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Marygrove College
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Wayne State University

Summer Research Experience
Poster Session
Wednesday, July 19, 2017

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9. Lead Toxicity: A Survey of Trends in Elevated Blood Lead Levels Among Children Living in the Detroit Metropolitan Area and Molecular Studies in Cultured Liver Cells.

Autumn Davis1, Colleen Buggs-Saxton2 (Advisor), Todd Leff 3 (Advisor) 1School of Liberal Arts and Sciences, Wayne State University1, Detroit, MI, 48201 2Departments of Pediatrics and Physiology and Department of Pathology3,

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Kody Whisnant, Da Li and Dr. Stephanie L. Brock

1. How Maternal Satisfaction with Paternal Financial Contributions Relates to Risk of Preterm Birth

Leena Abbas and Dr. Dawn Misra
Faculty Mentor: Dr. Dawn Misra, Wayne State University

Gestational length less than before 37 completed weeks of gestation, known as preterm birth, is strongly associated with increased risks of morbidity and mortality. Most studies focus on maternal influences on gestational length. Few papers have been published about paternal influences. In this study, we examine the satisfaction with the financial contributions of the father of the baby as reported by the mother as related to gestational length. We used data derived from the LIFE cohort study of preterm birth among 1410 Black women (71% response rate) in Southfield, Michigan interviewed during their postpartum hospitalization from June 2009 to December 2011. The medical record was abstracted to obtain the child's gestational length at birth. The preterm birth rate was 17.1% (144/842) where the mother reported being completely or somewhat satisfied, 12.6% (28/231) where the mother reported being a little satisfied or neither satisfied or dissatisfied, and 17.2% (50/291) where the mother reported being a little, somewhat, or completely dissatisfied. This suggested an inverse U-shaped association with highest risk for the middle group. In an independent-sample t-test, the mean gestational length was shorter for the middle group compared to the two extreme groups (268.6 vs. 271.4 days, $p=0.02$). We explored effects on preterm birth with logistic regression models controlling for maternal age or income but did not find statistically significant associations with the mother's satisfaction with financial support. In future studies, we will collect data directly from both the fathers and the mothers to better understand the role of paternal factors.

2. Functional analysis of Rad6B in cisplatin-induced DNA damage response and CrispR/Cas9 knock out of Rad6B

Angelina Antonyan, Brittany Haynes, and Malathy PV Shekhar
Faculty Mentor: Dr. Malathy Shekhar, Wayne State Universiy School of Medicine

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 ⬧FANCD2 and Rad51to ▉2AX-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 ⬧FANCD2, and Rad51 on ▉2AX-loaded foci in HeLa cells, we performed dual immunofluorescence staining with ▉2AX and Pol ⬧ ▉2AX and Rad51, and ▉2AX 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 ⬧FANCD2, and Rad51 to the sites of DNA double strand breaks marked by ▉2AX 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 selected by puromycin selection. Confirmation of Rad6B knockout was verified in genomic DNAs by PCR and sequence analysis. The Rad6B knockout cells will be used for analyzing the functional role of Rad6B in melanoma development.

3. Gastro-Intestinal Characteristics of Madagascar Hissing Cockroaches, Gromphadorhina portentosa: Carbonic Anhydrase Localization

ATearea Boggan, Jolani Perez, and Gregory Grabowski
Faculty Mentor: Gregory Grabowski, University of Detroit-Mercy

The goal is to find neuroendocrine cells and carbonic anhydrase (CAH) localization in the gastro-intestinal tract (GI tract) of hissing cockroaches. The hypothesis is that neuroendocrine cells release hormones from the epithelium of the GI tract and Malpighian tubules and are used in regulation, coordinating digestion and excretion. 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. Recent studies have shown a higher number of neuroendocrine cells in the malpighian tubules and GI epithelium. In mammals, body systems coordinate with one another, the expectation is that the neuroendocrine system will coordinate CAH localization in the cockroaches. Carbonic anhydrases catalyze the reaction: $CO_2 + H_2O \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$, determining the pH gradient, going from crop to rectum. Previous studies show that crop and cecum are acidic; the red midgut, white midgut, and rectum are neutral; and the intestine, light and dark hindgut are basic. pH tests and Hanson's Histochemical technique will be used to locate CAH histologically. The pH tests determine where the change from acidic to basic takes place. Hanson's technique identifies where CAH is located by $CoHPO_4$, precipitate, and turning the area with CAH, black with ammonium sulfide. Research is expected to show carbonic anhydrases are located toward the cecum, allowing for acid neutralization toward the rectum.

