by which water leaches NSC from plants. If the true NSC percentage within a given forage is not understood, it may not be safe to feed to metabolically challenged horses and can potentially lead to serious complications including death. Although cool-season forages have been studied, southern, warm-season forages have not. A study was conducted to determine kinetic characteristics of NSC solubilization in forages commonly fed in the southeastern USA to ascertain appropriate feeding management practices. Samples (180 g) of 4 hays: alfalfa (*Medicago sativa*), perennial peanut (*Arachis glabrata*), and Coastal and Tifton-85 varieties of bermudagrass (*Cynodon dactylon*) were evaluated in 50°C and 28°C soaking liquor at 7 soaking intervals. Samples were assessed for total nonstructural carbohydrates (TNC) using wet chemistry. Nonlinear regression models were constructed to measure the percentage of TNC remaining to create prediction equations. Soaking interval was significant with respect to TNC loss for all hay types except alfalfa which trended toward significance. Water temperature was not significant; thus, solubilization prediction equations were created for each hay ignoring water temperatures. These formulas may be utilized to establish the appropriate soaking interval for the 4 forages for them to be safely fed to afflicted equids. Regardless of forage quality or maturity, these formulas can be used to design effective soaking treatments to obtain desired TNC concentrations below recommended thresholds thus decreasing the assumptions made in management of metabolically challenged horses and improving the welfare of this group.

Title: Sequencing canines with mammary tumours to identify hereditary breast cancer genetic risk variants
Primary Author (and presenter): Watkins, Anna, L.
Additional Authors: Gobel, Katie and Merner, Nancy
Department: Drug Discovery and Development
College/School: Harrison School of Pharmacy

Description:

Canines provide an excellent genetic model for human disease. Canines and humans are genetic homologs, and due to limited intra-breed heterogeneity from canine breeding practices, canine samples provide a beneficial tool in identifying genetic markers for diseases. Ultimately, this homogeneity is advantageous in trying to identify the missing heritability of human disorders that have been difficult to decode for decades. This research project focuses on using canines with mammary tumors as a model for hereditary breast cancer to help solve the ~70% of human hereditary breast cancer cases that are currently genetically unsolved. Very few genetic research studies have focused on identifying inherited risk factors for canine mammary tumour (CMT). Our lab currently has a CMT cohort of 85 DNA samples extracted from blood/buccal swabs. This includes 32 different canine breeds from six of the seven American Kennel Club (AKC) recognized groups; the most represented breeds are Golden Retrievers (n=20), Siberian Huskies (n=8), and Standard Schnauzers (n=7). The cohort also includes 3 male CMT cases, which is a hallmark of hereditary CMT cases. Furthermore, pedigree analyses identify dogs within the CMT cohort who stem from a common ancestor. Currently, this includes seven different canine pedigrees from five different breeds, representing 46% of the CMT cohort. Select samples from these pedigrees have been chosen for genome sequencing, and will be compared to human hereditary breast cancer sequencing data that has been generated in our laboratory. This comparative genomics aspect can lead to discovery of novel genes that influence breast cancer risk.

Title: Morphology of introduced populations of *Orconectes virilis* (Decapoda, Cambaridae) is dependent on habitat

Primary Author (and presenter): Weber, Jennifer, M.
Additional Authors: Williams, Bronwyn and Helms, Brian
Department: Biological Sciences
College/School: College of Science and Mathematics

Description:

Invasive crayfish can strongly influence the composition of freshwater communities, often out-competing native species. Morphologic plasticity may allow introduced species to successfully establish populations in novel habitats. The width of the areola, an hourglass shaped structure on the dorsum of the crayfish, has been hypothesized to indicate gill volume, which impacts the efficiency of oxygen extraction. A narrower areola width likely increases the gill volume by providing more space for gill attachment. If the trait is morphologically plastic, individuals from lower dissolved oxygen environments, such as lakes, may exhibit a narrower areola and higher gill volume compared to individuals from higher dissolved oxygen environments, such as rivers. Lakes represent a relatively lower oxygen environment compared to rivers. To test whether variation in areola width exists between introduced crayfish from lake and river habitats, 719 *Orconectes virilis* from southern Canada and northern United States were examined. Individuals were classified as either “lake” or “river” depending on their collection locality. Length and width of the areola of each individual was measured, and a length-to-width ratio was calculated to control for crayfish size. The two groups were compared using a T-test. We found that individuals differ in areola width based upon habitat ($t= 5.18$, $df= 195.57$, $p= <0.001$), with lake-dwelling crayfish having narrower areola (mean ratio=13.23), and river dwellers having a wider areola (mean ratio=11.44). These data

suggest that lake-dwelling crayfish respond to lower dissolved oxygen-level environments by exhibiting a narrower areola width, potentially indicating an increase in gill volume. Future work will focus on the respiratory capacity of *O. virilis* individuals to determine if areola variation is associated with patterns of respiration.

Title: Multispectral opto-acoustic tomography provides a potential non-invasive method of tracking infections *in vivo*

Primary Author: Wesolowski, Alec, R

Additional Authors: Brazelle, Morgan; Brannen, Andrew; Panizzi, Peter

Department: Department of Drug Discovery & Development,

College/School: Harrison School of Pharmacy/Auburn University

Description:

Tracking of light-producing pathogens non-invasively in mice has been made possible due to Bioluminescence imaging (BLI). However, inherent biases, such as difficulty in procuring a clear signal from deep tissue or bone infection, have been attributed due to the light absorption and scattering properties of blood, fat, and muscle. Multispectral Opto-Acoustic Tomography (MSOT) technology overcomes these issues and can monitor *in vivo* propagation of a pathogen in mouse models over time. The MSOT reconstructs images by use of a near infrared laser that excites probes or agents causing thermoelastic expansion. Ultrasound detectors acquire expansion and reconstruct images from the data collected. As part of our study, we injected five murine models intravenously with light-producing *Staphylococcus aureus* (Xen29). Using the optoacoustic imaging system, we followed the spread of the intravenous infection throughout the organism. Before scanning the murine models, they are injected with XenoLight Redi-ject 750 to label proteins associated with *S. aureus* Xen29 cell surface. This provides a contrast agent to detect the infection by MSOT. Using the MSOT imager and XenoLight Rediject agent, we could detect 3 of the 5 animals imaged had kidney and liver abscesses present on day 5 following Xen29 injection. Once the data has been collected, the murine models are sacrificed and the organs are preserved for histology. To confirm sites of infection, histology was performed using gram and H&E staining techniques to verify the presence of gram-positive pathogens. These results suggest new avenues available for the *in vivo* study of Staphylococcal infections.

Title: Handwriting without tears

Primary Author (and presenter): Westbrook, Katherine E

Additional Authors: Porterfield, Stephen C; Nichols, Elizabeth L; Foster, Penny P; Pangelinan, Melissa M.

Department: Biological Sciences/School of Kinesiology

College/School: College of Science and Mathematics/College of Education

Description:

The aim of the intervention was to improve handwriting and fine motor skills in children and teens with and without developmental disabilities (ages 5 – 14 years; n=17) through a 10-week Handwriting Without Tears (HWT) program. HWT is designed to improve the effectiveness, efficiency, and legibility of handwriting strokes. Our presentation will discuss three components of the intervention: pencil grip, sequence and stroke of letters, and Mat Man. The participants completed activities to improve stability and quality of pencil grip (i.e., develop intrinsic hand muscles to build strength and stamina). Activities included squirting a water bottle on a pellet to reveal a toy or mixing different water colors using a turkey baster. Sequencing refers to the correct order of strokes for each letter. Importantly, proper sequencing improves the participant's speed and legibility. "Wet, Dry, Try" is an activity to practice letter strokes. The instructor

makes letter strokes using a piece of chalk and specific words to describe the types of strokes (“L” is big line down, small line across). The participant erases the letter using a small wet sponge using the same strokes, again guided by the verbal instructions. They dry the chalkboard with a tissue, again using the same strokes. Participants practice putting together Mat Man’s body using parts of the letter blocks (i.e., big line, little line, big curve, little curve). This activity helps improves the drawing a person) and identification of body parts, understanding of laterality, and encourages cooperation between the participants, and involves multisensory integration. Pre/post improvements in these skills (grip, letter sequence, and drawing a person) were observed. Moreover, parents reported greater improvements from this intervention compared with in-school occupational therapy.

