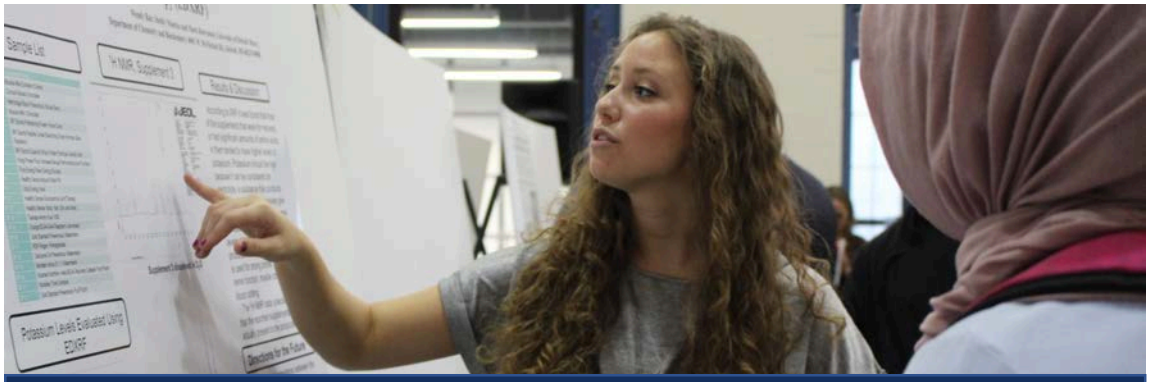
College of Engineering & Science



Undergraduate and Graduate

Research Symposium

October 13, 2017
10 am to 12 pm, High Bay

UNIVERSITY OF DETROIT MERCY

Build A Boundless Future

1. EXPLORING HEALTH BEHAVIORS AMONG AFRICAN AMERICAN WOMEN

College of Liberal Arts

Nema Kebbeh, College of Liberal Arts
Dawn Misra, Wayne State University School of Medicine Department of Family Medicine and Public Health Sciences

Preterm birth is one of the leading causes of infant mortality in the United States. African American women are more likely than women of other racial and ethnic groups to deliver preterm. The reasons for this disparity are largely unknown. Stress may be an important risk factor more prevalent in African-American women as well as a lack of health care and poor health prior to pregnancy. In this study, we examined the association between perceived stress in pregnancy and a woman's report of having a regular medical provider prior to her pregnancy. Either of these factors may be a marker for increased risk of preterm birth and/or factor that can be modified to reduce the risk of preterm birth. Data were derived from a retrospective cohort study of 1346 African American mothers interviewed in the immediate postpartum hospitalization as part of the Life Course Influences on Fetal Environments (LIFE) study conducted in the Detroit Metropolitan area. We used the Cohen's perceived stress scale questions to measure stress and a yes/no question to measure whether women had a medical provider before pregnancy. Women who reported not having a medical provider prior to pregnancy were 1.49 times more likely (or 49% more likely) to report perceived stress levels above the median during pregnancy compared to women with a provider. To reduce the rate of preterm among African American women, risk factors such as stress, lack of access to healthcare, and the woman's preconception health must be addressed.

2. HOW EDUCATION AND RELIGION CORRESPONDS TO THE AMOUNT OF PHYSICAL ACTIVITY PERFORMED BY PREGNANT BLACK WOMEN

Biology

Relicious Eboh, Biology
Dawn Misra, Wayne State University School of Medicine Department of Family Medicine and Public Health Sciences

African American women in the U.S. are more likely to deliver preterm compared with white women. Research has shown that an increase in physical activity may reduce the rate of preterm birth. Social factors, which include education and religion, may be associated with physical activity during pregnancy. We examined the levels of non leisure time physical activity in African American pregnant women in relation to their level of education and religious engagement in a birth cohort study of preterm birth in Black women in Southfield, Michigan (N=1410; 71% response rate) with in person interviews. We focused on “walking for a purpose,” not as part of an exercise program, as only a very small proportion of women did any exercise. Physical activity was reported as minutes per week walking that was not part of an exercise program and dichotomized (<30 minutes per day “inactive” (62.9%); ≥30 minutes “active” (37.1%). Highest self-reported level of education was categorized as: less than high school/high school diploma (16.4%), technical training (11.8%), some college without a degree (58.0%), ≥associate’s degree (13.7%). Religious engagement was measured as 4 categories of prayer (never, 0.5%; not too often, 6.5%; often, 23.2%; very often, 63.7%). A logistic regression model was used to estimate the effect of prayer frequency and education together on the likelihood of women being physically active. The odds of being physically “active” were 0.60 (0.36, 0.99) times lower for those who prayed “not too often” compared with other prayer frequency groups. The odds of being physically active were 0.59 (95% CI: 0.37-0.95) times lower for those with technical training compared to other educational groups. Our results suggest that social factors could influence physical activity among African American women during their pregnancy.

3. SUSTAINABLE MASONRY BRICKS

Civil, Architectural & Environmental Engineering

Aubin Fossouo, Civil, Architectural & Environmental Engineering
Alan Hoback, Civil, Architectural & Environmental Engineering

Sustainable and economical building bricks clay bricks are being investigated. Amendment with bamboo fibers are considered for bending strength and waste oil is considered for protection from moisture. The composite brick was made by adding 88% soil (clay & sand), 3% treated bamboo`s fibers and 8% mixing liquids (water, oil). The mixture was poured in 7in*5in*3in mold and confined using hydraulic jack. The specimens were air-dried, weighed, and their volume determined at 0, 5, 10, 15, and 20 days to evaluate the effect of bamboo fiber and oil on shrinkage. The results showed 3%, 2.1% and 1.5% shrinkage after 20 days for water-clay, water-fiber-clay, oil-fiber-clay's bricks respectively. Tendency to absorb water was measured by soaking the bricks in water for 30 days. The moisture content was measured and the results showed a decrease of water absorption by 58% due to the incorporation of oil.

4. ATRAZINE EXPOSURE AFFECTS OLFACTORY SENSORY NEURON MORPHOLOGY IN THE LATERAL ANTENNULES OF CRAYFISH (ORCONECTES VIRILIS)

Biology

Houda H. Khalil, Biology
Ameisha Y. Tutwiler, Biology
Lauren A. May, Biology
Saamera Awali, Biology
Rachelle M. Belanger, Biology

Atrazine is one of the most commonly used herbicides in the United States. Previous work has shown that exposure to atrazine negatively affects crayfish chemoreception, a physiological process essential to detecting food and mate odors. Our past research has also shown that after being exposed to clean water for a 72-hour period, crayfish do not recover their chemoreception abilities short term. Current data suggests that atrazine exposed crayfish are able to recover long term, regaining chemoreception within 15 days post-atrazine exposure. Due to the fact that atrazine impairs chemosensory responses, our goal for this study was to determine the effect of atrazine on olfactory sensory neurons located in the lateral antennules of crayfish. In this experiment, two groups were utilized. One group was exposed to environmentally relevant concentrations of atrazine, which included concentrations of either 80 ppb or 300 ppb respectively, for a 15-day period. The second group served as the control and was withheld from atrazine exposure. Post treatment, lateral antennules from both groups were fixed in 4% paraformaldehyde, decalcified and subsequently cryoprotected. Medial segments were then sectioned on a cryostat. Antennule cross sections were stained with antibodies against tubulin, a protein found in neurons, and DAPI, a nuclear stain and imaged. Our data shows that atrazine exposure causes degeneration of olfactory sensory neuron bundles or clusters, leading to impairments in chemosensory abilities. Overall, this research demonstrates that environmentally-relevant atrazine exposure causes structural changes in the main olfactory organ of crayfish. Future research will allow for the examination of olfactory cell death and regeneration.

5. SAFETY IMPLEMENTATION IN BIM

Civil, Architectural & Environmental Engineering

Zain Juratli, Civil, Architectural & Environmental Engineering
Alan Hoback, Civil, Architectural & Environmental Engineering

Safety is a major issue on construction sites. People work high in the air on buildings. Unless proper safety equipment is installed, workers may fall from the open edges of a building. Therefore, timely erection of barriers is essential. Since modern construction for large-buildings is managed through computer platforms, a tool was created that simplifies the model creation and tracking of installation of the barricades. Unfortunately, there appears to be still zero concern in safety.

6. FACIAL RECOGNITION IN VEHICLE FRONT AND BACK ENDS

Civil, Architectural & Environmental Engineering

Courtney Muchez, Civil, Architectural & Environmental Engineering
Alan Hoback, Civil, Architectural & Environmental Engineering

Pareidolia is the illusion of seeing human characteristics in inanimate objects, such as cars. The fronts and backs of several models of different vehicles are more easily recognized as human faces. I surveyed 96 people, aged 18 to 72, to see how many of them saw faces in different vehicles. Results were compared among the front and back ends of cars. All participants that recognized a face, indicated that most styles showed some degree of an angry expression. In addition, face recognition was significantly higher for the front end of vehicles verses the back.

7. THE ROLE OF YORKIE IN DIFFERENT STAGES OF EYE DEVELOPMENT THROUGH THE UTILIZATION OF DIFFERENT BINDING PARTNERS OFÂ DROSOPHILA MELANOGASTER

Biology

Maria Anderson, Biology
Batoul Nasser, Biology
Tiffany Cook, WSU Center for Molecular Medicine and Genetics
Jacob D. Kagey, Biology

The transcription factor Yes-associated protein (YAP) and theÂ Drosophila melanogasterÂ homolog, Yorkie (Yki) regulate organ size and other key developmental aspects. We utilized the UAS/Gal4 system and RNAi to study the knockdown of Yki and its binding partners to identify their role of eye development. The eye is used as a model system to study the role of Yki in growth, survival, and differentiation throughout different stages of development. Yki is known to contribute to cell survival, cell growth and cell signaling in theÂ DrosophilaÂ eye and other tissues. Misexpression of Yki leads to both tissue overgrowth and undergrowth.Â Using the eye has allowed Yki to be studied during both the adult stage to look for phenotypic changes, and the larval stage to use microscopy to stain for molecular changes. To conduct this experiment we are using Gal4 drivers, such as eyeless and GMR, to observe the role Yki and potential binding partners, scalloped and smad, roles in the development of the eye. Preliminary data suggests that a decrease in the size of the eye when using the driver eyeless inÂ YkiIRcorresponds with a similar phenotype in thick veins RNAi (tkvIR). Determining the effects on cell growth, regulation and signaling in Yki and its binding partners is important to understanding the effects of YAP in many cancers.

8. EXPRESSION AND TARGETING OF PI4KIIIÎ± AND SAC1 IN PROSTATE CANCER

Psychology

Madeleine E. Reardon, Psychology
Louie Semaan, Wayne State University
Sreenivasa Chinni, Wyane State University

Prostate Cancer (PC) is the second most common cancer in men, with an estimated 280,000 new cases at the end of 2016. Phosphatidylinositol 4-kinase IIIα (PI4KIIIα) and its corresponding phosphatase Sac1 phosphorylate phosphotidyl inositol (PI) and generate PI4P. PI4P serves as a precursor for the generation of PI(4,5)P2 and participate in intracellular vesicular traffic. Our investigation sought to determine the expression of PI4KIIIα in prostate cancer, as well as determine the role of PI4KIIIα in prostate cancer proliferation using the potent inhibitor GSK-F1. We carried out a Quantitative Polymerase Chain Reaction (qPCR) for PI4KIIIα and Sac1 mRNA to determine gene expression levels in various prostate cancer cell lines, SDS PAGE followed by Western Blotting (WB) for PI4KIIIα and Sac1 proteins to determine protein expression levels in various prostate cancer cell lines, and cell proliferation assays using the PI4KIIIα inhibitor GSK-F1 and the CyQuant® NF cell proliferation assay kit to determine the inhibitor's effect on cell proliferation. The qPCR analysis of PI4KIIIα and Sac1 gene level expression identified significantly higher expression of PI4KIIIα and Sac1 mRNA in PC cell lines as compared to prostate epithelial cell lines. Western blotting of PI4KIIIα and Sac1 proteins also identified significantly higher PI4KIIIα and Sac1 protein level expression in PC cell lines as compared to prostate epithelial cell lines. Cell proliferation assaying using the PI4KIIIα inhibitor GSK-F1 identified it as an effective inhibitor of cell proliferation in PC cell lines PC-3 and C4-2B, with significant reduction of cell proliferation after 0, 24, 48, and 72hr periods, correlated with increasing GSK-F1 concentration. Cell proliferation assaying also identified potent inhibition of cell growth through PI4KIIIα inhibition, based on low IC50 values in PI4KIIIα overexpressing PC cell lines, and negligible IC50 values in prostate epithelial cell lines that have no PI4KIIIα overexpression. These data identifies increased gene and protein level expression of PI4KIIIα and Sac1 in prostate cancer cell lines as compared to prostate epithelial cell lines, identifies GSK-F1 as an effective inhibitor of prostate cancer cell proliferation by PI4KIIIα inhibition, and identifies higher PI4KIIIα gene and protein level expression in Androgen Receptor positive (AR+) PC cell lines than in Androgen Receptor negative (AR-) PC cell lines, with respectively greater GSK-F1 sensitivity. This data suggests the PI4KIIIα/Sac1 pathway as a novel target for the treatment of prostate cancer, though mouse model studies are needed to confirm this.