4. Antagonism of Lactobacillus by sub-dominant vaginal bacteria: a trigger of bacterial vaginosis?

Alexandra Breves, Andrea Prenkocevic, and Dr. Robert Akins
Faculty Mentor: Robert Akins, Wayne state university School of Medicine

The mutualistic and antagonistic relationship of Enterococcus faecalis with other bacteria is understudied and still unclear. Research in this subject could find the cause and cure for Bacterial Vaginosis (BV) and the interactions between Lactobacillus species and E. faecalis. During BV, healthy dominant Lactobacillus species are replaced by BV associated species such as Gardnerella, Atopobium, Prevotella, and many others. We want to find the link between E. faecalis, the cytolysin that some strains produce, and initiation of BV, in the context of antagonism with healthy Lactobacillus species. I hypothesize that E. faecalis' cytolysin inhibits Lactobacillus and starts the conversion of bacterial populations from healthy to abnormal, resulting in BV. By co-incubation of mixed vaginal bacteria from swabs of BV patients in remission with E. faecalis and probiotic Lactobacillus species, we seek to mimic the conversion seen in women during BV recurrence. I use qPCR to determine which species become dominant in the co-incubations after 24, 48, or 144 hours. The purpose of the probiotic was to see whether it resisted inhibition by E. faecalis and prevented overgrowth of BV-associated species. The significance of this work is that it may offer new species as targets for antibiotic therapy, or new probiotic species, to prevent the alarming recurrence rates of BV.

5. Do responsive and happy partners create a safe space for their partner with chronic pain to disclose?

Rachel Bruinsma, Angelia Corley M.A., Hallie George M.A., Anthony Kostecki B.A., and Annmarie Cano Ph.D.
Faculty Mentor: Dr. Annmarie Cano, Wayne State University

Background: Previous research has shown that emotional disclosure is predictive of relationship satisfaction. Perceived partner responsiveness thought to contribute to relationship satisfaction. Validation is one way partners may be responsive to one another. Methods: The participants were couples in which one individual had chronic pain and the other had no or minimal pain. The partners were randomly assigned to an experimental condition in which they received validation training or a control condition. Couples took baseline measures of relationship satisfaction and perceived partner responsiveness then participated in a videotaped discussion about how the pain had impacted their lives. Results: Contrary to hypothesized results, greater perceived partner responsiveness at baseline was related to less validating responses made by the partner during the discussion. Further, there was not a significant relationship between relationship satisfaction and the number of emotional disclosures made during the discussion or between the number of invalidating responses made by the partner during the discussion and the individual with chronic pain's perception of their partner's typical responsiveness. Discussion: Future study may broaden the behavioral coding measure of responsiveness to include reassurance and other responsive behaviors.

6. The Effect of Different Disulfiram-Metal Complexes on Human Breast and Prostate Cancer Cells

Sarah Buhay, Jicang Wang, Ashton Lewandowski, and Q. Ping Dou
Faculty Mentor: Dr. 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.

7. The Role of Pericytes in Neurodegenerative Diseases of the Brain

Arnulfo M. Cazares and Annelise Crabtree
Faculty Mentor: Dr. Paula Dore-Duffy, Wayne State University

Pericytes are unique, contractile and motile cells of the microvasculature.   They are located in pre-capillary arterioles, capillaries and post-capillary venules of all tissues. Pericytes are regulatory cells that exhibit extraordinary characteristics such as being able to formulate an immune response, regulate angiogenesis, and demonstrate pluripotency (adult stem cell activity). In the brain pericytes are integral members of the "neurovascular unit (NVU)" (endothelial cells, pericytes, astrocytes and neurons). However, very little is known about the complex cell to cell communication utilized by pericytes with the other cells of the NVU. In this study, we question whether CNS pericytes engage in cell to cell cross talk with neurons. To study the interaction of pericytes with neurons, we developed a co-culture system using primary mouse CNS pericytes and Catecholaminergic a-differentiated (CAD) cells which is a murine neuronal cell line that secretes dopamine and norepinephrine. CAD cells do not express any neurites and remain in an undifferentiated state when cultured in the presence of serum. However, reversible morphological differentiation can be initiated by removal of serum or exogenously added protein from the medium. In serum- or protein-free media, CAD cells stop proliferating and extend long processes. Differentiated CAD cells can be maintained without serum or protein for at least 6 weeks. CAD cells exhibit biochemical and morphological characteristics of primary neurons and provide a unique tool for studying neuronal differentiation. Primary CNS pericytes were co-cultured with CAD cells at varying densities. Pericytes extended processes and made contact with CAD cells. At a 1:1 ratio CAD cells often clustered around pericytes. In serum-containing medium pericytes were found to be stimulated CAD cell differentiation. Pericyte-conditioned medium did not substitute for pericytes suggesting that pericyte-neuronal cell to cell contact is needed. Co-culture of primary pericytes with neurons also appeared to induced pericyte differentiation. These latter results suggest that neurons may also regulate pericyte pluripotency. To further evaluate whether this interaction requires direct cell-to-cell contact or a signaling molecule, we are planning to use a transwell culturing system in which cells were cultured in different compartments, but the culture medium can pass between the compartments.