Title: Variations in disclosure experiences among young adults exposed to domestic violence

Primary Author (and presenter): White, Shelby

Additional Authors: Lampkin, Ginny, Abele, Andrew, Hlavaty, Kathleen, & Haselschwerdt, Megan L.

Department: Human Development and Family Studies

College/School: College of Human Sciences

Description:

Each year an estimated 7 to 15.5 million youth are exposed to DV in the United States, however, only 57% of exposed youth report disclosing their exposure. Previous literature has documented a variety of factors (e.g., embarrassment, fear) that influence why DV-exposed youth choose to disclose or not. To our knowledge, no study has examined how disclosure experiences vary by the type of violence youth are exposed to. DV exposure experiences differ by the type of violence; coercive controlling violence (CCV) – physical violence occurring within the context of nonphysical abuse tactics aimed at controlling one’s partner (i.e., coercive control) – or situational couple violence (SCV). Therefore, disclosure experiences may also differ by type of DV (i.e. CCV vs. SCV). To address this gap in literature, this poster has two aims, 1) describe who young adults disclose DV exposure to and their perceived support after disclosure and 2) compare the disclosure experiences of young adults exposed to CCV and SCV. Participants ($n = 83$; 74% female) were part of a larger mixed methods study on young adults, ages 18-25, who were exposed to father perpetrated DV. On average, young adults reported disclosing to an average of approximately three people ($M = 2.77$, $SD = 1.70$), the most common individual they disclosed to was a close friend ($n = 53$). Young adults exposed to CCV were more likely to disclose to a close friend, $t(75) = 4.06$, $p < .001$, a therapist, $t(81) = 2.94$, $p < .01$, and police officers, $t(34) = 34.32$, $p < .01$. They also disclosed to more people, on average, $t(38) = 3.65$, $p < .001$, and to more informal supports, $t(62) = 2.50$, $p < .05$. Finally, the two groups differed in their perceived support after disclosure. It is possible that young adults exposed to CCV disclosed more frequently due to increased need for support. Future research should aim to elaborate on how decisions to disclose and perceived support are associated with adjustment for DV-exposed young adults.

Title: Trauma type and suicidal ideation: The mediating effect of cognitive distortions

Primary Author (and presenter): Whiteman, Sarah, E.

Additional Authors: Petri, Jess; Kramer, Lindsay; and Weathers, Frank

Department: Psychology

College/School: Liberal Arts

Description:

It is well-established that trauma survivors, particularly those exposed to interpersonal trauma, are at increased risk for suicidality compared to those who have not experienced a traumatic event (Tarrier & Gregg, 2004; LeBouthillier, McMillan, Thibodeau, & Asmundson, 2015), but reasons for this increased

risk are unclear. Previous findings suggest that cognitive distortions may mediate the relationship between trauma type and suicidality (Panagioti, Gooding, Taylor, & Tarrier, 2013). The aim of the present study was to examine the potential mediating effect of three types of cognitive distortions (i.e., negative cognitions about the world, negative cognitions about the self, and self-blame) on the relationship between trauma type and suicidality. Trauma-exposed undergraduates ($N=190$) completed the Posttraumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999) and Depression Symptoms Inventory, Suicidality Subscale (DSI-SS; Metalsky & Joiner, 1997). Path analysis was used to evaluate models in which cognitive distortions were hypothesized to mediate the relationship between trauma type and suicidal ideation. Results indicated that negative cognitions about the world, but not negative cognitions about the self or self-blame, fully mediated the effects of trauma type on suicidal ideation. Specifically, trauma type predicted suicidal ideation ($\beta = .35, p < .001$), but not after accounting for the effect of negative cognitions about the world ($\beta = -.05, p = .56$). The indirect effect of trauma type on suicidal ideation through negative cognitions about the world was significant, $\beta = .073, p < .001$. The present findings provide support for the inclusion of negative cognitions about the world in evaluations of potential suicide risk, particularly with trauma survivors. Limitations include reliance on self-report measures, a cross-sectional design, and the lack of a demographically diverse sample.

Title: Development and characterization of DNA aptamers targeting Small Cell Lung Cancer cells

Primary Author (and presenter): Whitener, Ricky, J.

Additional Authors: Wower Iwona, K.; Byrne, Mark, E.; and Wower, Jacek

Department: Chemical Engineering and Department of Animal Sciences

College/School: Samuel Ginn College of Engineering and College of Agriculture

Description:

Small-cell lung cancer (SCLC) represents 10% to 15% of lung cancers and is clinically the most aggressive subtype, with a 5-year overall survival rate as low as 5%. Molecular steps leading to SCLC are still poorly understood, and this has translated into the absence of efficient early detection strategies or targeted therapies.

We developed DNA aptamers that bind strongly and specifically to NCI-H69 SCLC cells. One of these aptamers, denoted as SCLC#1L, is composed of 71 nucleotides. This aptamer is predicted to form a lollipop-like secondary structure. Our studies revealed that the SCLC#1L aptamer can be trimmed to a shorter 35 nucleotide-long thymidine-rich molecule, which we denote as SCLC#1S. The SCLC#1S aptamer is unable to adopt a predictable secondary structure but binds to NCI-H69 SCLC cells as strongly as SCLC#1L. Control experiment demonstrated that the shortened aptamer is unable to recognize PC-3 prostate and MCF-7 breast cancer cells. Cross-linking experiments revealed that, upon UV-irradiation, the [$5' \text{-}^{32}\text{P}$]-labelled SCLC#1S aptamer molecules become covalently attached to five proteins. One of these proteins has been tentatively identified as RuvB1. This protein normally resides in the nucleus where it acts as a DNA-dependent ATPase and DNA helicase. RuvB1 protein associates with several multisubunit transcriptional complexes and with protein complexes involved in both ATP-dependent chromosome remodeling and histone modification. It plays an essential role in oncogenic transformation by MYC. Moreover, RuvB1 is essential for cell proliferation. Recent studies demonstrated that RuvB1 is over-expressed in NCI-H69 SCLC cells. In these cells, RuvB1 has been found not only in the nucleus but also in the cytoplasm and membrane. These findings suggest that the SCLC#1S aptamer molecules can be developed as excellent imaging agents and be used for constructing potent nanoparticles for targeted delivery of therapeutic agents.

Title: Evaluating developmental effects of a single follicle culture system and granulosa cell biopsies on fertilized cumulus-oocyte-complexes

Primary Author (and presenter): Willhelm, Gabrielle

Additional Authors: Read, Casey; Dyce, Paul

Department: Animal Sciences

College/School: College of Agriculture

Description:

Traditional *in vitro* fertilization (IVF) protocols utilized to produce in vitro embryos involve culturing the cumulus-oocyte-complexes (COCs) together as a group. Group culture strategies for bovine embryos is time efficient, but does not permit specific developmental outcomes to be tied to collected samples. Retrospective time-course analysis of single culture COCs would allow for investigation into biological markers that could be useful in predicting developmental potential. There is some evidence that embryo development can be negatively affected by culturing them individually. Moreover, in order to investigate both transcript and protein expression, there is a need to collect two cumulus cell biopsies immediately following COC isolation. This may also negatively affect embryo development. In this regard, we investigated the feasibility of using a single follicle IVF system and compared the embryo development to that of a traditional group culture method. We compared the cleavage and embryo development rates of the group culture and single culture systems and utilized the single culture system to investigate several prospective biological markers of developmental potential. We found no significant difference between group culture and single culture COCs with regards to cleavage or morula rates. Group culture COCs had a cleavage rate of $69.33 \pm 3.211\%$ vs. $66.43 \pm 2.507\%$ ($P > 0.05$) cleavage rate for COCs. Morula rates for group culture COCs and single culture COCs were $24.75 \pm 3.351\%$ and $22.54 \pm 3.163\%$ ($P > 0.05$) respectively. The single culture system evaluated in this study is robust and viable for future use. Transcript levels of different genes related to cellular communication and oocyte health are still being evaluated to determine the utility of the single culture system.