9. LENGTH VARIATIONS FROM PYLORUS TO PAPILLA MAJOR AND PAPILLA MINOR TO PAPILLA MAJOR

Biology

Reem Bazzi, Biology
Rama Zouabi, Biology
Alaa Abu-Mahfouz, Biology
Amena Al-Khafaji, Biology
Ami Patel, College of Health Professions
Dr. Mary Tracy-Bee, Biology

The duodenum, the first part of the small intestine, aids the human body in digestion and the breakdown of food. It plays a vital role in the breakdown of chyme from the stomach, allowing for absorption of food in the small intestine. The duodenum is located distal to the pyloric sphincter and stomach. The duodenum is functionally and structurally important for the survival of the human. It is characterized as being the widest and shortest part of the small intestine (2). Further, the duodenum contains the major and minor papilla, through which secretions from nearby organs are deposited. The purpose of our research was to measure the distance from the pylorus to the major papilla and the distance from the minor papilla to the major papilla. Having a solid understanding of these distances is of great importance to gastrointestinal (GI) doctors as they investigate the pathways through which bile and pancreatic juices pass upon their final draining into the duodenum. These measurements can be used for future medical studies in medicine and to allow for a better understanding of anatomical variations that occur within the small intestine.

10. VARIATION OF THE COMMON CAROTID ARTERY DIAMETER RELATED TO AGE

Biology

Martha Flores, Biology
Crystal Kallabat, Biology
Alana Garmo, Biology
Reem Bazzi, Biology
Dr. Mary T. Bee, Biology

In multi-campus and multi-year studies, we investigated the relationship of the size of the common carotid artery versus age of death. A significant and positive correlation was identified bilaterally in the diameter of the common carotid arteries in relationship to age of death in human cadavers ranging from 24 to 101 years old ($p=0.013$). The diameter of the common carotid artery has been associated with the occurrence and severity of strokes. This may provide insight into circulatory-related procedures in the cervical region or may be indicative of a related genetic predisposition to a higher vascular flow.

11. GASTRO-INTESTINAL CHARACTERIZATION OF THE MADAGASCAR HISSING ROACH, GROMPAORHINA PORTENTOS:
CARBONIC ANHYDRASE LOCALIZATION AND NEURAL INNERVATION

Biology

ATearea Boggan, Biology
Jolani Perez, Chemistry & Biochemistry

Various histochemistry techniques are used to localize neuroendocrine cells controlling Gastro-Intestine (GI)/Malpighian tubule interaction and carbonic anhydrase (CAH) pH involvement. It is suspected that neuroendocrine cells are localized in GI epithelial cells, as well as secreting hormones in the Malpighian tubules and to signal/regulate excretion and digestion. Investigating the location of the neurons in relationship to the Malpighian tubules and GI tract may show how and where these processes are carried out. The PAS-orange G and hematoxylin-phloxine histochemical techniques are stains used to find these cells. PAS-orange G stains basophils magenta, acidophils yellow, nuclei blue/black, and chromophobes pale blue. Hematoxylin-phloxine stain pancreatic B cells blue, A cells red, and D cells red/pink (1). Methylene blue, a vital stain used in staining nerve fibers and end plates, to inject the roaches. Once injected, methylene blue is absorbed and converted to its leuco-base by reducing agents in alkaline solution; the leuco-base formed is oxidized into methylene blue. This procedure shows how nerve endings connect with the cells in the Malpighian tubules and GI tract in the signaling of digestion. The goal is to find where they are in relation to the ganglia and neurons. It is expected that the neuroendocrine system may also coordinate CAH function in the cockroaches. Carbonic anhydrase catalyzes the reaction: C02 + H201 H2CO3 1 H+ + HCO3-. Hanson's histochemical technique will be used to locate CAH histologically in the GI. The pH tests determined where the change from acidic to basic takes place. Hansson's technique identifies where CAH is located by CoHPO4 precipitate, and turning the area with CAH, black after ammonium sulfide exposure. Research is expected to show carbonic anhydrases are located toward the lower GI tract, allowing for acid neutralization toward the rectum.

12. MODIFIED CLICK-STYLE SONOGASHIRA COUPLING REACTIONS INVOLVING SILYL-PROTECTED ALKYNES

Chemistry & Biochemistry

Matthew Mio, Chemistry & Biochemistry
Nicholas Boynton, Chemistry & Biochemistry
Mary Payne, Chemistry & Biochemistry
Bennett Ross, Chemistry & Biochemistry
Kevin Suiter, Chemistry & Biochemistry

A modified Click-style Sonogashira coupling reaction has been developed which can couple aryl bromides to silyl-protected alkynes at elevated temperature. Excellent yields are possible, the transformation is tolerant of electron-deficient and â€“rich aryl halide systems, and minimum homocoupling products are observed. The transformation protocol involves Pd(dba)2 catalyst, sodium ascorbate, copper (II) sulfate, and either 1,8-diazabicyclo[5.4.0]undec-7-ene (DBU) or trimethylamine as the base. The solvent system makes use of an acetonitrile/water mixture and it is likely the combination of the water and Cu2+ which allows for in situ silyl protecting group removal and subsequent Sonogashira coupling.

13. SHEAR AND BENDING GAME

Mathematics & Software Engineering

Robert Pytel, Mathematics & Software Engineering
Alan Hoback, Civil, Architectural & Environmental Engineering

A computer application was created for use as a tool for students to practice creating shear and bending diagrams. This will be used in UDM's CIVE 3420 Structural Analysis to review material. Several platforms were investigated before selecting HTML, CSS, and JavaScript. This challenge included displaying engineering data while keeping the program in a game-friendly environment. The program is now undergoing beta testing.

14. VARIATIONS IN THE ANATOMICAL POSITION OF THE MANDIBULAR FORAMEN

Biology

Marco Ciavaglia, Biology
Ibrahim Al-Jerdi, Biology
Adam Elturk, Biology
Mary Tracy-Bee, Biology

The inferior alveolar nerve courses through the mandibular foramen, where it is typically targeted in anesthesia of the lower jaw. In numerous dental operations, it is common for inferior alveolar nerve blocks to not have a perfect success rate. This is believed to be a result of the variation in the position of the mandibular foramen anatomically. The aim of this study was to determine the location of the mandibular foramen in relation to the typically used landmarks on the mandibular ramus in both African American and Caucasian patients. Using digital photographs of skulls from the Hamaan-Todd collection at the Cleveland Museum of Natural History, measurements were taken on 5 anatomical structures in the mandibular ramus. The study was performed using 146 dried mandibles with about half being Caucasian and the other half being African American. Each of those were then split into about half males and half females. Measurements of the mandible included distance from the center of the mandibular foramen to locations on the ramus such as the anterior border, posterior border, mandibular notch, and the mandibular angle and from the condyle to the coronoid process to see if there was any relation there as well. All measurement were normalized for the height of the skull. A significant difference was identified in the antero-posterior foramen position between African-American and Caucasian populations ($p=0.028$), with the foramen lying more anterior in African-American skulls. A significant difference was also found in the supero-inferior position of the mandibular foramen with it lying more superior on the mandibular ramus of females relative to males ($p=0.043$). A significant difference was not identified in the distance between the condyloid and coronoid process ($p=0.764$). This has great clinical relevance as it may result in variable treatment and positioning of anesthesia needles in patients of different races.

15. SUSTAINABLE VIRUS INFECTION IN ANTIBIOTIC RESISTANT PSEUDOMONAS AERUGINOSA BACTERIA IN UNDERGRADUATE RESEARCH

Biology

James Graves, Biology
Nathan Yaldo, Biology
Cody Bruno, Biology
Stefan Petrovski, Biology
Fadi Mousa-Aqrawi, Biology

Pseudomonas aeruginosa is the etiological agent for many types of infections and is responsible for antibiotic therapy treatment failures. Examination of phage (bacterial virus) biology may assist greater understanding of the parameters of the antibacterial nature of phage. The host strain of bacteria used in this investigation was P. aeruginosa ATCC 13388 and the phage was recovered from aquatic sediment. In determining the routine test dilution (RTD) or the highest dilution of phage to produce complete lysis use of host cells cultured either in brain heart infusion (BHI) broth or on BHI agar and application of these cells with a swab or rod did not appear to have a considerable effect on results. P. aeruginosa survivor bacteria (bacteria that were not destroyed by phage) purified by streak plate culture from samples collected from RTD lytic zones created by approximately 10 raised to the power of 8 plaque forming units (PFU) were sensitive to virus infection and exhibited an RTD similar to the wild type host. However, unpurified lytic zone bacteria showed an RTD decreased by 10 to 100 fold. Survivor strains purified from rare small distinct colonies (about 1 mm in diameter) in lytic zones appeared to be resistant to infection by phage from dilutions in the RTD assay. Spot inoculation with samples of broth cultures of unpurified lytic zone bacteria or culture supernatant on a lawn of host bacteria on agar showed lytic activity but samples of cultures or supernatants of purified lytic zone bacteria or distinct colonies did not show lytic activity. After evaluation of antibiograms made using the disc diffusion technique on BHI agar survivor strains of bacteria did not appear to exhibit any considerable decrease or increase in sensitivity to 6 antibiotics tested including carbenicillin, ciprofloxacin and gentamycin. Phage resistant survivors that produce distinct colonies may represent a type of mutant of P. aeruginosa that remains reasonably vigorous. Diversity in survivor bacteria produced after exposure of P. aeruginosa cells to phage may exist.

16. A LOWER LIMB EXOSKELETON GAIT DEVELOPED WITH A SINGLE ARDUINO

Electrical and Computer Engineering

Yuyi Li, Electrical and Computer Engineering
Yang Zhou, Electrical and Computer Engineering
Chaoyang Chen, Electrical and Computer Engineering

The Wayne State Robotic Rehabilitation Lab is developing an electronic system that ambulates a lower limb exoskeleton prototype. Currently, five prototyping boards (Arduino) are connected in a master-slave configuration. One master board sends commands to the slave boards. The slave boards execute the appropriate movement for each joint. In the prototyping process, reduced complexity of a design allows quicker troubleshooting and revision. This project investigated whether a single Arduino-based board can ambulate a lower body exoskeleton at consistent joint angle trajectories. A method was developed for constructing a walking gait on a single Arbotix-M board using gait data from the literature. A small-scale exoskeleton was prototyped and programmed with this gait. The exoskeleton appeared to maintain a consistent gait over an hour. Quantitative tests for evaluating the consistency of the constructed gait are proposed. The results demonstrated that a single Arduino-based board could ambulate a small-size four-limb exoskeleton prototype. A method was successfully developed for constructing a gait for the exoskeleton using PyPose software and data from previous gait research. A method was also developed for determining a mapping function between the motor joint angle and the position sensor values for future applications.

17. THE EFFECT OF DIFFERENT DISULFIRAM-METAL COMPLEXES ON HUMAN BREAST AND PROSTATE CANCER CELLS

Biology

Sarah Buhay, Biology
Jicang Wang, Wayne State University
Ashton Lewandowski, Wayne State University
Q. Ping Dou, Wayne State University/Barbara Ann Karmanos Cancer Institute

In recent years, Disulfiram (DSF), an FDA approved drug for treating alcoholism, has become more prominent for its ability to alternatively combat cancer cell growth. As a metal chelator, DSF has a high affinity for metals such as copper and zinc, which together in complex can bind to and inhibit 19S and 20S proteasomes, consequently inducing apoptosis in cancer cells. Repurposing DSF to treat cancer obtains more interest as the cost for translating into treatments is much lower for the already approved drug, compared to newly developed drugs. Here we investigate the effects of various DSF-metal complexes on proliferation of human breast and prostate cancer cells. Human breast cancer (MDA-MB-231 and MDA-MB-468) and prostate cancer (CWR22Rv1) cell lines were subject to time-dependent treatments of DSF complexed with 9 different metals: Copper(II) Chloride, Zinc(II) Sulfate, Cadmium(II) Chloride, Nickel(II) Chloride, Cobalt(II) Chloride Hexahydrate, Magnesium(II) Sulfate, Calcium(II) Chloride Dihydrate, Platinum(II) Diammine Dichloride, and Manganese(II) Chloride. After treatments, MTT and Ubiquitin Vinyl Sulfone (Ub-VS) assays were performed to determine cell viability and the effect on the 19S proteasome-associated deubiquitinases (DUBs) USP14 and UCHL5, respectively. The results revealed that DSF and Copper is a prime combination for cancer treatment, which significantly decreased cell viability of all cell lines tested and demonstrated strong inhibition of 19S-DUB activity at 0.2 μM. Other metals such as Nickel, Calcium and Magnesium partially contribute to the effects of DSF at the same or slightly higher concentration (0.4 μM). Our results strongly suggest the promise of DSF-metal combinations as a potential cancer therapy.