8. The Impact of Prebiotics and Probiotics on Glucose Control in Type 2 Diabetes Mellitus

Anthony Croft and Patricia Rouen
Faculty Mentor: Patricia Rouen, Detroit Mercy

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).

9. Lead Toxicity: A Survey of Trends in Elevated Blood Lead Levels Among Children Living in the Detroit Metropolitan Area and Molecular Studies in Cultured Liver Cells.

Autumn Davis1, Colleen Buggs-Saxton2 (Advisor), Todd Leff 3 (Advisor) 1School of Liberal Arts and Sciences, Wayne State University1, Detroit, MI, 48201 2Departments of Pediatrics and Physiology and Department of Pathology3,
Faculty Mentor: Dr.Leff ; Dr.Buggs-Saxton, Wayne state university School of Medicine

The long-term goal of Dr. Leff's laboratory is to understand the effects of lead exposure on the development of type 2 diabetes later in life. As an initial step in this direction, the laboratory is examining the effects of lead exposure in mice and in cultured mammalian cells. Preliminary experiments in lead-exposed rodents demonstrated that exposure promotes the development of diabetes, and that it does so, at least in part, by stimulating the glucose production from the liver. This possibility is being studied in vitro using cultured liver (hepatoma) cells by observing the effects of lead on the expression of genes involved in glucose synthesis (gluconeogenesis). The primary goal of my summer research project is to determine if the lead salt of diethyldithiocarbamic acid (DEDTC-Pb) can be used to deliver lead to cultured hepatoma cells, and to study its effects. I carried out the initial steps of this project by observing the effects of increasing concentrations of DEDTC-Pb on the viability of hepatoma cells using trypan blue and a hemocytometer. I also worked with Dr. Buggs, a colleague of Dr.Leff's, to assemble a regional catalog of pediatric Pb exposure (percent children with elevated blood lead levels) in cities and neighborhood in Metro Detroit and in Michigan as a whole. We observed striking local and regional disparities in the prevalence of pediatric Pb exposure.

10. Understanding Teacher Evaluations of Students' Academic Potential

Jamillah Douthet, Erin Moss, and David M. Merolla, PhD
Faculty Mentor: David M. Merolla, PhD, Wayne State University

Many scholars have argued that minority and low socioeconomic (SES) students are perceived as less capable than their white and high SES counterparts due to implicit biases on the part of teachers and other school personnel. In 2001, the No Child Left Behind Act (now known as Every Student Succeeds Act) was enacted with the intent to ensure that all children in the United States obtained an equal education - throughout the years, it became apparent that was not happening. Many students are still left behind, particularly minority and low SES students. Some research attributes this to teachers' attitudes towards students. However, there has been little experimental research done on how teachers perceive minority and low SES students and whether they are less willing to encourage those students to pursue education beyond high school. This research intends to fill that gap, by exploring teachers' attitudes towards minority and low SES students, and their willingness to encourage those students to go on to college. Through an experimental design, this study seeks to determine how race, SES, and gender shape teachers' perceptions of students' capabilities and potential. It is hypothesized that results from this study will show a bias towards minority students and those of low SES.

11. How Education and Religion corresponds to the amount of Physical Activity performed by Pregnant Black Women

Relicious Eboh, and Dawn Misra, PhD
Faculty Mentor: Dawn Misra, Wayne State University School of Medicine

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.