Title: Utilizing a screening Tool to Improve Depression Outcomes

Authors: Williams, Rachel, M: Ellison, Kathy Jo

College/School: Auburn University School of Nursing

Description:

In today's society, depression is a disease that is constantly being overlooked. Some psychiatric practices fail to have a depression screening tool in place. Unfortunately, this leads to failure of identifying patients with depression. The purpose of this project was to implement a screening method that can be utilized in a psychiatric practice to improve depression outcomes by providing appropriate treatment recommendations. Target population included adults (19-92 yrs.) with mental illness. Following permission, participants completed a validated depression screening tool (PHQ-9) in a psychiatric practice. The psychiatrist reviewed the results to guide treatment recommendations. Antidepressants were prescribed or adjusted and some patients were referred for counseling when indicated. A follow up phone call at 4-6 weeks was made to assess patient adherence with recommended treatment. Descriptive statistics were used to describe the patient population, prevalence of depression symptoms identified, how many required medication or adjustments and how many required referrals. Among patients with depressive symptoms at baseline, the pre-post PHQ-9 responses were compared with paired t-test. X gave permission to participate (% female), average age of X (sd) yrs. X % were identified with depression symptoms, X % were treated with medication, and X % were recommended some type of referral. Follow up indicated the X% adhered to treatment. Among those with baseline depression symptoms, the mean PHQ-9 score improved from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Screening for depressive symptoms among patients with other mental illness identified symptoms that guided

appropriate treatment and recommendations. Implementing a screening method in a psychiatric practice can identify early depressive symptoms and improve outcomes.

Title: Diabetes education: producing quality outcomes through knowledge and self-management

Primary Author: Wilson, Bridget, D.

Additional Authors: Peterson, Mary

College/ College: School of Nursing

Description:

Evidence-based guidelines recognizes a comprehensive education approach among the Type II diabetes population as being the cornerstone in achieving an enhanced patient knowledge base. The purpose of the project is to assess the knowledge level of the Type II Diabetes patient in regards to their disease process including self-management practices such as frequent glucose checks and a routine exercise patterns. Review of adherence to such recommendations is assessed. Target population inclusions are adults (20 years of age and older) with Type II Diabetes that are being seen in a diabetes clinic. After informed consent, a Diabetes Knowledge Test (DKT) is completed in order to assess patient pre-post education knowledge. Specific education regarding diabetes will be provided. Daily glucose checks and exercise patterns will be tracked by patients. Follow up will occur after 2 weeks of participation. Among the Diabetes Type II participant group, the pre-post knowledge test results are compared using a paired *t*-test. X consented to participate, with % being male and % female. Follow up indicated that % increased their total number of exercise days per week post education. Improvement occurred from pre- (mean, sd) to post (mean sd) DKT scoring significantly ($p < 0.05$). Comprehensive education among Type II diabetes patients demonstrates an increased knowledge base evidenced by improved self-management behaviors. such as increased exercise days per week and daily glucose monitoring. With thorough education and follow up, an improved patient knowledge level is achievable in the diabetes clinic setting and continued project implementation is recommended.

Title: Rapid Assessment of Atrial Fibrillation Self-Management (RAAFSM)

Primary Author: Wilson, Douglas, V.

College/ School: Auburn University School of Nursing

Description:

There is strong evidence that although catheter ablation is effective in the treatment of atrial fibrillation (AF), each case must be individualized. Evidence also suggest patients must have a good understanding of AF and the treatment options in order to comply with the selected plan. The purpose of this project was to increase patient's knowledge of AF, thereby increasing the patient's self confidence in the ability to participate in their care. Patient's confidence in the self-management of AF as it relates to an increase in education was assessed. Target population included adults with AF in a rural health clinic. Following agreement, participants completed a baseline confidence scale (CS) and AF exam. The patients were given an education tool (ET) for review and study. The participants were contacted in two weeks for follow up and again in two more weeks to retake the exam and reassess their confidence in order to measure the efficacy of the ET. Descriptive statistics were used to describe patient population, age when diagnosed with AF, and present treatment plan. Confidence and exam scores were measured pre and post reading the ET. Data was analyzed using a paired *t*-test. X participated (X% females), average age of X (SD) yrs. Follow up revealed that X% studied the ET. The CS and exam scores improved significantly ($p < 0.05$) with CS going from pre (mean, sd) to post (mean,sd) and exam scores pre (mean,sd) to post (mean,sd). Patients with AF who undergo diagnosis specific education have more confidence in their ability to self- manage (be interactive in) their treatment plan. Evidence suggest that an increase in

education leads to an increase in treatment compliance. Educating AF patients with an increase in compliance is achievable in this rural clinic and further evaluation of the project is warranted.

Title: Diabetic self-management education in the primary care setting using the chronic care model

Primary Author (and presenter): Wolff, Melissa, N.

Additional Authors: Ellison, Kathy Jo

Department: School of Nursing

College/School: Auburn University of Montgomery

Description:

There is strong evidence uncontrolled diabetes leads to costly health related complications. Research demonstrates Diabetic Self-Management Education (DSME) is an effective tool in lowering blood sugar values, increasing patient's knowledge and self-efficacy. The purpose of this project was to implement a DSME program into the primary care setting using the Chronic Care Model (CCM). Patient adherence was monitored throughout the project. The target population included persons with type 2 diabetes ≥ 19 years old. Patients were identified using a DSME algorithm or by their insurance company. Following agreement of participation, a Perceived Diabetes Self-Management Scale (PDSMS) was completed. Patients participated in two educational sessions and completed another PDSMS. The patients' progress was monitored by phone weekly. The staff was educated on the elements of the CCM to improve execution DSME program into the primary care setting. The staff completed pre-and post-project surveys on the elements of the CCM. Descriptive statistics were used to describe the patient population. Patients' pre-post blood sugar levels were compared with paired t-test and also the survey results for patients and staff. X consented to participate. X% were identified by the DSME algorithm, X% Caucasian, X% African-American, X% MOWA Indian. Among the participants, the mean PDSMS scores decreased from pre- (mean, sd) to post (mean, sd) significantly ($p < 0.05$). The mean blood sugar level pre-(mean, sd) to post (mean, sd) significantly ($p < 0.05$). The staff had improved survey scores from pre-(mean, sd) to post (mean, sd) significantly ($p < 0.05$). Implementing a DSME program into the primary care setting using the CCM is effective in improving outcomes. Improvements in diabetic management in type 2 patients in this primary care setting are achievable and further implementation of the project is warranted.

Title: The influence of time-restricted feeding on diet-induced obesity, metabolic dysfunction and cognitive impairments

Primary Author (and presenter): Woodie, Lauren N.¹

Additional Authors: Alhowail, Ahmad²; Suppiramaniam, Vishnu²; and Greene, Michael¹

Department: Nutrition, Dietetics and Hotel Management¹ and Drug Discovery and Development²

College/School: ¹School of Human Sciences, ²Harrison School of Pharmacy

Description:

Obesity itself can lead to a diminished quality of life; but the accompanying chronic diseases result in physical, emotional and monetary strain. In particular, type-II diabetes mellitus (T2DM) and non-alcoholic fatty liver disease (NAFLD) have high comorbidity rates with obesity. Additionally, the negative impact of obesity on cognition and memory has been well documented, and Alzheimer's Disease is now referred to as type-III diabetes. The lack of manageable and effective treatments is a reason for the continuing rise in obesity. Time-restricted feeding (TRF) - restricting food consumption to the active phase - has been proposed as a novel feeding technique to address diet-induced obesity (DIO). TRF differs from dietary regimens in that the individual can consume food according to preference during the allotted time. While a previous animal study from our lab found that TRF has positive effects on weight

gain, metabolic health, fat deposition and NAFLD progression, there is little known about its ability to ameliorate obesity-induced T2DM and cognitive deficits. Thus, we sought to fill this gap by implementing TRF on a mouse model of DIO while collecting additional data on glucose tolerance and behavior. We maintained mice on either a standard rodent chow with tap water (control) or a high-fat Western diet with sugar water (HFS) for six weeks prior to TRF. We then implemented TRF in a subset of both the control and HFS fed groups by allowing food access between zeitgeber time 1300 and 2200. Metabolic phenotype and food uptake data were obtained both pre- and post-TRF, and glucose and insulin tolerance tests were used to assess the progression of diet-induced T2DM. Additionally, we evaluated *in vivo* memory with Y-maze and Novel Object Recognition tasks, as well as *ex vivo* plasticity with electrophysiological field recordings. We expect our results to indicate that TRF ameliorates the impacts of a Western diet on weight gain, metabolism, NAFLD, T2DM and cognition.