18. FUNCTIONAL ANALYSIS OF RAD6B IN CISPLATIN-INDUCED DNA DAMAGE RESPONSE AND CRISPR/CAS9 KNOCK OUT OF RAD6B

Biology

Angelina Antonyan, Biology

Rad6B is an E2 ubiquitin conjugating enzyme that is overexpressed in breast cancer, melanoma and ovarian cancer. Studies from our laboratory have shown that Rad6B actively contributes to cancer development and progression through its ubiquitin conjugating activity. Rad6 can modulate therapy response because of its fundamental role in translesion DNA synthesis (TLS), a process also referred as DNA damage tolerance (DDT) or postreplication DNA repair. Cisplatin (CDDP) is a chemotherapeutic agent that is used for treating triple negative breast cancer (TNBC). CDDP induces DNA interstrand crosslinks; repair of these crosslinks requires activities of the Rad6 translesion synthesis (TLS) pathway, the Fanconi Anemia (FA) network and the homologous recombination repair (HRR) pathway. Recruitment of Pol h, FANCD2 and Rad51to gH2AX-labeled foci serve as markers for TLS, FA and HR pathway involvement in the repair process. Our lab has previously shown that Rad6 inhibition with a Rad6-selective small molecule inhibitor SMI#9 suppresses CDDP-induced increases in PCNA monoubiquitination and FANCD2 levels, which are essential for activation of the TLS and FA pathways, respectively. To determine the impact of SMI#9 on CDDP-induced recruitment of Pol h, FANCD2, and Rad51 on gH2AX-loaded foci in MDA-MB-468 and SUM1315 cells, we performed dual immunofluorescence staining with gH2AX and Pol h, gH2AX and Rad51, and gH2AX and FANCD2 antibodies, and counter stained with appropriate Texas Red or FITC conjugated secondary antibodies. Our results showed that SMI#9 pretreatment caused a dramatic decrease in CDDP-induced localizations of Pol h, FANCD2, and Rad51 to the sites of DNA double strand breaks marked by gH2AX labeling. We have also performed CrispR/Cas9 –based knockout of Rad6B as this would allow us to further verify the functional role of Rad6 in repair and therapy response. M14 melanoma cells were stably transfected with CrispR/Cas9 vector encoding Rad6B specific guide RNAs and homology directed repair plasmid specific for Rad6B. Stable clones were isolated by puromycin selection. Confirmation of Rad6B knockout was verified in the genomic DNAs by PCR and sequence analysis.

19. INSIDE LOOK: TRANSITION FROM CHILD TO ADULT HEALTHCARE SERVICES FOR AFRICAN AMERICAN ADOLESCENTS WITH TYPE 1 DIABETES

Developmental Psychology

Shelbi Matlock, Developmental Psychology
Patricia Rouen, Nursing

Background/Significance: Diabetes mellitus (DM) is a chronic condition in the United States that affects 29.1 million persons, approximately 9.3% of the population. Diabetes is a debilitating disease, in which the body either cannot produce insulin (known as type 1 DM) or cannot properly use the insulin it produces (known as type 2 DM). Diabetes leads to high blood sugar levels, which, if improperly or under-managed, can damage to vital organs, blood vessels and nerves over time (Diabetes Care, 2017). The majority of type 2 DM occurs in adults, many of whom are obese and accounts for 90% of all DM cases, whereas type 1 DM occurs primarily in children and young adults and accounts for 10% of diabetes prevalence, or about 5 million person. The prevalence of type 1 DM is rising with a 21% increase in the numbers of cases from 2001-2009 in persons under age 20 (Juvenile Diabetes Research Foundation, 2016). Caucasians are most often affected with few African American and Hispanics; males are the most common group diagnosed with type 1 DM.

Type 1 DM requires the daily administration of insulin to facilitate glucose uptake into tissues to ensure adequate metabolism along with intermittent or continuous glucose monitoring every day. Specialists in pediatric endocrinology manage type1 diabetes from diagnosis to age 18-21 years, when children and adolescents are also supported by parents. As those with type 1 DM transition to young adulthood, they often are required to transition to adult care providers.

Problem Statement: The transition phase from child to adult healthcare services in young adults with type 1 diabetes is often difficult. Prior studies show that post transfer to adult care, those young adults with type 1 DM fail to attend follow up medical appointments, have sub-optimal glucose control and experience adverse outcomes such as hospitalizations. Limited literature discusses this issue and has been primarily conducted with male populations with limited numbers of female patients. Research is needed to develop strategies that help young female adults adapt to their transition to diabetes care with an adult endocrinologist.

Methods: We propose to conduct and exploratory research project (survey, focus group interviews) with diverse female patients with type 1 DM ages 18 to 26 years to uncover the challenges and barriers with the transition from pediatric to adult care and an evaluation of diabetes related outcomes in this age group such as glucose control, attendance at office visits and adverse clinical and developmental outcomes. This project will be developed and implemented over the next 12 months.

20. THE EFFECTS OF SMOKING MARIJUANA

College of Health Professions

Vanessa Lee, College of Health Professions
Dr. Molly McClelland, College of Health Professions

The purpose of this project was to do a systematic review of current published research relating to physiological and behavioral effects of Marijuana use.

Methods: PUBMED, CIHNAIL and PROQUEST search engines were used to find studies published between 2010-2017 relating to the effects of Marijuana use. The following terms were included in the search: cannabis, cannabinoid(s), marijuana abuse, marijuana smoking, pharmacological actions, and physiological effects. 196 articles were initially reviewed, but only 27 articles met the established criteria for this review. All eligible studies presented original research data and were written in English.

All studies found physiological and/or behavioral changes in persons using marijuana. Some of the physiological changes included; increased heart rate, dizziness, decreased skin temperature, increased brain activity, carbon dioxide retention, decreased sense of smell, increased appetite and slower reaction times. Some behavioral changes included; psychomotor malfunctions, decreased decision making time, reduced anxiety, inability to recognize fear or anger in others, impaired short-term memory recall, increased risky sexual behaviors, and paranoia. Several studies found users who only smoked occasionally still developed a tolerance to the effects of marijuana but people who smoked more frequently were more likely to experience increased deleterious health effects. Marijuana is the most widely used recreational drugs in the United States. Often, people misperceive smoking marijuana as having fewer negative health effects compared to smoking tobacco cigarettes. Further research is needed to discover the potential long-term adverse effects of smoking marijuana. Additionally, more research on edible marijuana is needed comparing it to smoking or vaporization of marijuana as well. The negative psychological and behavioral effects of marijuana use outweigh the beneficial outcomes. Since the legalization of marijuana, it is rapidly becoming a common recreation drug. People should be aware of the consequences of marijuana use and become educated on its potentially harmful effects.

21. CRISPR-CAS9 DELETION OF ZCF28 AND EFFECTS ON CANDIDA ALBICANS BIOFILM FORMATION

Biology

Diana McMahon, Biology
Alex Jackman, Biology
Jonathan S. Finkel Ph.D., Biology

The fungus Candida albicans is an opportunistic pathogen that produces harmful biofilms on internal devices such as pacemakers and catheters when a patient is immunocompromised. Adherence of the yeast cells is essential to the development of a biofilm. Previous work has identified ZCF28 as a transcription factor relevant to adherence. In this study, the mechanisms by which the transcription factor regulates adherence will be determined. Using the CRISPR-Cas9 system, we will delete the transcription factor and replace it with a marker gene resistant to nourseothricin, NAT1. The mutated fungal strains will be assayed for biofilm formation on catheter squares and grown to observe the impacts on their biofilms. Complementation will be performed to restore the genes and deduce whether restoration reverses the effects of the deleted transcription factor. Then, the targets of ZCF28 will be overexpressed or deleted to discern which targets are required for adherence and/or biofilm formation. At the end of this study, it is hoped that the regulatory roles of the genes that ZCF28 transcribes can be determined, leading to known protein targets for drug therapy.

22. PREDICTING SEX CRIMES USING PATTERNS EXTRACTED FROM TWEETS

Mathematics & Software Engineering

Christian Schneider, Mathematics & Software Engineering
Gabriel Hanna, Mathematics & Software Engineering
Dr. Bani Taan, Mathematics & Software Engineering

Artificial intelligence is useful for many things, one of them being crime prediction. This paper discusses the AI used to discern sex offenders from non-sex offenders based off variables such as twitter tweet information, user age, race, gender, and the methods and processes used for the data acquisition and AI algorithms involved. The purpose of this research is to determine whether or not the data in criminal twitter accounts can be used to accurately predict future crimes before they occur. To achieve this, data from the accounts of 19 sex offenders and 19 non sex offenders was used to “teach” a classifier to discern between people who could be sexual criminals and those who are not. It was perplexing to see that the unprocessed text in the tweets yielded better classification accuracy than the processed tweets did. The results show that the discernment process can be successful with telling who may and who may not be a sex offender based off twitter information as long as there is enough data for the classifier to “learn” from.

23. RECONSTRUCTION OF CONTINUOUS SIGNALS USING A LOW COST DAQ MODULE

Wayne State Department of Biomedical Engineering

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Data acquisition systems (DAQ/DAS) are devices that take any detected data from transducers or sensors (voltages, currents, etc.) and converts them into digital signals to be viewed in a specified application. Most DAQ, when being used in these biomedical technologies, are able to obtain millions of sample data points per second, generating smooth and accurate waveforms. This research focuses on the testing of a low-cost DAQ, the BeagleBone Black, in regards to its sampling rate and waveform generation when gathering data continuously. Testing the accuracy of the waveforms creates the opportunity of developing affordable biomedical technologies, i.e. ultrasound systems, for commercial use.

24. THE USE OF MCHERRY FLUORESCENCE PROTEIN TO VISUALIZE PROTEIN-PROTEIN INTERACTIONS BETWEEN AIL AND PLA OF YERSINIA PESTIS

Division of Integrated Biomedical Sciences

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Jamal Alhabeil, Division of Integrated Biomedical Sciences
Eric S. Krukonis, Division of Integrated Biomedical Sciences

Yersinia pestis is the causative agent of plague, a highly fatal infectious disease. Ail and Pla are two surface-localized proteins that contribute to disease by facility delivery of cytotoxic proteins to host cells and degradation of fibrin clots via Pla's proteolytic activity. Preliminary evidence suggests Ail and Pla may form a functional complex leading to maximal proteolysis by Pla. The main focus of our study is to use a split of mCherry fluorescence protein system to visualize potential Ail/Pla protein-protein interactions in *Y.pestis*. mCherry is a monomeric red fluorescent protein developed for visualizing protein-protein interactions in living cells. mCherry can be split into two components at only fluoresce when brought together by interacting fusion proteins. Previous studies found the optimal fusion functions to be residues 1-159 and 160-237. To assess Ail/Pla interactions we are fusing Pla to mCherry residues 1-159 at the N-terminus and Ail to residues 160-237 at the C-terminus. The Ail-mCherry hybrid protein, while expressed, does not maintain Ail's binding activity. Thus, we have designed a 10-amino acid linker to inset between Ail and mCherryCT to allow better flexibility or folding of the two proteins. Construction of the mCherryNT-Pla fusion required multiple steps including: cloning mCherryNT adjacent to Pla, elimination of an existing EcoRI restriction site by mutagenesis PCR, and finally insertion of a secretion signal sequence to allow surface expression of the mCherry NT-Pla fusion protein. The first two steps have been accomplished and we are currently screening clones for insertion of the Pla signal sequence. Once assembled, mCherryNT-Pla will be assessed for proteolytic activity. Following establishment of active Ail-mCherryCT and mCherryNT-Pla fusion proteins, the two proteins will be co-expressed in *Y.pestis* to determine the ability of Ail and Pla to interact and restore mCherry fluorescence.

25. A BOTTOM-UP, TOP-DOWN APPROACH TO THE FORMAL SYNTHESIS OF CONTROL SOFTWARE

Electrical and Computer Engineering

Juliana Vilela, Electrical and Computer Engineering
Richard Hill, Mechanical Engineering

The cooperative control of multiple autonomous robots is an important, emerging research area that has implications for many new technologies, such as self-driving cars and aerial drones. This type of system has high complexity and the development of the necessary control logic commonly relies heavily on heuristics. However, such heuristics depend on designer understanding and intuition and can be prone to error. The prior work of [1] suggests the use of the supervisory control framework of Ramadge and Wonham [2] to generate control logic for these cooperative systems that is correct-by-construction. This framework makes the modeling of the system and its control more straight-forward, and also results in a control structure, known as a supervisor, that explicitly identifies all possible legal behaviors of the system that can be achieved through control. The next step of the problem is to choose the best" sequence of actions from the set of legal behaviors to apply to the system. This planning step is usually done by a search algorithm, as in [1] and [3]. This approach to supervisory control suffers from an explosion in computational complexity when applied to systems of an industrially-relevant scale. This reduces the application of the approach proposed by [1] to small systems. To deal with this issue, [3] splits the problem into a global and a local synthesis step using decomposition and hierarchy to reduce the overall complexity of the approach. The system is still modeled employing the same approach as [1], however, the supervisory control software is constructed in a bottom-up manner where component supervisors are synthesized and composed using hierarchy, resulting in an abstracted version of the "global" supervisor. Using this abstracted supervisor, a global plan is generated off-line. A sequence of local plans are then generated on-line based on portions of the unabstracted model of the system using a receding horizon. Though the approach proposed by [3] is able to handle significantly larger systems than [1], it still has computational limitations. The present work modifies the approach proposed in [3] by including a top-down phase that refines the component supervisors based on the global plan that is generated off-line. This model refinement reduces the size of the component supervisors used during the local planning step, decreasing significantly the number of evaluations required by the search algorithm. As a result, there is a reduction of the optimization time during the on-line phase, which makes it possible to synthesize correct control software for systems with greater numbers of autonomous robots and more complex specifications.

[1] J. Goryca and R. C. Hill, "Formal synthesis of supervisory control software for multiple robot systems." in American Control Conference. Washington D.C. USA, 2013, pp. 125-131.
[2] P. J. Ramadge and W. M. Wonham. "The control of discrete event systems." Proc. IEEE, vol. 77, no. 1, pp. 81-98, January 1989.

[3] R. C. Hill and S. Lafortune, "Scaling the formal synthesis of supervisory control software for multiple robot systems." in American Control Conference. Seattle, WA, 2017, pp. 3840-3847.