12. The use of mCherry fluorescence protein to visualize protein-protein interactions between Ail and Pla of Yersinia pestis

Nour El Yaman, Jamal Alhabeil, and Eric Krukonis
Faculty Mentor: Dr. Eric Krukonis, University of Detroit Mercy School of Dentistry

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.

13. Child Sleep Patterns and Their Impact on Development On Low Socioeconomic Populations

Sara Elhasan and Marjorie Beeghly
Faculty Mentor: Marjorie Beeghly, Wayne State University

Sleep studies have become increasingly important for health across the lifespan, especially during early childhood when brain development is at its most critical stage. The correlates of sleep are vastly understudied, especially in low-income samples. The present study addresses the predictors of sleep patterns in children from low socioeconomic backgrounds in the greater Detroit area and its impact on their language and cognitive development. It was hypothesized that children with low socioeconomic backgrounds and high family chaos would be significantly correlated with poor sleep patterns and that these factors would be associated with poor performance on the psychometric test, Bayley III. Data was collected through mother-child interactions, psychometric testing, and questionnaires, which determined demographics, sleep patterns, and family home environment (CHAOS). The data was then analyzed by Statistical Package for the Social Sciences (SPSS), where correlations between dyadic interaction conflict, cognition and language development and demographics were established. Results would suggest that there is a correlation between sleep patterns and child outcomes, such as dyadic conflict during a challenging task and psychometric test scores.

14. Do Social Behaviors Correlate with Cognitive Abilities from Childhood to Early Adulthood?

Da' Jonae Foster, Tiara Perkins, Mallory Fogus, Dana Anderson, David Chen and Noa Ofen
Faculty Mentor: Dr. Noa Ofen, Wayne State University

In early childhood social behavior problems are related to an individual's cognitive ability such as measured with tests and reports of executive functions. However, it is unclear whether social behaviors correlate with cognitive abilities from childhood to early adulthood. This study is intended to fill the gap by assessing how individual differences in social behaviors, measured with the Child Behavior Checklist (CBCL) and the Behavior Rating Inventory of Executive Function (BRIEF), are correlated with differences in cognitive abilities, measured with the Woodcock Johnson III Tests of Cognitive Abilities (WJ III COG), in a sample of 109 participants aged from 5 to 20 years.   In our sample, age negatively correlated with two specific indices of social behavior problems, the Behavior Regulation Index in BRIEF and the Social Problems Score in the CBCL, suggesting that social behaviors improve from childhood to early adulthood. In addition, age positively correlated with specific indices of cognitive ability, the Pair Cancellation Total Correct Score, and the Visual Matching Total Correct Score in the WJ III COG, suggesting that cognitive abilities increase from childhood to early adulthood. Interestingly, negative correlations were found between the Behavior Regulation Index and both cognitive ability scores, as well as between the Social Problems Score and both cognitive ability scores. These findings suggest that social behaviors show strong correlations with cognitive abilities from childhood to early adulthood. Discussion of limitations in the data will be provided.

15. The Yersinia pestis Adhesin Ail Enhances Pla Protease Activity on Multiple Substrates

Lizbeth Garcia-Leon, Christina Jones, Dalia Al-Alfe, Jamal Alhabeil and Eric S. Krukonis
Faculty Mentor: Eric S. Krukonis, University of Detroit Mercy School of Dentistry

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.

16. The effect of dreissenids on the biodiversity of benthic macroinvertebrates

Gabrielle Gordon, Darrin Hunt and Dr. Donna Kashian
Faculty Mentor: Darrin Hunt and Dr. Donna Kashian, Wayne State University

The Great Lakes contain more than 20% of the world's fresh water. Human activity has significantly altered Michigan's aquatic biome. Industrialization and invasive species have changed both the form and function of our riparian systems. Long-lasting pollutants, called legacy contaminants, released into the Great Lakes since the industrial revolution, have had lasting effects. Industrialization also facilitated the use of waterways as high-traffic passages, introducing the invasive zebra mussel, Dreissena polymorpha, in the ballast of a ship. The effect of altered water chemistry and invasive species on the native inhabitants of the Great Lakes can be examined through an evaluation of macroinvertebrate populations. The primary objective of this research was to determine if the presence of shells left behind by dead zebra mussels affect macroinvertebrate biodiversity. To accomplish this I compared biodiversity between two different sites, one in the Huron Watershed, and the other in the Rouge Watershed impacted by invasive zebra mussels. I found no direct correlation between the presences of dreissenid shells and decreased benthic biodiversity.