Title: Effect of vertical accelerations on steel frame structures

Primary Author (and presenter): Wu, Hongyang

Additional Authors: Marshall, Justin

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

Current design practice for design of structures for earthquake effects focuses on the horizontal accelerations imposed on the structure. However, according to recent data and analysis of ground motion recordings, vertical peak accelerations (PGA) are often as high as or higher than the maximum horizontal. This is especially true in the near fault region where the vertical accelerations can be much greater than the horizontal accelerations. In an effort to investigate the demands that vertical ground motions impose on steel frame structures, this study will study the problem using three- and six-story steel structures. For each structure height a special moment frame and buckling-restrained brace (BRB) frame was designed and analysed using nonlinear dynamic analysis. For the moment frame structures, two different configurations were investigated. The two different cases included the moment frame beams as girders and the moment frame beams as beams. 2D models of the frames were created and included the tributary mass in both the vertical and horizontal direction. The RBS connections were modelled nonlinearly including both stiffness and strength degradation in the program Perform 3D. Columns and panel zones were also modelled to include the impacts of nonlinear behaviour. A suite of 20 ground motions was selected from the far-field and near-field suites of recorded ground motions in the FEMA P695 method. The ground motions were selected based on the vertical to horizontal acceleration ratio. The suite of horizontal motions was then amplitude scaled by determining an average scale factor over the frequency range of importance. Each of the structural models was analysed under the horizontal and horizontal plus vertical ground accelerations to determine the impacts. The results show that the vertical motions increase the ductility demands in the beams and the axial force demands in the columns.

Title: Diabetic dyslipidemia: Efficacy of diabetes self-management education and medical nutrition therapy

Primary Author (and presenter): Wyatt, Chris, S.

Additional Authors:

Department: Nutrition, Dietetics, and Hospitality Management

College/School: Human Sciences

Description:

Diabetic dyslipidemia is a pattern of lipid disorders often seen as a comorbidity in individuals with Type 2 diabetes (T2D). The metabolic abnormality is characterized by high serum triglycerides (TG), low high-density lipoprotein cholesterol (HDL-C), and high low-density lipoprotein cholesterol (LDL-C) that increase an individual's risk for developing cardiovascular disease (CVD). Specifically, the TG/HDL ratio has been identified as a useful biomarker of CVD risk in patients with T2D. Provision of diabetes self-management education (DSME) and medical nutrition therapy (MNT) have been demonstrated to improve glycemic control and reduce risk of comorbid disease. The objective of this study was to demonstrate the efficacy of DSME and MNT in patients with diabetic dyslipidemia associated with T2D. Data utilized for this analysis was taken from a multisite retrospective chart review of patients with T2D receiving DSME and MNT through four regional American Diabetes Association (ADA)-recognized education programs in Alabama. Baseline and follow-up lipids were available for a small subset of the population (n=29). Paired t-tests were used to determine significance. Statistically significant improvement in the lipid profile was observed at follow-up: triglycerides (-53 mg/dL, $P < 0.0001$), HDL (+3mg/dL, $P < 0.05$), and TG/HDL ratio (-1.59, $P < 0.0001$). A modest improvement in total and LDL cholesterol was observed, but did not reach statistical significance. Reduction in A1C averaged $1.86\% \pm 2.18$ ($P < 0.001$) from baseline to follow-up. DSME and MNT are effective means of improving dyslipidemia associated with T2D. Reductions in triglycerides paralleled reductions in A1C.

Title: Solid-state naphthylsalophen actinide complexes and rare thorium fluorescence

Primary Author (and presenter): Wyss, Kevin M.

Additional Authors: Hardy, Emily E.; Gorden, Anne E. V.

Department: Chemistry and Biochemistry

College/School: College of Science and Mathematics

Description:

Increasing the use of nuclear fuels for energy is plagued with problems that include what to do with used fuels and the potential for an accidental spill. The ability to sense radioactive contamination after a possible release event would be critical to determining the scope of the threat, and reducing the potential for exposure from spreading it. Thorium is a more accessible water soluble nuclear contaminant, along with the more publicized and controlled uranium and plutonium. Thorium is also a common contaminant in lanthanide ore deposits. Being able to detect thorium via an on-site fluorescent sensor would greatly aid in the identification of release events. For detection and isolation applications, naphthylsalophen is a salen type ligand made through 2 successive condensation reactions between 1,2-diaminobenzene and 2-hydroxynaphthaldehyde affording a O-N-N-O binding pocket previously shown to bind actinides. This ligand was found to bind thorium in a 2L:1M complex and a hydrogen bonding tetramer with uranyl. Solid-state structures of uranyl and thorium complexes are discussed as well as unique fluorescence upon thorium coordination.

Title: Impact of harvest maturity on consumer preference, fruit quality, and postharvest longevity of two kiwifruit cultivars (*Actinidia chinensis* Planch.)

Primary Author (and presenter): Xie, Lingbo

Additional Authors: Spiers, James, D.; Bell, Leonard, N.; Kessler, J. Raymond; and Woods, Floyd M.

Department: Horticulture

College/School: Agriculture

Description:

Harvest maturity is tightly associated with postharvest performance and consumer preference of kiwifruit. This research focused on the impact of harvest maturity on consumer preference and postharvest performance of two *Actinidia chinensis* cultivars, 'AU Golden Dragon' and 'AU Golden Sunshine', grown in central Alabama. Sensory evaluation was conducted in 2016 using fruit harvested at 7 d intervals from mid-Aug. to mid-Sept for 5 weeks and 4 weeks, respectively for 'AU Golden Dragon' and 'AU Golden Sunshine'. In general, 'AU Golden Dragon' was more popular with consumers than 'AU Golden Sunshine'. Harvest maturity did not affect overall consumer preference for 'AU Golden Dragon', while consumers preferred 'AU Golden Sunshine' fruit harvested on 29 Aug. 2016. To determine the effect of harvest maturity on fruit quality and postharvest longevity of these two cultivars, fruit were harvested at 7 d intervals from mid-Aug. to mid-Sept. in 2015 and 2016. Fruit quality attributes were measured initially and subsequently every 14 d until fruit was unmarketable, or chilling injury became severe. As harvest date increased, there was a quadratic increase in chilling injury incidence of 'AU Golden Dragon' and a linear decrease in chilling injury incidence of 'AU Golden Sunshine' in 2016. Chilling injury incidences increased as storage time increased. 'AU Golden Dragon' harvested around 30 Aug. with soluble solids content approximately 8% and 'AU Golden Sunshine' harvested around 13 Sept. with dry matter content >18% had better postharvest performance.

Title: Evaluation of foamed warm mix asphalt with reclaimed asphalt pavement: Field and laboratory experiments

Primary Author (and presenter): Xie, Zhaoxing

Additional Authors: Trana, Nam; Taylora, Adam; Juliana, Grant; Westa, Randy; and Welchb, Jarrett

Department: Civil Engineering, National Center for Asphalt Technology

College/School: Samuel Ginn College of Engineering

Description:

Warm mix asphalt (WMA) technology and reclaimed asphalt pavement (RAP) materials have been increasingly used in asphalt paving mixtures due to environmental and cost benefits. Combining WMA and RAP offers more economic and environmental benefits compared to using either alone. To evaluate the combined effect of WMA and RAP, two WMA mixtures with 20% and 30% RAP were produced using water-injection plant foaming, and they were compared with two comparable HMA mixtures with 20% and 30% RAP. The four mixtures were paved on I-70 near Eagle, Colorado in May 2013. Laboratory performance properties of plant-produced mixes and field performance of the four test sections after 13, 25, 38 months were evaluated. The research results showed that the effect of water foaming WMA and RAP was not significant on the laboratory performance properties, construction quality and field performance. Thus, water-injection plant foaming WMA could be used to produce WMA mixtures with 20% and 30% RAP at a lower production temperature. These sections will continue to be monitored to evaluate their long-term performance and compare with the laboratory test results.