26. THE IMPACT OF TRAUMATIC BRAIN INJURY ON COGNITION AND LEARNING USING DROSOPHILA MELANOGASTER

Chemistry & Biochemistry

Ali Issa, Chemistry & Biochemistry
Ekta Shah, Wayne State University
Jordan Holloway, Wayne State University
Katherine Gurdziel, Wayne State University
Douglas Ruden, Wayne State University

Neurological damage and death is commonly seen in people with traumatic brain injury (TBI). Such brain injuries can be found in people who went through vehicular and sporting accidents and in military personnel. We are using Drosophila melanogaster (fruit fly) as a model to study the effect TBI has on cognition and learning. Drosophila shares about 75% of disease-causing genes with humans and have been used previously used as a model to study Alzheimer's and Parkinson's disease. TBI is inflicted in flies using a high-impact trauma (HIT) device to cause closed head injuries. Flies subjected to HIT show temporary incapacitation and ataxia similar symptoms to humans after a closed head injury. We are using the Drosophila Activity Monitor (DAM2, Trikinetics, Inc.) to measure changes in circadian rhythm and locomotor activity as well as Y-mazes to observe fly learning and memory after TBI. We have shown that learning in flies is impaired after TBI.

27. THE EFFECT OF PARENTAL STRESS ON CHILD BEHAVIOR AND PARENT-CHILD INTERACTION

Psychology

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Sara Elhasan, Wayne State University
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Background. Parenting stress can result from parental distress (e.g., depression), a parent-child dysfunctional relationship (e.g., dyadic conflict), or difficult child temperament. Parenting stress impacts children's social emotional behavior in real-life contexts and undermines the quality of the parent-child relationship. It is still unclear whether different dimensions of parenting stress are linked to direct observations of child behavior and parent-child interaction quality, or if these associations vary in challenging vs. unstructured interaction contexts. This is especially understudied in low-income families.

Aims. The primary aim was to evaluate whether three types of parenting stress (parent-related, dyad-related, or child-related) were associated with observations of preschoolers' social emotional behavior and dyadic interaction quality during two videotaped interaction tasks. A second aim was to evaluate whether the context in which dyads interacted (challenging or unstructured) altered the magnitude of these associations.

Method. Analyses were based on data collected from 50 mother-child dyads at the 4-year visit in a larger study. At that visit, parent-child dyads were asked to engage in two interaction tasks: a challenging dyadic copy task using an Etch-A-Sketch, and unstructured free play. Dyads were videotaped during each context, and the videotapes were later scored for qualitative dimensions of maternal, child, and dyadic behavior using 5-point Likert ratings from a reliable scoring system. In the current study, three child scales (positive affect, negative affect, engagement,) and one dyadic scale (interaction quality) were evaluated.

Results. Results of correlational analyses indicated that higher parent-related stress and higher child-related stress were each associated with higher child negative affect and lower dyadic interaction quality during the Etch-A-Sketch (but not the free play) task. In contrast, higher dyadic-related stress was associated with higher child negative affect and lower dyadic interaction quality in both contexts, and with lower child engagement during the Etch-A-Sketch task.

Conclusion. Results confirm that parenting stress is associated with direct observations of negative child and dyadic interactive behavior, but specific results vary depending on the context, the type of parenting stress, and the dimension of interactive behavior being evaluated. Negative child behavior and dyadic interaction problems are more apparent during challenging as opposed to unstructured contexts. Interventions focused on alleviating parenting

stress may be beneficial. Future research and interventions should include interactive contexts varying in level of challenge to elicit a wider range of parent-child interactive behavior.

28. MODELING THE ELECTRICAL DYNAMICS OF LITHIUM-ION BATTERIES VIA ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY

Mechanical Engineering

Zhan Li, Mechanical Engineering
Yasha Parvini, Mechanical Engineering

This research focuses on the modeling of lithium-ion batteries using equivalent electric circuits. An equivalent circuit model described by electrical elements is proposed, whose values will be identified with the electrochemical impedance spectroscopy (EIS) measurement as well as parameterization techniques. Frequency analysis such as Nyquist plot can provide some information about which elements should be used and how they should be connected in the model. Furthermore, the error between the terminal voltage of the initial model and the experiment is minimized to identify the remainder of the unknown parameters. The EIS measurements and the identification will be performed at different temperatures to track the changes in model parameters. These models will help to gain insight about the parameters that are responsible for the performance degradation of the cell at extremely low and high temperatures.

29. SOIL COMPACTION AND MOSITURE CHANGES FROM EGRP

Civil, Architectural & Environmental Engineering

Zeinab Hussein, Civil, Architectural & Environmental Engineering
Alan Hoback, Civil, Architectural & Environmental Engineering

In some land development projects, infiltrations rates are critical and make up a key component of the storm water network. In areas with drainage problems, Parajana Distribution Company has installed EGRP tubes into the ground. Previous research has shown higher infiltrations rates dramatic increase 7-10X at Coleman Young Project- and enhancement in the vegetation of those areas. For this study, we determined the effect EGRP installed areas at Belle Isle Park in Detroit on compaction and moisture. Using portable devices we found evidence of small differences in soil moisture and compaction. Further studies should be done with more advanced tools.

30. EFFECTS OF MCP-1 CHEMOKINE ON OVARIAN CANCER CELL VIABILITY

Biology

Jada Nelson, Biology
Ramandeep Rattan,

Ovarian cancer is a lethal gynecologic disease that's usually diagnosed at advanced stages. This is due to its nonexistent symptoms, size and location of ovaries, and limited knowledge on its unique biology. Discovering key proteins, pathways, and molecular events can lead to improved diagnosis, progression, and target treatments to improve the outcome of ovarian cancer. Ovarian cancer cells use stored fat of the adipocytes, specifically from the omentum, to fuel their growth. Our lab has shown that one of the top upregulated genes in ID8 ovarian cancer cells when exposed to adipocyte conditioned media is Monocyte Chemoattractant Protein-1 (MCP-1). MCP-1, also known as CCL2, is a protein produced by tumor and immune cells that aid in leukocyte migration and inflammatory response. MCP-1 has become of interest due to its abundance in ovarian cancer patients. MCP-1, when bound to its preferred receptor, can cause increased adhesion and invasion of cancer cells. Previously we showed high-fat diet induced aggressive ovarian tumors to express and produce increased amounts of MCP-1 along with decreased expression of AMPK. AMPK regulates the metabolism and energy levels of cells in the body. We have shown activation of AMPK to inhibit ovarian cancer growth and progression. Based on our previous observations, we hypothesized that MCP-1 promotes migration/invasion of ovarian cancer cells via inhibition of AMPK. We used MTT assay to ascertain the effect of MCP-1 on cell proliferation of ID-8 ovarian cancer cell, scratch assay to view effects on cell migration and western blot to identify phosphorylated AMPK (pAMPK). Our results show that MCP-1 has no effect on the proliferation of ID-8 ovarian cancer cells, but significantly promoted migration at low (10ng) and high (100ng) doses. MCP-1 also inhibited AMPK activity as seen by decreased pAMPK in western blot. Pre-treatment with metformin, an activator of AMPK blocked MCP-1 mediated migration of ID8 cells. Together, our study shows that MCP-1 promotes migration of ovarian cancer cells, which is reversed by activation of AMPK. Currently, we are performing a RT-PCR based array to identify the migration/invasion genes involved in mediating the effect of MCP-1.

31. OPERATIONAL STABILITY OF FUEL CELL MEMBRANE MATERIAL SPEEK: ABSTRACTION REACTIONS OF H AND OH RADICALS, BOND BREAKING AT SITE 4 OF THE AROMATIC RING

Chemistry & Biochemistry

Nikki Ognanovich, Chemistry & Biochemistry
Jonathan E. Stevens, Chemistry & Biochemistry
Alice Piatkowski, Chemistry & Biochemistry

A fuel cell is a device that obtains electrical energy from the reaction of hydrogen and oxygen to produce water. Sulfonated PEEK (sPEEK) is a proposed material for use in making the membrane of fuel cells. Molecular orbital calculations are used to determine the thermodynamics of abstraction of H from sPEEK by H and OH radicals and the thermodynamics of and barrier to C-O bond breaking following addition of OH radical to site 4 of the aromatic ring of the repeating monomer unit of sPEEK. Results indicate that sPEEK will be unstable in fuel cells due to bond-breaking reactions and other processes.

32. OPERATIONAL STABILITY OF FUEL CELL MEMBRANE MATERIAL SPEEK: ADDITION REACTIONS OF H AND OH RADICALS, BOND BREAKING AT SITE 1 OF THE AROMATIC RING

Chemistry & Biochemistry

Alice Piatkowski, Chemistry & Biochemistry
Jonathan E. Stevens, Chemistry & Biochemistry
Nikki Ognanovich, Chemistry & Biochemistry

A fuel cell is a device that obtains electrical energy from the reaction of hydrogen and oxygen to produce water. Sulfonated PEEK (sPEEK) is a proposed material for use in making the membrane of fuel cells. Molecular orbital calculations are used to determine the thermodynamics of addition of H and OH radicals to sPEEK, and the thermodynamics of and barrier to C-O bond breaking following addition of OH radical to site 1 of the aromatic ring of the repeating monomer unit of sPEEK. Results indicate that sPEEK will be unstable in fuel cells due to bond-breaking reactions and other processes.

33. EXPRESSION PATTERN OBSERVATION OF CG6191 AND THE LINK BETWEEN CABLES1 PROTEIN AND EPITHELIAL BASED CANCERS.

Biology

Amber Elinsky, Biology
Jacob Kagey, Biology
Stephanie Conant, Biology

The mammalian protein Cables1 has been shown to be down regulated and frequently mutated in various forms of cancers including ovarian cancer. Investigating the gene CG6196/Mary Shelly (MS) in Drosophila melanogaster (fruit fly) can demonstrate the effects of altering the MS gene with RNAi. The RNAi disruptions have been observed in the wing discs but are lacking in the eye discs dissected out of the larvae of the fruit flies. An expression pattern has been observed using the Green Fluorescent Protein (GFP) introduced to the fly's genome. The Cables1 protein has been observed in several mammalian tissue types, both epithelial tumor cell lines and normal epithelial cell lines, and screened on Western Blots. Implementing SiRNA transfection the link between Cables1 and epithelial tumor growth can be observed and implemented into human cancer therapies.

34. THE IMMEDIATE PHYSIOLOGICAL EFFECTS & SOCIAL IMPLICATIONS OF VAPING

College of Liberal Arts

Channing Sesoko, College of Liberal Arts
Molly McClelland, Health Professions

Vaping is an alternative to smoking that is widely believed to be less harmful than traditional tobacco products. Vaping is thought to be a safer alternative to smoking. Within the past 5 years, there has been a drastic increase in vape usage amongst teenagers and young adults. There is minimal, if any, research identifying the physiological effects of vaping and whether it is a safer alternative to traditional tobacco products. 24 people participated in the study organized into two groups. 12 people who self-identified as vapers and 12 who self-identified as non-vapers. We have created a brief medical questionnaire for participants, wherein they respond to questions pertaining to their current health, health history, and any vape products that they may be using. In conjunction to the medical questionnaire, physiological measurements of health were taken including: blood pressure, heart rate, respiratory rate, blood oxygenation level, blood sugar, and pulmonary function test. Physiological data was compared between the vaping and non-vaping groups. Additionally, the physiological data was compared before and after 30 minutes of vaping for the vape group. To gather data on the sociological effects of vaping, focus groups were held. During the focus groups we discussed what participants knew about vaping, why they vaped or abstained from vaping, if they noticed any stigmas associated with vaping, and any questions or concerns about vaping that that participants had. These conversations were recorded and transcribed via Verbal Ink. These transcripts were then analyzed for themes.

35. PRECONDITIONING FACILITATES MOLECULAR TOCOLYTICS LEADING TO TERM PREGNANCY

Biology

Arren E. Simpson, Biology
Judith A. Ingles,

Normal gestational length is between 40-42 weeks, whereas preterm birth is delivery prior to 37 weeks. Detroit has one of the highest rates of preterm birth at 18% versus the national average of 11%. We hypothesize that the normal incremental gestational stresses that every pregnant uterus experiences may play a crucial role in the maintenance of uterine quiescence through a novel preconditioning-like paradigm. A broad definition of preconditioning is the act of incremental low dose stressors preparing cells to withstand subsequent more damaging stresses. Our lab has previously observed in vitro, that preconditioning of human uterine muscle cells enhanced cell viability and decreased apoptotic and inflammatory parameters. We also discovered that uterine preconditioning is controlled through activation of the unfolded protein response, which is a stress response mechanism housed in the endoplasmic reticulum in all of our cells. In this current study we examined the functional role of preconditioning in the regulation of uterine quiescence and gestational length in the pregnant mouse. Utilizing an in vivo model of pregnant CD-1 mice we disrupted endogenous gestational preconditioning by administering phenyl butyric acid (PBA) (50mg/kg, intraperitoneal) twice a day from gestation day 10 to 15 (E10-15) (n=6) and compared to a non-PBA treated controls (n=6). PBA is a compound that prevents the down stream preconditioning effects of endogenous gestational stresses. All mice were then administered a small dose of exogenous stress late in gestation (E16, 0.2mg/kg Tunicamycin, intraperitoneal). We then monitored a subset of the treated mice for the time of labor and delivery. Subsequently, the uterine, ovary, placental tissue and serum were collected from the counter-subset of mice on E17.5. Stress response and inflammatory related proteins from the tissue and serum were then analyzed using western blot, ELIZA, TUNEL assay, immunohistochemistry, and mass spectrometry. Confirming our in vitro results our in vivo analysis demonstrated sub-preconditioned mice had significantly higher risk for preterm delivery compared to preconditioned controls (57%, 14% respectively). Increased apoptotic and inflammatory parameters were also observed in the sub-preconditioned animals in comparison to the appropriated preconditioned pregnant mice. Overall, our results demonstrated that preconditioning during pregnancy enhances cell viability and reduces inflammation allowing for the maintenance of uterine quiescence to term. These results are important due to their prospective role in potential therapeutics drug development for the prevention of preterm birth.

36. UNDERSTANDING THE MISREGULATION OF COP9 SIGNALOSOME IN EPITHELIAL DERIVED CANCERS

Biology

Faith Volpe, Biology
Travis Miller, Biology
Selena Cholak, Biology

Epithelial tissues maintain their integrity due to cellular membrane junctions such as the desmosome. When mutations arise in many of the desmosomal genes, it can lead to harmful disorders. The desmosome is a membrane-bound protein junction known for its role in intercellular adhesion, its regulation of signalling molecules related to proliferation and differentiation, and its relationship with the COP9 signalosome. In normal tissue, the desmosome and COP9 mediate epidermal differentiation through a mechanism that inhibits epidermal growth factor receptor (EGFR) activity, a signaling pathway known to promote growth. This mechanism of dampening EGFR signaling, allows the suprabasal layers to properly differentiate and stratify. The eight-unit COP9 protein complex regulates protein degradation through the cleavage of a ubiquitin-like protein, Nedd8, from ubiquitin ligases. While it has been shown that both COP9 and EGFR are upregulated in certain cancers, it is undetermined whether their interactions or failure to interact with the desmosome contribute to the disease. Through the protein analysis of Nedd8 and desmosomal components in a variety of cancer cell lines, our research aims to clarify the process by which a misregulation of COP9 creates a cancerous phenotype. Our data will be obtained by western blot analysis and protein immunoblotting. Further, densitometry quantification will be performed to address statistical significance. In this presentation, we will show differences in protein regulation across a range of epithelial cancer cell lines.

37. DELETION OF ZCF34 USING CRISPR AND EFFECTS ON BIOFILM FORMATION OF CANDIDA ALBICANS

Biology

Alex Jackman, Biology
Diana McMahon, Biology
Jonathan S. Finkel Ph.D., Biology

The fungus Candida albicans is a opportunistic pathogen that often forms biofilms on implanted medical devices. The formation of a biofilm is dependent first on adherence. The transcription factor ZCF34 has been identified by previous research to be involved in the regulatory network governing adherence. This study focuses on the role of this transcription factor and its effect on cell adherence. A CRISPR-Cas9 system developed for Candida albicans will be used to delete ZCF34, and replace it with NAT1, a gene that provides a resistance to the antibiotic nourseothricin. Adherence of this strain will be determined by assaying adherence on pieces of catheter material under flow, and discerning whether a wild-type biofilm forms. Targets of the deleted transcription factor will then be over-expressed or deleted to see if biofilm formation is restored. The genes that contribute to adherence can then be targeted for drug therapy to prevent biofilm formation.

38. TRAJECTORY TRACKING OF UNDERACTUATED QUADROTOR USING ADAPTIVE CONTROLLER

Mechanical Engineering

Shayan Mirzaei, Mechanical Engineering
Yasha Parvini, Mechanical Engineering

This research focuses on adaptive control strategy to deal with tracking problem of a quadrotor unmanned aerial vehicle in presence of parametric uncertainties, actuator amplitude constraints, and unknown time-varying external disturbances. First, Lyapunov-based indirect adaptive controller optimized by particle swarm optimization (PSO) is developed for multi-input multi-output (MIMO) nonlinear quadrotor to prevent input constraints violation, by limiting the control input, and then disturbance observer-based control (DOBC) technique is aggregated with the control system to attenuate the effects of disturbance generated by an exogenous system. Finally, illustrative numerical simulations are conducted to demonstrate the effectiveness of the presented approach in altitude and attitude tracking problem.

39. SUPERCAPACITORS VERSUS LITHIUM-ION BATTERIES

Mechanical Engineering

Mengjie Wang, Mechanical Engineering

Nowadays, our planet faces huge challenges related to energy, such as reducing CO2 emissions and fossil fuel consumption. Therefore, researchers and engineers have focused their efforts towards sustainable energy development. We can convert sustainable energy from many different forms into usable electricity. However, the main problem for electricity is how we store and transport it from the generation source. It is exactly the problem that can be solved by supercapacitors and lithium-ion batteries.

40. LIGAND SYNTHESIS FOR PLATINUM DRUG

Chemistry & Biochemistry

Adam Fraeyman, Chemistry & Biochemistry
Wayman Jones, Biology
Alexandra Carnathan, Biology
Deja Lee, Biology
Reneisha Banner, Chemistry & Biochemistry
Ksenia Providokhina, Chemistry & Biochemistry
Christine Chow, Department of Chemistry, Wayne State University
Klaus Friedrich, Chemistry & Biochemistry

Drugs like cisplatin are essential for the treatment of cancer. They crosslink DNA, thus leading to cell death. Tumor cells are most affected due to high growth rates. However, resistance of the cancers to cisplatin is observed in many patients. The reasons for this resistance are not well understood; and eventual failure of the drug poses a major hurdle to successful cancer treatment. In this project, new amino acid-derived platinum compounds will be synthesized and tested in cell-based assays for the observation of DNA crosslinking in cells; formation, isolation and characterization of the adducts; and the optimization of physiological and pharmacological parameters governing cell uptake and cell death. Understanding these aspects will enable the development of drug with a more advantageous pharmacological profile, thus reducing some of the side effects and also outmaneuvering the defenses of cancer cells against medically induced apoptosis.

41. OUTCOMES IN BEREAVED DEMENTIA CAREGIVERS: A SYSTEMATIC REVIEW

Nursing

Dazja Jones, Nursing
Mitzi Saundars, Nursing

Objective: While much is known about dementia caregiving, less is known about the caregiver when the caregiving ends. Evidence suggests, however, there is a connection between the caregiving experience and how one transitions into widowhood. We systematically reviewed the existing studies on the transition from dementia caregiving to bereavement.

Methods: We searched five databases that resulted in 305 studies retrieved with 18 meeting predetermined criteria.

Results: A range of trajectories for bereaved caregivers were noted. Depression increases immediately post death and then declines over time for the majority of caregivers. However, depression remains high for a subgroup of caregivers for up to 3 years post-death with anywhere from 6% to 20% experiencing complicated grief. Although psychological health improves for a significant number of caregivers, physical health takes longer to show improvement. Factors that impact the transition include: gender, relationship to care recipient, caregiver burden, income, and education. Limitations of the studies include: homogenous samples (White, educated, high income, urban populations), lack of analysis of caregiver subgroups (i.e. spouse vs. adult child), focus on mental over physical health outcomes, and limited number of intervention studies.

Conclusions: Future studies should include (1) more diverse samples; (2) analyses of outcomes by caregiver group (i.e. spouse, adult child, other); (3) more physical health outcomes; (4) rural populations; and (5) evaluation of resources and/or interventions.

42. 1,2-DIHYDROPYRIDINES AS SYNTHETIC BUILDING BLOCKS.

Chemistry & Biochemistry

Edwin Jurado, Chemistry & Biochemistry
Klaus Friedrich, Chemistry & Biochemistry
Brian Curtis, Chemistry & Biochemistry
William Arce, Chemistry & Biochemistry

Depression, addiction and many other neurological disorders have been linked to chemical imbalances within the central nervous system. Over the past 30 years, a number of these disorders have been associated with derailed glutamate transport. Glutamate is an important neurotransmitter and acts via ionotropic and metabotropic receptors, which are widely distributed throughout the central nervous system.

Allostreric modulation has become an important therapeutic venue because of the potentially high specificity of the modulators and their well-defined action. NAMs (Negative Allosteric Modulators) down-regulate the response triggered by orthosteric binding; one objective of this project is to synthesize molecular scaffolds that are capable of penetrating the blood-brain barrier while carrying ligands known for their interaction with allosteric binding sites. The synthetic pathway starts with dihydropyridines that are converted to cage-like structures inspired by the psychoactive natural product ibogaine.

43. GIANT DUCKWEED (SPIRODELA POLYRHIZA) GENE EXPRESSION RESPONSE TO PHOSPHORUS

Biology

Royce Swasey, Biology
Stokes Baker, Biology

In 2014, Toledo's water supply was shut off due to phosphorus pollution in Lake Erie. To gain a better understanding on how aquatic plants response to phosphorous water pollution, an RNAseq with Spirodela polyrhiza's (greater duckweed) was conducted. The study indicated many gene, such as those encoding pyridoxial phosphate phosphatase related protein and purple acid phosphases are tightly regulated and induction by phosphate starvation. Reverse transcriptase quantitative polymerase chain reaction (rt-qPCR) studies are planned to confirm these observations. Primers are being evaluated by end-point PCR experiments. Total RNA from control and phosphate-starved plants was extracted using the Qiagen (Hilden, Germany) RNeasy mini kit. Reverse transcriptase qPCR primers were used on total RNA (with contaminating genomic DNA (gDNA)), DNase I treated RNA, and first strand complementary DNA (cDNA). Unfortunately, amplicons from contaminating gDNA was detected with some primers. A temperature gradient end-point PCR experiments showed that these false positive signals can be prevented with increase annealing temperatures.

44. SIMULATION-BASED DESIGN OF A POD-BASED MOBILITY CONCEPT

Mechanical Engineering

JingHan Fu, Mechanical Engineering
John Slowik, Electrical and Computer Engineering
Rick Hill, Mechanical Engineering

This work presents a design and simulation-based validation of a pod-based mobility concept. The design of independent pods that can be attached to arbitrary heavy objects for movement and positioning is presented. The pods are free to rotate about a vertical axis and include two independently-driven wheels situated in an Active Split Offset Castor (ASOC) arrangement. The ASOC architecture allows the achievement of approximately omnidirectional motion with conventional wheels and minimal scrubbing, which makes the design suited to a range of terrains. Previously, a linear least squares estimation algorithm was developed to estimate the relative positions of the individual pods. This algorithm is improved with a Kalman filter for estimating the velocity of each pod attachment point based on the individual wheel speed measurements and two accelerometers placed orthogonally on each pod platform. Further new developments include a force-based, wheel-level control algorithm along with a disturbance observer algorithm used for estimating the road force at each wheel. This force-based control algorithm is shown in simulation to provide improved tracking performance as compared to a more traditional velocity-based controller.

45. QUANTITATING THE ROLE OF RNASE E IN CELL CYCLE REGULATION

Chemistry & Biochemistry

Nathaniel Nunez, Chemistry & Biochemistry

The asymmetric cell division in Caulobacter crescentus results in two functionally and morphologically different cell types; motile swarmer and sessile stalked cells. During the cell cycle, about 20% of cellular mRNAs are cell-cycle regulated. While much of the cell cycle-regulated mRNA levels are due to a transcriptional regulatory circuit that controls the cell cycle timing of transcription, only 57% of cell cycle-regulated promoters are controlled by this circuit and the role of mRNA decay remains unknown. Recent reports showed that the major mRNA turnover nuclease, RNase E, has cell cycle-regulated protein levels suggesting a role for mRNA decay in the cell cycle-regulation of mRNA levels. To study the interplay between RNase E and cell cycle regulation a conditional expression system utilizing xylose was developed to make specific alterations to the RNase E protein. Interestingly, misalteration of the RNase E protein through the conditional expression revealed defects in the cell cycle, resulting in aberrant division and elongated cells. To quantitate the impact of RNase E alteration on the cell cycle, an imaging analysis software package Microbe J was utilized to measure the cell length across RNase E expression conditions in a high-throughput manner. Microbe J automatically detects cells and creates polygonal meshes to measure the length of the medial axis. Through this quantitative analysis we were able to accurately compare the phenotypes of different RNase E protein constructs and their relative abilities to function in the cell cycle.

46. COGNITIVE BIAS TESTING IN MICE

Psychology

Jace Paupert, Psychology
Ian Moore, Psychology
Elizabeth Hill, Psychology

The present study examined sex differences in cognitive bias, exploratory behavior, and impulsivity among mice. Cognitive bias tests are used to assess how optimistic or pessimistic an animals' response to an ambiguous stimuli is. Cognitive bias is also known to be related to human emotions (MacLeod, 1994). Based on previous research, it was hypothesized that males would show more exploration and impulsivity, along with a more "optimistic" learning bias. This study included 20 Swiss Webster mice, 10 males and 10 females. The mice were trained to discriminate between a negative and a positive odor stimulus and later exposed to a 50/50 mixture of each odor as the ambiguous stimulus. An androgenital distance was measured on each mouse; a greater androgenital distance indicates greater prenatal masculinization, which correlates with higher aggression (Kerin et. al., 2003). Each mouse went through habituation, odor discrimination training, exposure to an ambiguous stimulus, an open field test, and a novel item test. Defensive behaviors were recorded during each of these procedures. Analyses were compare males and females. Overall the hypothesis of sex differences in cognitive bias was not supported and findings pertaining to defensive behavior support previous research. The average frequency of defensive behavior appeared to be higher for females but the difference was statistically significant only for the ambiguous day (Males, $M = 8.14$, $SD = 7.15$; Females, $M = 23.25$, $SD = 10.77$; $t [12.2] = -3.236$, $p = .007$). The behaviors recorded during open field testing were not statistically different between males and females (all $p > .05$). Results and implications will be further discussed.