Title: Impact of deceleration lane length on vehicles' speed and deceleration rates based on NDS data

Primary Author (and presenter): Xu, Dan

Additional Authors: Zhou, Huaguo

Department: Department of Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

The diverging area on the freeway have been identified as the most likely area for freeway crashes to happen, which could significantly impact the safety and operation performances on freeways, exit ramps, and crossroads. The deceleration lane is a critical section of the diverging area which is designed to

provide vehicles with a safe and efficient exit from the mainline. Deceleration lane length is based on three factors: (1) the speed at which drivers maneuver onto the auxiliary lane; (2) the speed at the end of the deceleration lane; and (3) the manner of deceleration. Thus, the length of the deceleration lane is determined by the speed differential. The Naturalistic Driving Study (NDS) is a new approach to provide insight into driver behavior during daily trips by recording details of the driver, vehicle, and surroundings through unobtrusive data gathering equipment and without experimental control. The goal of this study is to explore the impact of deceleration lane length on vehicles' speed and deceleration rates utilizing NDS data which monitored driving behavior (front view and rear view videos), including information about vehicle movements such as acceleration, deceleration, and driving speed. To better understand this topic, the speed profile of each trip at each location will be developed by analyzing the original speed before entering the deceleration lane, the operating speed on the deceleration lane, the speed after entering the exit ramp, and the trend of deceleration rate. Subsequently, the interrelationship between the driver, vehicle, and speed choice on the deceleration lane will also be analyzed. The results of this study will provide a better knowledge of driver behavior at deceleration lane so that the effective deceleration distance would be determined.

Title: Global ammonia emissions from synthetic nitrogen fertilizer applications in agricultural systems: empirical and process-based estimates and uncertainty

Primary Author (and presenter): Xu, Rongting¹

Additional Authors: Tian, Hanqin¹; Chen, Jian²; Yang, Jia¹; and Pan, Shufen¹

Department: ¹Forestry; ²Geology

College/School: ¹School of Forestry and Wildlife Sciences; ²College of Sciences and Mathematics

Description:

Excessive ammonia (NH₃), emitted from nitrogen fertilizer application in global croplands, plays an important role in the production of aerosol in the atmosphere, resulting in the visibility reduction and regional haze. However, large uncertainties exist in the estimate of NH₃ emissions from global and regional croplands, which are associated with different data and methods. In this study, we coupled a process-based Dynamic Land Ecosystem Model (DLEM) with the bi-directional NH₃ exchange module in the Community Multiscale Air-Quality (CMAQ) model to quantify the NH₃ emission at global, continental, and crop-type scales at a spatial resolution of 0.5° × 0.5° during 1961–2010. Global NH₃ emissions increased from 1.91±0.03 to 16.72±0.47 Tg N yr⁻¹ during 1961–2010. The annual increase of NH₃ emission showed a large spatial variation. Southern Asia, typically China and India, accounted for more than 50% of the total global emissions since 1988, followed by North America and Europe. Since 1995, rice cultivation became the largest contributor to the total global NH₃ emissions, followed by corn and wheat. The estimates in the DLEM-CMAQ provided a scientific understanding of global and regional NH₃ emissions over the past 50 years, which would offer a reference for governments to mitigate the N fertilizer practice in future agricultural systems.

Title: New mobility to sustainability: Herder and animal husbandry

Primary Author: Xu, Yecheng

Additional Author: Zhang, Yaoqi

Department: Forestry and Wildlife Sciences

College/School: Agriculture

Description:

Nomadic pastoralism has been a highly critical practice for livestock production in drylands across the world for centuries. To adapt to marginal environments, nomadism's strategy of mobility has widely

viewed the best solution. In recent years, the loss of mobility associated with nomadism has been lost in Inner Mongolia is regarded major cause for grassland degradation which generate vulnerability and less resilience of the society. This paper argues that mobility should be redefined with changing transportation. Traditional nomadic life built upon mobility cannot possibly face the challenges of population increase or take advantage of new mobility, which has been generated by new technologies, emerging markets and institutions. New mobility in turn make capital, labor (e.g., herdsman), and livestock products that are more mobile, cost efficient in transportation and movement in space. Inner Mongolia was used as a case study to demonstrate how new mobility may change the sustainability of animal husbandry.

Title: Evaluate in-cab sound and vibration generated by directional rumble strips for deterring wrong-way freeway entries

Primary Author (and presenter): Xue, Chennan

Additional Authors: Xu, Dan

Department: Civil Engineering

College/School: Samuel Ginn College of Engineering

Description:

Wrong-way driving on freeways has been identified as a serious traffic safety problem. Drivers who make wrong-way entries onto freeways pose a serious risk to the safety of other motorists and themselves. Despite decades of improvements on design, marking, and signage at freeway interchanges, more efforts should still be taken to mitigate the wrong-way driving issue. This project investigated the feasibility of a novel design of directional rumble strips based on the transverse rumble strips implemented on the road nowadays. The directional rumble strips were designed to generate elevated noises and vibrations to warn against wrong-way driving and to generate normal noises and vibrations to slow down the traffic for the right-way direction. Three conceptual designs of directional rumble strips were proposed based on the state department of transportation design guidelines, field tests. Each of the concept designs was expected to generate elevated noise and vibration for wrong-way driving. In last November, the test was done on a road segment in NCAT. The tested vehicle was a full-size passenger car. During the test, the sound was collected by a sound level meter, and the vibration was measured by an accelerometer. From the results, Pattern 1 was designed based on the transverse rumble strips but the spacing between the strips was changed to generate different rhythms of sound and vibration. Pattern 2 had increasing height and length for each strip, which also visually warned the potential wrong-way drivers. Pattern 3 was a right-angled triangle with different length of side in cross-section which produced most recognizable sound and vibration from wrong-way direction among the three patterns. Overall, the results indicated that the tested directional rumble strips helped generate a recognizable amount of interior noise and a moderate amount of vibration to affect driver behavior.

Title: Dissociable meta-analytic networks contribute to post-traumatic stress disorder (PTSD)

Primary Author (and presenter): Yanes, Julio, A.

Additional Authors: Reid, Meredith and Robinson, Jennifer;

Department: Psychology

College/School: Liberal Arts

Description:

From a neurobiological perspective, post-traumatic stress disorder (PTSD) is among the better-understood psychiatric conditions. However, this enhanced understanding has not produced reliable biomarkers that could serve as diagnostic criteria. Functional neuroimaging studies have provided important insight into

PTSD-related brain differences; however, some findings are inconsistent. Meta-analytic tools provide a more holistic perspective, aggregating published neuroimaging results and assessing statistical convergence. Here, we sought to establish which brain regions show consistent differences among PTSD patients (across neuroimaging paradigms) by examining a corpus of studies within the Activation Likelihood Estimation (ALE) framework. To provide enhanced interpretation, we used auxiliary analyses to (i) fractionate impacted regions into sub-networks and (ii) determine which psychological processes those sub-networks may implicate. We identified 44 studies, representing data from 707 patients and 758 controls, reported as 925 foci from 113 separate statistical contrasts. Our results indicate that PTSD is associated with region-specific changes across the brain, including functional differences convergent changes in the cuneus, cingulate, amygdala, hippocampus, insula, thalamus, and prefrontal cortex. Specifically, sub-network 1 represents increased activations associated with inducing emotional states and processing emotional content. In addition, sub-networks 2 and 3 represent increased activations linked with monitoring visual content and subsequent evaluation. Finally, sub-networks 4 and 5 represent distributed decreased activation associated with decision-making, response inhibition, and effortful attention to one's environment. Deeper understanding of the neural systems that may be impacted by PTSD is important for establishing reliable biomarkers that are specific and sensitive, capable of serving as diagnostic criteria and therapeutic targets.

Title: Nanoplasmon ruler for visualizing how cells “talk”

Primary Author (and presenter): Yang, Wen

Additional Authors: He, Jiacheng; Cai, Yuxin; Chen, Pengyu.