48. APPLICATION OF DNA NANOTECHNOLOGY: ROLLING CIRCLE AMPLIFICATION PRODUCTS (RCP) AS DRUG DELIVERY SYSTEM

Chemistry & Biochemistry

Bianca Jones, Chemistry & Biochemistry
Birgitta Knudsen, Biology

The application of nanotechnology within pharmaceutics as well as biomedicine have greatly contributed in the advancement of drug delivery systems. The use of nanoparticles such as liposomes, micelles, and biodegradable polymer vesicles have been favored but pose risk due to their exogenous nature. A beneficial approach to this problem is the incorporation of DNA nanoflowers (NFs) as a drug delivery tool. Use of NFs provide researchers with biocompatibility, programmability, high drug-loading capacity and acidic conformational changes for toxin release. More specifically this research aims to battle lysosomal malfunctions such as infectious diseases, neurodegenerative diseases, and inflammation conditions which may efficiently receive the toxins via DNA NFs.

49. SYNTHESIS OF NOVEL LIGANDS FOR PLATINUM DRUGS

Biology

Adam Fraeyman, Biology
Wayman Jones, Biology
Alexandra Carnathan, Biology
Ksenia Providokhina, Chemistry & Biochemistry
Deja Lee, Biology

The overarching objective of this project is the improvement of treatment outcomes for cancer patients who require chemotherapy. An important class of chemotherapeutic agents is that of platinum-containing antineoplastic drugs. The treatment is typically associated with numerous side effects and the risk of malignancies that develop drug resistance.
Here the synthesis of new ligands for platinum complexes derived from indoles is described. The complexes are designed to facilitate DNA-bending upon base crosslinking. The DNA-platinum adducts will be characterized to gain insight into the mechanisms of DNA-related cytotoxicity of these platinum compounds and to conduct cell-imaging studies.
The new ligands are obtained from nitroanilines through Fischer indole synthesis followed by Mannich reactions to introduce side chains. These are designed to modify the lipophilicity of ligands, contribute some steric hindrance and can be functionalized to attach reporter groups to determine the position of the adduct on the DNA strand as well as the location in the cell. Synthetic methodologies, procedures for the separation of enantiomeric products and analyses of platinum compounds are presented.

50. THE EFFECTS OF BACTERIAL COLONIZATION ON NUTRIENT ABSORPTION OF GIANT DUCKWEED (SPIRODELA POLYRHIZA)

Biology

Biology
Dr. Stokes Baker, Biology

Aquatic nutrient pollution is a worldwide problem. Giant duckweed (Spirodela polyrhiza) is used as a model organism. The natural aquatic environment of S. polyrhiza contains free and bound phosphate. Previous experiments have shown that axenic cultures of S. polyrhiza do not grow experimentally in media containing hypereutrophic concentration of phosphate (sic 250 ug/L). It is hypothesized that in natural ecosystems, bacteria help aquatic plants like duckweed assimilate phosphorous; possibly by converting bound phosphate into organophosphate. To determine if bacteria form a close relationship with giant duckweed, wild cultures of S. polyrhiza were stained with the vital stains SYTO9 and propidium iodide; which fluorescently stain living microbes green and dead microbes. Z-stacked epifluorescence micrographs show the epidermal cells of both roots and the ventral sides of fronds were extensively covered with living bacteria, with a few dead cells scattered throughout. To determine if fungi were associated with the epidermal cells, the same plant material was stained with lophenyl flavine 7GFE 500 (Direct Yellow 96), a dye that fluorescently stains fungal cell walls. Only a few chiton containing cells were observed penetrating the rhizoids in various locations. I plan to determine if the microorganisms facilitate duckweed assimilation of phosphate from organic sources. To conduct this experiment, sterile cultures of S. polyrhiza from the wild population will be needed. Preliminary experiments indicate that I have successfully created axenic cultures. We plan to compare the growth rate of sterile and inoculated duckweed cultures grown in defined media containing only DNA as an organics phosphate source found in aquatic ecosystems.

51. DATA-CENTRIC CLUSTERING APPROACH FOR VEHICULAR AD HOC NETWORKS

Electrical and Computer Engineering

Yamei Xiao, Electrical and Computer Engineering
Dr. Utayba Mohammad, Electrical and Computer Engineering

Data dissemination is a fundamental step in all inter-vehicle communication. However, traditional dissemination protocols fail to serve vehicular networks due to the large load of exchanged data and the dynamic nature of these networks. Recently, clustering algorithms have been used to mitigate the dynamic network problem by segmenting communicating vehicles into stable groups, clusters of vehicles. Clustering allows for multiple streams of data to run on parallel through multiple stable vehicle clusters, resulting in reduced packet delay and improved performance. Thus far clustering criteria have been focused on the topological stability of clusters, but not paying attention to the limited bandwidth of available communication channels. In this paper, a Stable and Data Centric Clustering (SDCC) algorithm is developed by adding the type of exchanged data as a new parameter in the clustering criteria. By identifying seed vehicles to disseminate data to interested parities over pre-allocated channels, both external download resources, such as cellular networks; and internal resources, the Dedicated Short Range Communication (DSRC) channels, will be better used. The SDCC is shown here to reduce packet delay and improve the overall throughput of the network, hence, providing better communication characteristics and resource utilization in the Intelligent Transportation System (ITS).

52. THE IMPACT OF PREBIOTICS AND PROBIOTICS ON GLUCOSE CONTROL IN TYPE 2 DIABETES MELLITUS

Nursing

Anthony Croft, College of Health Professionals

Type two diabetes mellitus (T2DM) is a chronic, progressive health condition that requires ongoing assessment, interventions to control blood glucose levels and education and evaluation to reduce complications. T2DM is the seventh leading cause of death in the United States (U.S.) (American Diabetes Association [ADA], 2016). Currently, 29.1 million people have T2DM, accounting for approximately 9% of the U.S. population (ADA, 2016); additionally, another seven million people have high blood sugar and hemoglobin A1c (HbA1c) levels that diagnose them as having pre-diabetes (ADA, 2016). Diabetes is an expensive disease where the total cost of diagnosis and treatment is estimated to be $245 billion annually (American Diabetes Association, 2016), prompting a U.S. national objective to reduce the economic costs that are caused by this health concern (Healthy People 2020; U.S. Department of Health and Human Services, 2013).

The key to diabetes management is maintaining control of glucose as measured by the HbA1c. Ideal values for HbA1c are under 5.7%. Those with HbA1c values ranging from 5.7-6.4% have pre-diabetes and those over 6.5% are diagnosed with diabetes. Poorly controlled diabetes causes significant complications include cardiovascular disease, nephropathy, neuropathy and retinopathy of the eye, which can result in blindness. Control of blood glucose values and HbA1c levels reduces complications from the disease (ADA, 2016).

A relatively new line of therapeutic intervention for diabetes has taken the form of prebiotics and probiotics. Prebiotics and probiotics have been used increasingly over the last few years in a variety of studies that focused on assessing and recording their impact on the management of diabetes mellitus. Essentially probiotics work to balance the microflora in the gastrointestinal tract that, according to prior research, results in an improved Hemoglobin A1c (HbA1c), fasting blood glucose, and fasting blood insulin levels. electronic databases such as: PubMed, Google Scholar, CINAHL, EBSCO, and ProQuest were used to identify randomized controlled trials and metadata-analysis reviews that were relevant to the topic. The purpose of this review is to ascertain the current state of science regarding the medical use and effectiveness of prebiotics and probiotics for the management of diabetes mellitus (specifically type II).

53. AN EXPLORATION IN THE GRADUATE ADMISSIONS PROCESS: GENDER BIAS IN FACULTY LETTERS OF REFERENCE

Psychology

Jennifer Nava, Psychology
Annmarie Cano, Psychology

Much of the research looking at implicit gender bias in letters of reference (LORs) has been for faculty positions in science, technology, engineering, and mathematics (STEM), however, little is known as to whether similar biases are apparent in the graduate admissions process. We conducted a preliminary test on whether gender differences were present in four STEM departments at Wayne State University (WSU). These departments included Nutrition and Food Sciences, Physics, Biology, and Chemistry. LORs were then de-identified and coded through the use of the text analysis application Linguistic Inquiry and Word Count (LIWC2015). It was hypothesized that, in comparison to male applicants, letters for female applicants would be shorter, and include fewer mentions to performance and achievement. Preliminary results suggest that there are indeed gender biases in the language recommenders use to describe candidates. This knowledge can be used to improve guidance for faculty members and to achieve more equitable access throughout the graduate admissions process.

54. IDENTIFICATION OF NEW SUBSTRATES FOR THE YERSINIA PESTIS OUTER MEMBRANE PROTEASE PLA AND THE ROLE OF AIL IN PLA-MEDIATED CLEAVAGE

School of Dentistry Division of Integrated Biomedical Sciences

Christina Jones, School of Dentistry Division of Integrated Biomedical Sciences
Lizbeth Garcia, School of Dentistry Division of Integrated Biomedical Sciences
Dalia Al-Alfe, School of Dentistry Division of Integrated Biomedical Sciences
Eric S. Krukonis, School of Dentistry Division of Integrated Biomedical Sciences

Yersinia pestis, the causative agent of plague, utilizes plasminogen activator (Pla) to activate the host's circulating plasminogen into plasmin via proteolysis as well as adhere to extracellular matrix (ECM) proteins and host cells. Pla-mediated cell adhesion can also facilitate delivery of cytotoxic Yop proteins to host cells via a type 3 secretion system (T3SS). Another Y. pestis outer membrane protein, Ail, also adheres to host cells and enhances Yop delivery as well as provides serum resistance. Previous studies have shown Ail also facilitates Pla-mediated cleavage of plasminogen by an unknown mechanism. We hypothesize that Ail and Pla may function as a molecular complex to bind and then cleave multiple protein substrates during a plague infection. Ail binds the ECM proteins laminin (Ln) and fibronectin (Fn) while Pla binds Ln, Fn, and collagen IV. Pla also cleaves the apoptotic signaling molecule Fas ligand (FasL). To investigate the role of Ail in facilitating Pla binding and cleavage of multiple substrates, Y. pestis strains expressing both Pla and Ail, either protein alone (Î”ail or Î”pla) or neither protein (Î”ailÎ”pla) were mixed with each of four substrates (Ln, Fn, collagen IV, and FasL) and Pla-mediated proteolysis was monitored using Western blot analysis. We found neither Ln nor collagen IV is cleaved by Pla, even though both proteins are bound by Pla, suggesting these substrates lack a proteolytic cleavage site for Pla. Fn was bound by both Ail and Pla and Pla cleaved Fn in a time-dependent fashion. This was demonstrated using a time course proteolysis assay encompassing the time points 0, 15, 30, and 60 minutes. These time course studies also revealed little to no influence of Ail on Pla-mediated degradation of Fn. Early results indicate Ail is unable to bind FasL, but further experiments are required to determine whether Ail influences the ability of Pla to degrade FasL. In conclusion, we have identified one new proteolytic substrate of Pla, Fn, and have demonstrated that Ail does not influence the rate of Fn degradation by Pla; Ongoing studies will assess the contribution of Ail to FasL cleavage.

55. MODELING OF FEEDDRIVE SYSTEMS OF CNC MACHINES

Mechanical Engineering

Saeed Ramzi, Mechanical Engineering
Mostafa Mehrabi, Mechanical Engineering

The feeddrive system is an important component of CNC machines and its performance plays a key role in the accuracy and precision of the entire machining system. This work is mainly focused on modeling of such a system, and the results can be mainly utilized for design, control, and monitoring applications. A 7th order linear model is developed in the state-space format which takes into account the electrical characteristics of the servo system, stiffness, inertia, and damping properties of individual components of the feeddrive system. A detailed parametric study of this model is carried out which reveals the contribution of various components of the system in its transient and steady-state response. The results are used in further simplifying this model to a 4th order systems which is simpler in structure and more appropriate for control applications. A comparison is made between these models and the merits of each individual model are presented. Details of the results are presented and suggestions are made as when to use each of these models.

56. ENHANCEMENT OF THE DIELECTRIC PROPERTIES OF POLYOLEFINS

Chemistry & Biochemistry

Maria Evans, Chemistry & Biochemistry

The goal of this research project is to enhance the dielectric properties of polyolefins while maintaining the necessary mechanical properties. Since polylefins are transparent to microwave energy enhancing the dielectric properties allows the use of microwave energy in the industrial processing of polyolefin based materials. To achieve this goal, nanoscale materials with desired dielectric properties are formulated into bulk polyolefins by melt compounding. The dielectric values of the resulting formulations are determined using a coaxial probe and the microwave heating is tested using a 1250 W inverter microwave mounted with a FLIR infrared camera. The infrared camera is recording while the experiment is happening. Thus far sustainable materials which include collagen, Rochelle salt and sucrose were formulated into polyethylene and the dielectric properties of the resulting bulk formulations were compared with pure polyethylene.

57. SYNTHESIS OF A SERIES OF PODAND LIGANDS ALL INCORPORATING LONG-CHAIN ALIPHATIC MOIETIES

Chemistry & Biochemistry

Justin Pothoof, Chemistry & Biochemistry
Michele Bhagwagar, Chemistry & Biochemistry
Mark Benvenuto, Chemistry & Biochemistry

A series of long, podand ligands has been produced, incorporating three to five nitrogen atoms, in attempts to create new chelating agents which can extract metal ions from aqueous solutions. Common starting materials include tetraethylene pentaamine and diethylenetriamine, each combined with octanal, decanal or dodecanal via a Schiff's Base condensation. The goal of the project is to determine if novel, inexpensive ligands can be produced to remediate polluted water streams. The ligands are therefore designed to be non-specific to numerous Lewis acids.

58. A NOVEL CURB DETECTION METHOD FOR PARKING ASSISTANCE

Electrical and Computer Engineering

Karthika Balan, Electrical and Computer Engineering
Melvin P Manuel, Electrical and Computer Engineering
Dr Mohannad Murad, Electrical and Computer Engineering

Curb detection is an important research topic, a subset of the task of environment perception, which is the key challenge in being able to realize Self Driving Automobiles. Specifically, curb detection is a component of the category of Advanced Driver Assistance Systems (ADAS), that assist and alert drivers in the task of parking, while avoiding unintended and damaging contact with concrete curbs and parking blocks. In this work, a novel curb detection method is presented that uses camera images and associated software processing to achieve the goal. A CCD camera is fixed at the bottom of the mesh grill, at the center of the front bumper, at an angle that provides a desirable field of view. An algorithm using the MATLAB programming language is developed on a computer used to acquire the camera images. It makes use of the Hough Transform for detecting the edges of the curb and is also capable of measuring the distance from the front end of the car to the curb. The results appear to be robust in typical static and dynamic environments.

59. A PRM APPROACH TO PATH PLANNING WITH OBSTACLE AVOIDANCE OF AN AUTONOMOUS ROBOT

Electrical and Computer Engineering

Saleh Alarabi, Electrical and Computer Engineering
Chaomin Luo, Electrical and Computer Engineering
Mohan Krishnan, Electrical and Computer Engineering
Mark Paulik, Electrical and Computer Engineering

A probabilistic Roadmap (PRM) approach of an autonomous robot for real-time map building and navigation is proposed in this paper. A probabilistic Roadmap is first constructed based on the environment, which is utilized to generate the initial global trajectory with obstacle avoidance. A histogram-based algorithm is employed to navigate the vehicle to follow the path locally. Once a global trajectory is planned by the probabilistic Roadmap approach, a foraging-enabled trail is created to guide the robot to the target. A local map composed of square grids is created through the local navigator while the robot traverses with limited LIDAR sensory information. In this paper, simulation studies demonstrate that the real-time concurrent mapping and PRM trajectory planning of an autonomous robot is successfully performed in complex environment.

60. A MAX-MIN ANT SYSTEM TO MULTI-GOAL MOTION PLANNING OF AN AUTONOMOUS ROBOT

Electrical and Computer Engineering

Saleh Alarabi, Electrical and Computer Engineering
Chaomin Luo, Electrical and Computer Engineering
Mark Paulik, Electrical and Computer Engineering
Mohan Krishnan, Electrical and Computer Engineering

A MAX-MIN ant system model is developed for real-time map building and navigation for multiple goals purpose. In real world applications such as rescue robots, service robots, mine rescue robots, and mine searching robots, etc., an autonomous mobile robot needs to reach multiple goals with a shortest path that, in this project, is capable of being implemented by a MAX-MIN ant system method with minimized overall distance. Once a global path is planned, a foraging-enabled trail is created to guide the robot to the multiple goals. A histogram-based local navigation algorithm is utilized to plan a collision-free path along the trail planned by the global path planner. A replanning-based algorithm aims to generate path while a mobile robot explores through a terrain with map building in unknown environments. In this paper, simulation and experimental results demonstrate that the real-time concurrent mapping and multi-goal navigation of an autonomous robot is successfully performed under unknown environments.

61. REAL-TIME MAPPING AND NAVIGATION WITH OBSTACLE AVOIDANCE OF AN AUTONOMOUS ROBOT BY AN ARTIFICIAL IMMUNE SYSTEM ALGORITHM

Electrical and Computer Engineering

Chien Yen Wang, Electrical and Computer Engineering
Chaomin Luo, Electrical and Computer Engineering
Mohan Krishnan, Electrical and Computer Engineering
Mark Paulik, Electrical and Computer Engineering

An autonomous robot achieves the desired goal and avoids obstacles with improved artificial immune system (AIS) algorithm is proposed in this project. Artificial immune system has been widely utilized in obstacles avoidance with the strong searching ability and learning ability. The AIS is a class of computationally intelligent, rule-based machine learning system inspired by the principles and processes of the vertebrate immune system. The algorithms are typically modeled with the immune system's characteristics of learning and memory for use in problem-solving.

The AIS aims to abstract the structure and function of the immune system to computational systems, and investigate the applications of these systems towards solving computational problems such as robotics motion planning. The AIS is developed to generate the initial global trajectory with obstacle avoidance. A histogram-based algorithm is designed to navigate the robot to follow the trajectory locally by connecting the traces along the global trajectory. A local map composed of square grids is created through the histogram-based algorithm while the robot traverses with limited LIDAR sensory information. In this project, the real-time concurrent mapping and AIS trajectory planning of an autonomous robot is successfully simulated in a complex environment.

62. WHEELCHAIR ESCALATOR

Mechanical Engineering

Evan Jeffries, Mechanical Engineering

Millions of people in the United States have some form of disability. Often these disabilities inhibit even the most basic of their daily tasks, especially those who are wheelchair bound. The Wheelchair Escalator concept started as a senior design project intended to help people with disabilities traverse stairs unassisted. An initial proof of concept was created in 2015 which sparked the University's interest in developing the project for commercialization. The goal was to create an Americans with Disabilities Act (ADA) compliant, safe, and cost effective product that can be easily reproduced. A modular framing system called T-slots is utilized to construct a platform for the wheelchair which is towed up and down along inclined rails. This construction method allowed the flexibility necessary to make design adjustments for functional and ADA compliance reasons. The Wheelchair Escalator makes use of modified off-the-shelf components making it increasingly more cost effective and reliable. With a weight capacity of 600lbs, the Wheelchair Escalator can easily support the weight of a rider in both a manual or powered wheelchair. The rail support system was designed to be modular in order to allow the lift to span over any length of stairs. Operating the lift is simple and easy with only 2 buttons in total, for either ascending or descending the staircase. This project has a patent pending status and the team is looking for commercial partners.

63. INVESTIGATING THE RELATIONSHIP BETWEEN AEROSOL PARTICLE SIZE AND ACIDITY

Chemistry and Biochemistry

Mohammed Hossain, Cass Tech High School
Rebecca Craig, Department of Chemistry, University of Michigan
Andrew Ault, Department of Chemistry, University of Michigan

Aerosols are particles in the atmosphere that can vary in chemical composition, size, and phase. Aerosols are a focus of the scientific world's attention as they can affect climate by scattering and absorbing solar and thermal radiation and can have adverse health effects. One of the largest sources of aerosol mass is secondary organic aerosol (SOA) formed by reactions in the atmosphere between volatile organic compounds (VOC) and their oxidation products in the atmosphere. Aerosol acidity plays an important role in the formation of SOA since acidic particles lead to increased production of SOA compared to neutral particles. Despite the importance of aerosol acidity on particle phase atmospheric processes, there are no direct measurements of particle pH for atmospheric particles, which limits our understanding of the impact of aerosol acidity. A general trend of increasing particle acidity with decreasing particle size has been observed with a new method for directly determining aerosol acidity colorimetrically. This research focuses on quantifying the relationship between particle size and acidity. The results of this study will provide key information to improve our understanding of aerosol acidity and the overall effect of aerosols on climate and human health.

64. THE YERSINIA PESTIS ADHESIN AIL ENHANCES PLA PROTEASE ACTIVITY ON MULTIPLE SUBSTRATES

Biology

Lizbeth Garcia-Leon, Biology
Christina Jones, Biology
Jamal Alhabeil, Division of Integrated Biomedical sciences
Eric Krukonis, Division of Integrated Biomedical sciences

Yersinia pestis, the causative agent of the plague, can cause pneumonic, septicemic, and bubonic plague. For plague to occur, cytotoxic Yop proteins from Y. pestis must be delivered to host cells, blocking normal cell functions and immune responses. Two outer membrane proteins of Y. pestis, Ail and Pla, mediate binding to host (human) cells and can facilitate Yop delivery. Ail also confers resistance to human serum. Previous studies showed the presence of Ail enhances to ability of the Pla protease/adhesin to cleave one of its natural substrates, plasminogen. We sought to determine whether Ail contributes to Pla-mediated cleavage of other substrates. Y. pestis expressing Pla with or without Ail was mixed with normal human serum or two purified serum proteins Factor H and vitronectin (Vn), that contribute serum resistance. Protein degradation by Pla was followed in both the supernatant and on the bacterial surface using Western blot analysis. Pla was able to degrade Factor H and Vn in human serum or as purified proteins and the degradation of Factor H was enhanced in the presence of Ail.

Using a time-course degradation assay, the level of proteolysis was assessed over 60-minutes and the level of full-length vs. cleaved proteins was quantified. In this assay Factor H was degraded by wild-type Y. pestis expressing Pla and Ail to 7-13% at 30 minutes (relative to 0 minutes) and only 2-5% of full length protein remained at 60 minutes. For the strain expressing Pla but no Ail (Δail) slower degradation was observed with 25-33% full length Factor H remaining at 30 minutes and 10-24% remaining at 60 minutes. Minimal protein degradation was observed in the absence of Pla. This indicates that Ail is required for maximal Pla-mediated cleavage of Factor H. The impact of Ail on Pla-mediated cleavage of Vn was less clear as Vn was not cleaved by Pla in the supernatant under conditions tested. Future work will address the role of Ail in cleavage of Vn by Pla using extended time points.

65. AUTONOMOUS OBJECT TRACKING ROBOT WITH OBJECT AVOIDANCE

Electrical and Computer Engineering

John Slowik, Electrical and Computer Engineering
Wento Bi, Electrical and Computer Engineering
Ziyu Wang, Electrical and Computer Engineering

Project goals were to develop an autonomous robot with colored object tracking, collision avoidance, and data communication functionalities. These goals were primarily achieved through multiple module integration. A hexapod robot chassis was interfaced with a single-beam laser scanner, a digital servo and wireless communication for sending telemetry data.

66. LIDAR OBSTACLE DETECTION, AVOIDANCE, AND ROOM MAPPING

Electrical and Computer Engineering

Viken Yeranosian, Electrical and Computer Engineering
Anna Rose Periyappurathu, Electrical and Computer Engineering
Andrew Mueller, Electrical and Computer Engineering

Currently, many automotive companies are in the process of developing autonomous vehicles. There are many essential functions expected of autonomous vehicles, but obstacle avoidance is the most important. Obstacle avoidance is crucial to many features of autonomous vehicles: Collision Avoidance Systems, Automatic Emergency Braking, Adaptive Cruise Control, and others. This project reflects these automotive systems in its use of obstacle avoidance. Similar to some automotive systems, the robot provides a visual feedback to the user of potential hazards and steers towards an open path.

67. OBSTACLE AND LANE LINE DETECTION USING IMAGES (OFF-ROAD)

Electrical and Computer Engineering

Varkey Periyappurath, Electrical and Computer Engineering
Juliana Vilela, Electrical and Computer Engineering

Over the years, autonomous mobility in robotics have become very popular. Soon, we will have Autonomous Vehicles in our everyday lives. However, with everyday use comes, every day challenges of robots. How will a robot interpret information in unknown, unplanned, off-road environments? Since, Cameras and Images are the closest we can get- in terms of robotic sensors - to mimic human eye sight: we decided to attempt “obstacle” and “lane line” detection using them. In this project, we will be developing and tuning an algorithm to detect white lane lines on lawn, and construction barrels as well as saw horses in terms of obstacles.

68. LANE LINE AND OBSTACLE DETECTION FOR ROBOT NAVIGATION

Electrical and Computer Engineering

Karthika Balan, Electrical and Computer Engineering
Melvin Manuel, Electrical and Computer Engineering

The main objective of this project is to detect the obstacles and lane lines from the supplied color image sets. There are three sets of images which are taken from an Intelligent Ground Vehicle Competition course track. Each set has different properties. Some of the images have many obstacles such as barrels and hurdles, and others possess very low intensity lane lines which cannot be differentiated from the surroundings. Another set of images have very low-level brightness. Along with the obstacle and lane line detection the confidence level for each image analysis also has to be calculated. This helps the engineer make effective use of image results for robot control.

69. COLOR IMAGE ANALYSIS ON OFF-ROAD OBJECT IDENTIFICATION

Electrical and Computer Engineering

Wentao Bi, Electrical and Computer Engineering
Nayan Patel, Electrical and Computer Engineering

This project focuses on the detection of roadway lane lines and obstacles. This is challenging because such images commonly have widely varying contrast and illumination. For this work the approach used compared image colors using HSV (Hue Saturation and Value) mappings to detect barrels and other obstacles.

These obstacles were then removed from the image to permit more consistent lane detection. Lanes were then identified by determining automatic threshold values that could distinguish lane lines in every image. It is understood that image contrast could have been changed using gamma correction but performing this operation often increases image noise. The threshold detection method employed was successful for the majority of the images analyzed.

70. INVESTIGATING ATRAZINE ACCUMULATION AND HISTOLOGICAL CHANGES IN THE HEPATOPANCREAS OF CRAYFISH POST-EXPOSURE

Biology

Daniel J. Dayfield, Biology
Kaitlin S. Lambert, Chemistry & Biochemistry
Danielle N. Maxwell, Chemistry & Biochemistry
Ila L. Sayed, Biology
Victoria C. Torres, Chemistry & Biochemistry
Kathrine E. Yacoo, Biology
Rachelle M. Belanger, Chemistry & Biochemistry
Elizabeth S. Roberts-Kirchhoff, Chemistry & Biochemistry
Kendra R. Evans, Chemistry & Biochemistry

Many pesticides are known to have long-term adverse effects on aquatic organisms, and thus it is of interest to explore the effects of pesticide accumulation in these species. We are investigating the accumulation of atrazine (ATR) in the hepatopancreas of the virile crayfish, Orconectes virilis. Crayfish were treated with environmentally-relevant ATR concentrations (80 and 300 ppb) and control concentrations (0 ppb (negative control) and 1000 ppb ATR (positive control)) for 15 days. Histological changes, including increased vacuolization, were visualized in the hepatopancreas following sectioning and staining with hematoxylin and eosin (H & E). It is of interest to correlate physiological changes with the level of accumulation of ATR, so we have developed and are evaluating a method to extract and quantitate the amount of ATR in the hepatopancreas. Hepatopancreas tissue was isolated from the crayfish, and ATR was extracted using a “quick, easy, cheap, effective, rugged, and safe” (QuEChERS) method. Following the extraction, the ATR was analyzed using liquid chromatography-mass spectrometry (LC-MS), which allows for the quantitation of ATR, its metabolites, and other pesticides that may accumulate in the tissue. A stable-isotope internal standard, ATR-d5, was included in the analysis and will be used to improve the accuracy and precision of the ATR quantitation.