Department: Material Engineering

College/School: Samuel Ginn College of Engineering

Description:

Unravelling the underlying mechanism of how cells communicate upon external stimulation offers critical knowledge for modern biology and clinical science in a wide range of fields, such as fundamental biology, drug discovery, disease diagnosis, and cancer/stem cell research, to name a few. However, the extremely complex intercellular communication networks in multicellular systems pose significant technical challenges to exploit the cell signalling and cell-to-cell communication. Nanoplasmon ruler, self-assembled dimers of noble metal nanoparticles conjugated by a biomolecule linker (typically DNA or peptide), have shown great potential in real-time biomolecule analysis with superior sensitivity and selectivity. Upon target analyte binding, the nanoparticle dimers are brought to closer proximity, resulting in strong plasmonic coupling. The resonating free electrons on both nanoparticle surfaces generate light scattering spectra that can be readily tuned by the interparticle distance. The large scattering cross section thus high intensity of the scattering light from the nanoplasmon ruler allows the detection and imaging at ultrahigh spatial resolution even for single molecule binding. In this study, we would like to present a novel approach based on an emerging nanoplasmon ruler coupled with dark-field imaging technique to real-time map multiple cytokine secretion profiles from a single immune cell upon external stimulation. Such a novel approach will establish a new paradigm that permits, for the first time, the direct visualization of the dynamic intercellular communication process in the immune system. The knowledge obtained from this study will facilitate a more comprehensive understanding of the immune intercellular network, unlocking the potential to transform the experimental studies into an information-rich science not only in immunology but beyond.

Title: Adhesion between polyimide films and thin metal films

Primary Author (and presenter): Yelamanchili, Bhargav

Additional Authors: Gupta, Vaibhav; Sellers, John A.; Zou, Simin; Cao, Yang; Tuckerman David B.; and Hamilton Michael C.

Department: Electrical and Computer Engineering

College/School: Samuel Ginn College of Engineering

Description:

The goal of this work is to determine the best stack-up of polymer-metal-polymer for good adhesion. PI2611, PI2555, HD4110 and HD4100 are the polymers used in this study. Polymer is spun on the silicon wafer and cured in a convention oven in nitrogen ambient environment. Metal deposition is done after the cure and another layer of polymer is cured on the deposited metal. Fabricated samples on the silicon wafer with different polymer stack-up are tested for good adhesion using scotch tape test. This adhesion test will be used for processing multilayer stack-up.

Title: Preventing readmission in patients with congestive heart failure

Primary Author (and presenter): Young, Brian, C.

Additional Authors:

College/School: School of Nursing

Description:

Many health systems have implemented interventions to reduce the rate of heart failure readmission. Under the Affordable Care Act, Medicare has begun to financially penalize hospitals on a 30-day readmission rate for certain conditions such as heart failure. There is strong evidence that bedside pharmaceutical teaching prior to discharge can help reduce these readmissions. The purpose of this project is to provide a multi-disciplinary approach to bedside teaching. Patient understanding of medications, adherence, and 30-day readmission rates were assessed. Target population included adults over the age of 65 with heart failure in the inpatient setting. Following informed consent, participants answered questions from The Morisky 8-Item Medication Adherence Scale to assess the patients' existing knowledge of their medications. One group received the hospital's standard discharge instructions and one group received bedside pharmaceutical teaching prior to discharge. A follow-up call was made at four weeks to repeat the Morisky scale and determine if readmission was needed. Descriptive statistics were used to describe the patient population, prevalence of readmissions, and patient adherence. Among both groups, pre-post Morisky scores were compared with paired t-tests. X consented to participate (% female, % male), average age of X (sd) years. X% received bedside pharmaceutical teaching and X% received usual care. Follow-up indicated that X% were readmitted to the hospital. Among those who received bedside teaching, the mean Morisky scores improved from pre (mean, sd) to post (mean, sd) significantly ($p < 0.05$). Bedside pharmaceutical teaching improves understanding of prescribed medications and reduces readmission in patients with heart failure. With proper teaching, reduction of readmission to the hospital is achievable and further implementation of the project is warranted.

Title: Wellness design in Alzheimer's disease

Primary Author (and presenter): Young, Laura, C.

Additional Authors: Vohler, Jesse; Purcell, Lydia; Kennedy, Jordan; Walker, Allen

Department: Interior Design

College/School: College of Human Sciences at Auburn University

Description:

Every 66 seconds, someone new develops Alzheimer's Disease (alz.org). As a progressive mental deterioration that can occur in middle or old age, Alzheimer's Disease develops due to generalized

degeneration of the brain (alz.org). This disease is a growing epidemic that needs to be treated with specialized care within healthcare facilities. A growing body of research indicates that the interior environment can have a strong impact on occupants' health and wellbeing, so it needs to be carefully designed based on evidence and research. This project will focus on improving effects of the environment on occupants of a memory care facility, building a sense of community and responsibility among residents, designing sustainably and functionally, and providing the best possible care center for the seniors in the assisted care home. If all of these conditions are given thorough attention throughout the design of the facility, the researchers hypothesize that patients will have lower levels of stress and anxiety in their day-to-day lives, along with higher self-esteem. Upon completion of the project, post-occupancy surveys will be given to patients and staff members in order to determine whether their experience in the space reduces stress and enhances self-motivation.

Title: Comparison of quality of life ratings in young adults with ADHD across various chronic conditions

Primary Author (and presenter): Young, Margaret, E.

Additional Authors: Gray, Wendy; Schaefer, Megan; Wagoner, Scott; and Shapiro, Steve

Department: Psychology

College/School: Liberal Arts

Description:

ADHD is one of the most common chronic conditions and results in various psychosocial consequences, including more negative quality of life (QOL). Little is known about the impact of ADHD on QOL as adolescents transition to independent young adulthood. This study examines changes in QOL across an academic semester in a young adult sample with ADHD and the impact of transitioning to independence on QOL trajectories. We expected students undergoing transition to experience worse QOL than those fully transitioned. We also compare QOL in this population to published norms in healthy young adults and several chronic illness populations. 56 undergraduate students with ADHD were recruited.

Participants reported their quality of life on a monthly basis using the Pediatric Quality of Life Inventory-Young Adult Module. Multi-level modeling examined changes in QOL across the academic semester and compared QOL trajectories between young adults who had recently transitioned to those who had successfully transitioned. Overall quality of life in this sample was also compared to the quality of life ratings of young adults who were healthy or had other chronic illnesses. Correlations between QOL scores were strong. QOL increases across the semester and transition status predicted the linear slope in QOL, $B = -10.87$, $SE = 2.81$, $p < .001$, with lower rates of QOL among students who had transitioned to independence. This difference in QOL scores remained constant across the semester and did not change as a result of transition status. There was a significant difference in QOL scores between students with ADHD and the comparison samples, but post hoc probing found no significant difference between these samples. QOL remains relatively stable across an academic semester. However, contrary to our expectations, those going through transition reported higher QOL than those who have fully transitioned. Differences in social support and academic demands may explain differences in overall QOL.

Title: Comparison of different enumeration protocols for indicator microorganisms in water and sediment

Primary Author (and presenter): Yuan, Jing

Additional Authors: Reutebuch, Eric and Wang, Luxin

Department: Animal Sciences

College/School: Agriculture

Description:

Water quality becomes more and more important for food safety. *Escherichia coli* have been used as indicator organisms to monitor the potential fecal contamination of water. Previous studies have shown that both the *E. coli* counts might be significantly different when water is sampled at different times of the day. It has also been proposed that sediments might contain higher levels of indicator microorganisms than the surface water, and may be one of the reasons causing fluctuations reported in bacterial enumeration. To better understand the fluctuations seen from bacterial enumeration and the role sediments may play in water quality monitoring, this study chose two lakes in the state of Alabama as models and examined their water quality. At each lake, two sampling spots were chosen. Fifty milliliters of surface water and 25 grams of sediment from each sample site were collected and plated using 3M™ Coliform/*E. coli* Petrifilm and 3M™ Enterobacteriaceae Petrifilm. The concentrations of the indicator microorganisms were enumerated following the manufacturer's manual. In addition, one milliliter of surface water was collected using a disposable Transfer Pipet and plated using *E. coli* Coliscan Easygel for parallel comparison with the 3M method. Results showed that both the sampling time (morning vs. afternoon) and sample types (sediment vs. surface water) impacted the enumeration results ($P < 0.05$). Because the Enterobacteriaceae group covers bacteria such as *Salmonella* and *Shigella*, the numbers of Enterobacteriaceae in water and sediment were always higher than the total *E. coli*/Coliform ($P < 0.05$). The results of this study indicate that a more accurate sampling method and sampling schedule are still needed in order to better monitor water quality, especially the water used for irrigation purposes and direct body contact.