71. MAP-LESS OBSTACLE AVOIDANCE COLOR SIGNATURE FOLLOWING AUTONOMOUS HEXAPOD ROBOT

Electrical and Computer Engineering

Christine Hillebrand, Electrical and Computer Engineering
Isaac Elicea, Electrical and Computer Engineering
Joseph Vega, Electrical and Computer Engineering
James McGlynn, Electrical and Computer Engineering

The main objective of this project was to customize a Trossen Robotics Hexapod to navigate autonomously while actively avoiding obstacles, and following objects of a predetermined color. This involved developing an algorithm which allows the hexapod to analyze the current obstacle situation and respond in an effective manner. This objective was accomplished through the utilization a Garmin Lidar-Lite V3 laser scanner combined with a high speed Dynamixel MX28 360Â°Robot Actuator, which is used to continuously scan and detect obstacles, as well as a PixyCam5 which is used to determine the color of an object and label it as an objective.

Sub-tasks include generating a radar map using Matlab, and the integration of the Garmin Lidar-Lite V3, which determines an obstacle's distance, and the Dynamixel MX28 Robot Actuator, which determines an obstacle's position with respect to the hexapod. Both data sets would then be wirelessly transmitted to Matlab, through an XBEE, and the radar would then be generated on a PC. Concurrently, the Pixy Camera continuously scanned for a specific predetermined color signature, and when the color signature was found, it would set the object that contained that color signature as a target that the hexapod would move towards while autonomously avoiding obstacles and navigating within the environment.

72. DESIGN AND MANUFACTURING OF A NOVEL PERIODIC CELLULAR MATERIAL USING SCALABLE INDUSTRIAL PROCESSES

Mechanical Engineering

Pruthvi Panwala, Mechanical Engineering
Nassif Rayess, Mechanical Engineering

Three dimensional cellular materials can be very beneficial for lightweight application, be it automotive or otherwise. The most commonly known cellular material are metal foams, but they suffer from two major drawbacks for implementation. The first is that the price point is too high for automotive applications. The second drawback is that the manufacturing processes are not scalable for high volume manufacturing. The proposed alternative addresses these drawbacks by creating a periodic cellular metallic material that uses industrially scalable processes. The process begins with sheet metal which is formed into three-dimensional morphology using progressive die manufacturing. The layers of stamped sheet metal is then assembled to form the thickness and then cured using a bulk heating process. The primary technology are the joints connecting the layers which are "destroyed" using the heating process locking them permanently. The resulting material is a fully recyclable cellular material that can be tailored to the needs of the end user. The basic outline of the process will be presented in this poster.

73. END-USER CENTRIC CONTROL SYSTEMS FOR IMPROVED HVAC EFFICIENCY AND PERSONAL COMFORT

Mechanical Engineering

Michael Brill, Mechanical Engineering
Wiley Dressell, Robotic and Mechatronic Systems Engineering
Brynne Gustafson, Mechanical Engineering
Kaegan Kumnick, Robotic and Mechatronic Systems Engineering
Nassif Rayess, Mechanical Engineering
Mark Schumack, Mechanical Engineering

This project is one of three statewide finalist in the E-Challenge Competition for Colleges and Universities focused on technologies and processes to aid in energy efficiencies. It involves upgrading and instrumenting the heating and air conditioning infrastructure in the second floor east wing of the Engineering Building in order to create a test bed for students to develop and test various energy efficiency techniques and technologies. This project is intended to utilize internet of things technologies to create smart spaces that can make executive decisions regarding heating and cooling based on complex factors such as projected occupancy, weather forecasting, etc... The resulting efficiencies will be documented and will serve as the basis for judgment for the competition.

75. TRAJECTORY TRACKING CONTROL OF UNDERACTUATED QUADROTOR USING ADAPTIVE CONTROLLER

Mechanical Engineering

Shayan Mirzaei, Mechanical Engineering
Yasha Parvini, Mechanical Engineering

This research focuses on adaptive control strategy to deal with tracking problem of a quadrotor unmanned aerial vehicle in presence of parametric uncertainties, actuator amplitude constraints, and unknown time-varying external disturbances. First, Lyapunov-based indirect adaptive controller optimized by particle swarm optimization (PSO) is developed for multi-input multi-output (MIMO) nonlinear quadrotor to prevent input constraints violation, by limiting the control input, and then disturbance observer-based control (DOBC) technique is aggregated with the control system to attenuate the effects of disturbance generated by an exogenous system. Finally, illustrative numerical simulations are conducted to demonstrate the effectiveness of the presented approach in altitude and attitude tracking problem.

76. MICROBIAL ANALYSIS OF DENTAL UNIT WATERLINES

Civil, Architectural & Environmental Engineering

Zhe Li, Civil, Architectural & Environmental Engineering
Alexa Rihana, Civil, Architectural & Environmental Engineering
Stokes Baker, Biology

Biofilms play an important role in microbial contamination of dental unit waterlines due to their antiseptic resistance and strong adherent ability. Many approaches have been utilized to ensure high clinical water quality in dental clinics. These approaches include chemical germicides, filtration, independent reservoirs, and waterline flushing. However, the efficiency of combined use of these methods are rarely studied in literature. This research aims to comprehensively analyze the efficiency of dental water treatment methods based on the measurement of total viable count (TVC) as well as microbial community analysis. Microbial species identification is accomplished by using 16s rRNA sequencing and the subsequent matching with SILVA SSU and Greengene databases. The results indicate the importance of simultaneous utilization of multiple microbial control approaches and continuous disinfection in dental unit waterlines.

78. RADAR MAPPING THROUGH A HEXAPOD ROBOT

Electrical and Computer Engineering

Ben Kendell, Electrical and Computer Engineering
Miles Kelleher, Electrical and Computer Engineering
Zachary Arnold, Electrical and Computer Engineering

In this project we used a Trossen Hexapod robot, a lidar V3, two Arduino Arbotix boards, and an HCS12 board. By using the lidar to measure distance, and one of the Arduino Arbotix boards to check the position of the lidar, the robot is able to scan the room. This information is then sent to a computer and run through MATLAB code in order to create a map of the room that is constantly updating. The robot, which we named “Long Nights and Dark Days” is able to navigate a room and avoid obstacles.

Although much of this code can be found online, unfortunately, the project was much more difficult than that. The code that we found online had the robot “talk” to the computer from the Arduino Arbotix board using a wired serial connection. We were required to have the robot send and receive data to the HCS12 microcontroller, then wirelessly send that information to a computer. This was accomplished using C language in CodeWarrior.

79. BCL-2 EXPRESSING CANCEROUS CELLS EVADE PROGRAMED CELL DEATH COULD A CHIMERIC BCL-2-BAX GENE DECREASE THE CELL DEATH EVASSION

Biology

Yuxiao Hu, Biology
Monica Nessim, Biology
Michelle Andrzejak, Biology

Many cancer treatments target cells with high proliferation rates; however, healthy cells that maintain homeostasis also exhibit high proliferation rates. For example, blood cells, immune cells, skin cells and stem cells are all highly proliferative. Targeting highly proliferating cells is nonspecific and leads to severe side effects; thus, there is a pressing need for developing a more specific targeted treatment. Many targeted treatments exist but further research needs to be explored. The goal of this research is to test the idea of creating a chimeric gene where the Bax gene (a pro-apoptotic protein triggering cell death) is placed under the control of a full length Bcl-2 promoter. Bcl-2 is an anti- apoptotic protein causing evasion of cell death. In normal cells, Bax and Bcl-2 are in a state of equilibrium. The ratio of the two proteins determines if apoptosis occurs through a mechanism that regulates mitochondrial pore opening, which leads to cytochrome c release, caspase activation and apoptotic cell death. The cell becomes cancerous when Bcl-2 is over-expressed inhibiting apoptosis and causing the accumulation of unwanted cells. In theory, the chimeric gene will prompt cancer cells to activate or cause transcription of proteins that lead to apoptosis (programed cell death that leaves the surrounding cells unharmed). This study will see how cells that express various levels of Bcl-2 expression react to the chimeric gene using Bcl-2 promoter activating Bax. This portion of the study involves creating the chimeric gene.

80. H-1 B VISA BIG DATA ANALYTIC

Mathematics and Software Engineering

Kevin Daimi, Mathematics and Software Engineering
Sravan Kopparthi, Mathematics and Software Engineering
Krishna Smrithi Paritala, Technical Management

H1 B is a visa in the United States that allows U.S. companies to employ foreign human resources in specialty professions. There is a fixed large number of H1 B visa applications annually. About one fourth of these are reserved for academia. Employers spend money and long waiting time on these applications. With the huge number of applications and the limited number of this kind of visas, rejecting applications is inevitable. To save companies money and time, this paper provides an application to classify the outcome of application before submission. Based on this classification, employers can make their decision on whether to continue with the application, modify it, or completely abort the visa application. R language is used to implement three classification methods, and the results are compared.

82. A FUZZY BASED BOILER TEMPERATURE CONTROLLER FOR THERMAL POWER STATION

Electrical and Computer Engineering

Mariam Faied, Electrical and Computer Engineering

Thermal power generation units are playing an important role in economical and industrial development of all countries in the world. In a thermal power station, the boiler is a main component and the temperature control of the boiler is very important in the over all efficiency of the power plant. Also, for economy, quality, consistency of production, saving in manpower, comfort control, safety and to optimize rates of production in industrial processes, boiler temperature control is unavoidable. In current scenario, conventional Proportional Integral Derivative (PID) controls are used for controlling the temperature of the boiler unit. Because there are nonlinearity, variation, disturbance and change of objective architecture, the PID system which already using in these kind of high temperature applications are inefficient. The operation of power stations are a continuous process and are complex systems characterized usually by nonlinearity, uncertainty and load disturbances. PID controllers do not work accurately in a system having nonlinearity in it. So, for an alternative to conventional controllers, a fuzzy logic based intelligent control system is developed which will meet the nonlinearity of the system which will results an accurate control of boiler steam temperature and also the water level of the reservoir.

83. CHARACTERIZATION OF MUTANS STREPTOCOCCI IN THE ORAL CAVITY TO FACILITATE DISCOVERY OF NOVEL SPECIFIC BACTERIOPHAGE

School of Dentistry - Integrated Biomedical Sciences

Payal Patel, Biology
Jonathan Toma, Biology
Nicolena Lulgjuraj, Oakland University
Joshua Thomson, School of Dentistry - Integrated Biomedical Sciences

The oral cavity is home to over 700 diverse microbial species. With the ability to form biofilm, generate acid as a byproduct of sugar metabolism, and thrive in an extremely acidic environment, the Mutans Streptococci, mainly Streptococcus mutans and Streptococcus sobrinus, are highly associated with the initiation of dental caries. Bacteriophage (phage) are viruses that selectively infect and eliminate their host bacterium. Phage therapy can be used as an alternative treatment to antibiotics, and such therapies are currently in practice in Eastern Europe and the former Soviet Union. To date, five novel phages, with very similar genomes, specific to S. mutans have been isolated. These phages have a very narrow host range and infect only certain strains of a single serotype of S. mutans. The aim of our study is to isolate novel bacteriophage against the Mutans Streptococci with the hopes that these phage with have a lower strain specificity than those previously isolated. To quickly determine the host strains (S. mutans and S. sobrinus) in an individual, collected saliva samples were analyzed using polymerase chain reaction with species-specific primers. After the detection of potential host strains was complete, isolated strains of S. mutans and S. sobrinus were used as host strains for bacteriophage from saliva samples. Now, working with a library of S. mutans and S. sobrinus strains, the aim is to isolate bacteriophage with a lower strain specificity for future use as a therapeutic for individuals at high-caries risk.

84. FACE RECOGNITION USING ARTIFICIAL NEURAL NETWORKS

Electrical and Computer Engineering

Karthika Balan, Electrical and Computer Engineering
Melvin P Manuel, Electrical and Computer Engineering
Mariam Faied, Electrical and Computer Engineering

A Face Recognition system is basically a computer application that is capable of identifying and verifying a person's identity from a digital image or set of frames. It has a variety of applications ranging from human computer interaction, database recovery, computer entertainment, information security etc. The basis for face recognition comes from the idea of Back Propagation theory in Artificial Intelligence. Face Recognition involves a series of complex and varied subjects such as Image Processing, Computational Intelligence, Neural Networks, Advanced Mathematics and high level computational science. Face Recognition using Wavelet Neural Network, a feed-forward network is of great importance and is discussed in this paper. The main advantage of this compared to Back Propagation theory is that it avoids the blindness in the structural design. A MATLAB graphical user interface has been developed for the purpose of face recognition. A database with different faces is fed to the neural network and the learning process is carried out using Wavelet Neural Networks. The effectiveness and accuracy in this algorithm is much better when compared to other face recognition methods.

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