Title: Survival of *Escherichia coli* O157:H7, *Salmonella* spp., and *Listeria monocytogenes* on the skin and sliced kiwifruit

Primary Author (and presenter): Yuan, Jing

Additional Authors: Wang, Luxin

Department: Animal Sciences

College/School: Agriculture

Description:

Two varieties of kiwifruit are available on the market now for consumers. One is the green-fleshed "traditional" kiwifruit and the other is the yellow-fleshed "golden" kiwifruit. Pathogens, such as *E. coli* O157:H7 and *Salmonella*, have shown their capability to survive in low pH fruits such as pineapples, mangoes, and strawberries. However, no study has been done for kiwifruit. The objective of this study is to evaluate the survival of *E. coli* O157:H7, *Salmonella* spp., and *L. monocytogenes* cocktails on the skin and on sliced kiwifruit. The green and golden kiwifruit were purchased from a local grocery store. They were proven to be *E. coli* O157:H7, *Salmonella*, and *L. monocytogenes* negative before inoculation following the FDA standard protocols. The whole kiwifruit were inoculated by dipping the entire fruit into the cocktail broth for 30 sec then drying and storing them at room temperature for 30 days. The sliced kiwifruit were inoculated by adding 100µL of each cocktail to the cut surface of every slice. The sliced inoculated kiwifruit were dried and stored at 4°C for 48 hours. Selective agars were used to enumerate survived pathogens. *E. coli* O157:H7 survived for 30 days on whole green kiwifruit while it survived only for 20 days on the golden kiwifruit. The numbers of *Salmonella* and *L. monocytogenes* were below the limit of detection after 15 days on green kiwifruit and 10 days on golden kiwifruit. The pH of cut kiwifruit was 3.48 for golden kiwifruit and 3.51 for green kiwifruit. Although the pH of cut kiwifruit was low, three pathogens survived for 48 hours in the refrigerator. This study highlights the importance of preventing contamination of pathogens on raw kiwifruit. Implementation of intervention and preventive control strategies is essential to the safety of fresh cut fruits.

Title: Factors influencing survival and capture-related mortality of Eastern wild turkeys in Alabama

Primary Author (and presenter): Zenas, Stephen, J.
Additional Authors: Grand, James; Moore, Carolyn; and Silvano, Amy
Department: Wildlife Sciences
College/School: School of Forestry and Wildlife Sciences

Description:

In an effort to address the perceived decline in abundance of eastern wild turkeys (*Meleagris gallopavo silvestris*), the Alabama Department of Conservation and Natural Resources (ADCNR) has initiated research on eastern wild turkey demographics. Estimates of survival are critical in developing precise estimates of population size, structure, and growth rates, which are required for understanding and addressing the perceived decline. Turkeys will be trapped using cannon nets, and their fates will be monitored using very high-frequency radio transmitters. Known Fate and Nest Survival models in program MARK will be utilized to estimate annual and seasonal survival rates, capture-related mortality rates, and the influence physical, biological, and regulatory factors have on both. Akaike's Information Criterion (AICc) weights and model averaging will be used to identify the best approximating models and the factors with the greatest influence on survival and capture-related mortality. From these analyses, we will develop a model to predict survival rates in other areas of the state in which vital rates are unknown. Additionally, analysis of capture-related mortality will be used to develop the best practices for reducing mortality caused by capture and handling. Results from both analyses will allow the ADCNR to develop biologically defensible management initiatives supported by empirical data.

Title: Complete plastid genome sequence of goosegrass (*Eleusine indica*) and comparison with other poaceae

Primary Author (and presenter): Zhang, Hui¹
Additional Authors: Hall, Nathan²; McElroy, J. Scott¹; Lowe, Elijah K.³; and Goertzen, Leslie R.²
Department: ¹Crop, Soil and Environmental Science; ²Biological Sciences
College/ School: Agriculture; College of Sciences and Mathematics
Other Affiliations: ³Department of Biology and Evolution of Marine Organisms, Stazione Zoologica Anton Dohrn, Villa Comunale, 80121 Napoli, Italy; ³BEACON Center for the Study of Evolution in Action, Michigan State University, East Lansing, MI, USA

Description:

Eleusine indica, also known as goosegrass, is a serious weed in at least 42 countries. In this paper we report the complete plastid genome sequence of goosegrass obtained by *de novo* assembly of paired-end and mate-paired reads generated by Illumina sequencing of total genomic DNA. The goosegrass plastome is a circular molecule of 135,151 bp in length, consisting of two single-copy regions separated by a pair of inverted repeats (IRs) of 20,919 bases. The large (LSC) and the small (SSC) single-copy regions span 80,667 bases and 12,646 bases, respectively. The plastome of goosegrass has 38.19% GC content and includes 108 unique genes, of which 76 are protein-coding, 28 are transfer RNA, and 4 are ribosomal RNA. The goosegrass plastome sequence was compared to eight other species of Poaceae. Although generally conserved with respect to Poaceae, this genomic resource will be useful for evolutionary studies within this weed species and the genus *Eleusine*.

Title: Investigating the vector(s) of epizootic hemorrhagic disease virus in Alabama.

Primary Author (and presenter): Zhang, Xinmi
Additional Authors: Mathias, Derrick
Department: Entomology and Plant Pathology
College/School: Agriculture

Description:

Epizootic hemorrhagic disease virus (EHDV) is an arbovirus that mostly cycles between white-tailed deer and biting midges of the genus *Culicoides*. EHDV infections can be fatal for white-tailed deer and on occasion cause mild to severe disease in cattle. There are many knowledge gaps about EHDV, and one of the most important questions is the vector of EHDV in areas where the only confirmed vector in North America (*Culicoides sonorensis*) is absent. We used miniature CDC light traps baited with CO₂ to collect *Culicoides* to examine the population dynamics of *Culicoides* species by seasons. We then performed blood meal analysis, investigated EHDV infection rates in *Culicoides*, and assessed FTA® cards as surveillance tool. We found that several *Culicoides* species were abundant during the EHDV transmission season, which suggests their possibility to be vectors of EHDV. The findings of this study implies potential vectors of EHDV in the US and may lead to more effective strategies to control EHD among wild and domestic ungulates in the US.

Title: *In situ* esterification and extractive fermentation for butyl butyrate production with *Clostridium tyrobutyricum*

Primary Author (and presenter): Zhang, Zhongtian

Additional Authors: Steven, Taylor and Wang, Yi

Department: Biosystems Engineering

College/School: Samuel Ginn College of Engineering

Description:

Butyl butyrate (BB) is a valuable chemical that can be used as flavor, fragrance, extractant, etc. in various industries. Meanwhile, BB can also be used as a fuel source with excellent compatibility as gasoline, aviation kerosene and diesel components. The conventional industrial production of BB generates various environmental pollutants. Recently, there have been tremendous interests in producing BB from renewable resources through biological routes. In this study, based on the fermentation using the hyper-butyrate producing strain *Clostridium tyrobutyricum* ATCC 25755, efficient BB production through *in situ* esterification was achieved by supplementation of lipase and butanol into the fermentation. Three commercially available lipases were assessed and the one from *Candida sp.* (recombinant, expressed in *Aspergillus niger*) was identified with highest catalytic activity for BB production. Various conditions that might affect BB production in the fermentation have been further evaluated, including the extractant type, enzyme loading, agitation, pH, and butanol supplementation strategy. Under the optimized conditions (5.0 g L⁻¹ of enzyme loading, pH at 5.5, butanol kept at 10.0 g/L), 34.7 g L⁻¹ BB was obtained with complete consumption of 50 g L⁻¹ glucose as the starting substrate. We then increased the starting glucose concentration to 80 g L⁻¹ attempting to achieve even higher level of BB production. Indeed, a higher BB titer of 36.9 g L⁻¹ was generated at the end of the fermentation but with 24.5 g L⁻¹ glucose left unconsumed. This suggested that additional optimization is necessary to achieve more elevated BB production by overcoming the end product inhibition and enhancing carbon source consumption. To our best knowledge, the BB production achieved in this study is the highest among the ever reported from the batch fermentation process. Our results demonstrated an excellent biological platform for renewable BB production from low-value carbon sources.

Title: Effect of CdSe quantum confinement on charge transfer kinetics in solar-driven hydrogen production from urea

Primary Author (and presenter): Zhao, Rong

Additional Authors: Radich, James

Department: Chemical Engineering

College/School: Samuel Ginn College of Engineering

Description:

Urea has been proposed as a source to produce hydrogen. We describe here CdSe-sensitized TiO₂ assembled with urea electrocatalyst, Ni(OH)₂, on fluorine-doped tin oxide (FTO) coated glass (FTO/TiO₂/CdSe/Ni(OH)₂) used as photoanode for simultaneous urea oxidation and water reduction using visible light irradiation. The steady-state photoresponse of the semiconductor-catalyst electrode in the photoelectrochemical system is investigated, and the CdSe quantum confinement effect on charge transfer kinetics is investigated by employing transient absorption spectroscopy. The obtained carrier dynamics reveal the reaction mechanism and indicate the change of the CdSe band position and hence driving force for charge transfer.

Title: A novel and economic approach to produce CT-like image

Primary Author (and presenter): Zhou, Huanyi¹

Additional Authors: Smith, Mary²; Brannen, Andrew²; Panizzi, Peter²; and Reeves, Stan¹

Department: ¹Electrical and Computer Engineering; ²Drug Discovery and Development

College/School: ¹Samuel Ginn College of Engineering; ²Harrison School of Pharmacy

Description:

Computed Tomography (CT) is an advanced imaging method that produces non-invasive three dimensional (3D) images of a given object by use of many X-ray projections collected and reconstructed into a single image. In medicine, CT machines produce high-quality 3D images that reveal soft tissue, bone structure and blood vessels. The advantage of CT imaging is that it produces cross-sectional information not possible from 2D X-ray alone. CT works by use of single X-ray projection data collected from different angles and then mathematically the inverse of the Radon Transform can calculate X-ray absorption in a given space. The cost of a CT machine is often prohibitive for academic labs, often costing hundreds of thousands dollars. Hence, our work is to develop a less expensive device that still provides good quality CT images. Commercial micro CT scanners rotate the X-ray source and the detector array synchronously with respect to the scanned animal. By contrast, we developed a device called the mouse imaging spinner (MiSpinner), that rotates the specimen in a standard X-ray scanner to collect equivalent data. By applying some advanced image processing techniques to the data obtained from this system, we can reconstruct acceptable images. A further step is that we can use our data to generate 3D models, with which we have had some success. Presently, our research is focused on removing the noise arising in the data measurement and the device itself. Also, we are working to improve data utilization by applying a cone-beam reconstruction technique that more accurately models the shape of the x-ray source than traditional parallel beam reconstruction algorithms do.

Title: Dendrimer-encapsulated ultra-small porous MnO₂-Fe₃O₄ nanosphere for supercapacitors

Primary Author: Zhu, Yan

Additional Authors: Ma, Baisheng and Chen, Pengyu

Department: Materials Engineering

College/School: Samuel Ginn College of Engineering

Description:

Electrochemical capacitors (ECs) are attractive for energy storage due to their fast charging capacity and long cycling life. Manganese dioxide (MnO₂), as one of the most promising electrode material, has been extensively studied in recent years because of its high theoretical specific capacitance (SC, ~1370 F/g), but the actual SC value is much lower with rapid charging rate and decreases over time. Recent advances

in nanotechnology have made hierarchically porous MnO₂ nanocomposites possible, achieving highly stable, high density electrochemical capacitive energy storage. In this research, we present, for the first time, an ultrasonic assisted synthesis method for creating ultrasmall porous MnO₂/Fe₃O nanocomposites templated on poly(amidoamine) (PAMAM) dendrimer. The prepared nanocomposites were characterized by ultraviolet-visible spectroscopy, dynamic light scattering and transmission electron microscope, showing a uniform size distribution as small as 2 nm. The ultrasmall porous nanostructure can provide high surface to volume ratio, thus high ion-accessible surface area and fast ion transportation, rendering such nanocomposite a promising candidate of superior electrochemical properties for supercapacitors

Title: A methods comparison of ectoparasite quantification in white tailed deer (*Odocoileus virginianus*)

Primary Author (and presenter): Zikeli, Shelby, L.

Additional Authors: Zohdy, Sarah and Ditchkoff, Stephen

Department: Wildlife Sciences

College/School: School of Forestry and Wildlife Sciences

Description:

Quantification of ectoparasites is an important method for the study of wildlife disease because many species are vectors of veterinary importance. The current standard for quantification of ectoparasites on larger bodied animals, such as livestock, in field settings is an estimation technique that involves sampling organisms from select regions on 50% of the individual animals' body, and then doubling that count for a full body estimation. These methods, however, are time consuming and difficult with large live animals. Here, we introduce a new method where high-resolution photos of selected regions of the deer (Anogenital region, ventrum, neck and face) are taken and analyzed for ectoparasites in order to provide a more efficient quantification technique. During a field study at the Piedmont Research facility, near Camp Hill, Alabama, all three methods of ectoparasite quantification were performed on 31 deer in order to compare the efficiency and accuracy of standard methods, and to present more efficient methods. Tick (Acari: Ixodidae), Lice (Phthiraptera: Anoplura, Mallophaga) and Ked (*Lipoptena cervi*) counts were performed on each deer. We show that the half body method of estimation does not differ significantly from quantification using the full body count method (Welch's, $t=-0.719$, $df=48.74$, $p=0.475$). The photography method underestimates the presence of both ticks and lice species, but does present an accurate representation of ked infestation. Therefore, the photography method of ectoparasite quantification can be used as an accurate measure of deer ked prevalence on large host animals.

Title: A spirit that is not afraid: Gay and lesbian rights at Auburn University 1990-1991

Primary Author (and presenter): Zinner, Max G.

Department: History

College/School: Liberal Arts

Description:

Recent years have seen the rise of many concerns surrounding diversity on college campuses and Auburn University has been no exception to this trend. One of many groups that has seen increased attention in recent years is the LGBT community. Despite this, there has not yet been any history of Auburn written with a focus on LGBT rights. This paper is an effort to write a part of this story by examining the founding and first year of Auburn's first official LGBT organization: The Auburn Gay and Lesbian Association (AGLA). While one may initially see the founding of a student organization as an event of relatively little consequence for those not directly involved, the story of AGLA is fraught with difficulties and serves as an excellent case study to examine popular perceptions of homosexuality in Southern academia during the

early 1990s. I also argue that these particular events are representative of the general state of Auburn University during this time.

Title: Influence of Fatigue and Bending Strain on Critical Currents of Niobium Superconducting Flexible Cables containing Ti and Cu Interfacial Layers

Primary Author (and presenter): Zou, Simin,

Additional Authors: 2nd Gupta, Vaibhav; 3rd Sellers John; 4th Tuckerman, David; 5th Hamilton, Michael;

Department: Electrical and Computer Engineer Department

College/School: Auburn University

Description:

One of the major limitations to constructing densely-integrated cryogenic electronic systems is the electrical interconnect technology. Dense superconducting cables with small cross-sections are desirable. The superconducting characteristics of thin-film Nb make it a viable material for realizing low-temperature (4 K or below) superconducting cables, such as high density DC cables and RF cables. Thin flexible superconducting ribbon cables incorporating polymer dielectrics would be particularly useful for making multiple interconnections between different substrates and/or different temperature zones. For such applications, it is important that the cables be tolerant of routine handling and bending that may occur during room-temperature assembly, and retain their superconducting properties after multiple thermal cycles. Nb thin films are susceptible to microscopic cracking and possible delamination from the underlying substrate, when subjected to flexing as in the case of a flexible cable. Micro-cracks and other deformation, caused by bending in tension or compression, may reduce the critical current (I_c) of Nb wires. In this work, we report the results of fatigue testing and bending testing on the critical current degradation of thin-film Nb test cables incorporating different thicknesses of Ti adhesion layer and Cu capping layer, fabricated on flexible 50- μm thick Kapton polyimide. The cables were subjected to hundreds of consecutive unidirectional bending strain cycles, placing the Nb film under either tensile or compressive direction. Significant improvements in reliability were observed (i.e., less degradation in I_c) as the thicknesses of the Ti adhesion layer and Cu capping layer were increased. We also tested the cables under a static bending condition at low temperature (4 K) and found the Ti(50 nm)/Nb/Cu(200 nm) cables maintained a fairly stable I_c as the bending curvature is increased, whereas the pure Nb cables exhibited progressively lower I_c .