17. What is the relationship between electronic medical records screening tools/procedures and screening for domestic violence?

Emily Gorkiewicz and Theresa R. Wyatt, PhD, RN
Faculty Mentor: Theresa R. Wyatt, University of Detroit Mercy

Domestic Violence (DV) is a serious health and social problem in the United States, causing both short and long term health consequences. With 1 in 3 women and 1 in 4 men reporting experiences with DV, nurses are in a position to screen, educate, and intervene during health care visits, yet screening rates for domestic violence are low. This may directly impact the victims of DV as they may feel isolated and be unaware of resources available to them. With DV being such a unique on going healthcare problem, it is crucial that healthcare providers are provided with effective DV screening tools. This study seeks to understand if the EMR affects the screening for DV. The purpose of this study is to understand how the nursing admission assessments and screening questions for DV are developed or chosen for inclusion in the EMR. In addition, the study will include information on measures the hospitals take to screen for DV. The study will look into what types of questions each hospital has for screening, along with what types of additional measures they take such as, DV patient handouts, automated referral prompts for positive screens. The method a hospital utilizes to screen for DV and the follow-up measures taken post screening may provide insight into the barriers to screening as well as target areas for improvement in screening behaviors.

18. Reconstruction of Photoacoustic Signals using a Low Cost DAQ

Christopher Harness, Afreen Fatima and Mohammadreza Nasiriavanaki
Faculty Mentor: Mohammadreza Nasiriavanaki, Wayne State University

Biomedical technologies focused on measurement rely on the process of data acquisition when obtaining any electrical or physical samples to help convey a proper diagnosis for users. 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 compared to a commercial oscilloscope. Testing the accuracy of the waveforms creates the opportunity of developing affordable biomedical technologies, i.e. ultrasound systems, for commercial use.

19. Outcomes in Bereaved Dementia Caregivers: A Systematic Review

Nailah Henry, Dazja Jones, Dr. Mitzi Saunders and Dr. Carla Groh
Faculty Mentor: Dr. Carla Groh, University of Detroit Mercy

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.

20. The Impact of Traumatic Brain Injuries on Cognition and Learning Using Drosophila Melanogaster

Ali Issa, Ekta Shaw, Jordan Holloway, Katherine Gurdziel and Douglas Ruden
Faculty Mentor: Douglas Ruden, Wayne State University

Neurological damage and death is commonly seen in people with traumatic brain injuries (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 of TBI has on cognition and learning. Drosophila share about 75% of genes that cause disease in humans and have been used previously to model human 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 Drosophila Activity Monitor to measure changes in circadian rhythm and locomotor activity as well as Y-mazes to observe fly learning and memory after TBI. We expect to show that learning in flies is impaired after TBI.

21. Reaction rates of Platinum Compounds

Marcel Jones, Bett Kimutai and Dr.Christine Chow
Faculty Mentor: Dr. Christine Chow, Wayne State

Cancer is a disease that involves uncontrolled cell division, which usually interferes with the function of organs and eventually leads to death. In the Chow lab, we are interested in improving the efficacy of a known cancer drug cisplatin that is currently used to treat testicular, ovarian, and a few other specific types of cancer. Patients experience side effects such as loss of hair, weight reduction, and nephrotoxicity. Because of the risks behind using cisplatin, we are altering the compound by changing the ligands that are linked to the platinum center. The long-term goal of this lab is to reduce the toxicity of cisplatin, while increasing its potency. Alaplatin is an analogue of cisplatin that is bound to the amino acid alanine. My work involved kinetic measurements with alaplatin and DNA/RNA nucleosides in order to understand the reactivity of this new compound in comparison to other amino acid-linked cisplatin analogues. The main techniques employed were High Performance Liquid Chromatography (HPLC) and curve fitting analysis in order to obtain pseudo-first-order rate constants. This work may eventually lead to alternative compounds that have altered reactivity compared to cisplatin. This approach would be useful in developing platinum compounds that are less toxic and more potent than cisplatin.

22. Identification of new substrates for the Yersinia pestis outer membrane protease Pla and the role of Ail in Pla-mediated cleavage

Christina E. Jones, Lizbeth Garcia, Dalia Al-Alfe and Eric S. Krukonis
Faculty Mentor: Dr. Eric Krukonis, University of Detroit Mercy School of Dentistry

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 (Δail or Δpla) or neither protein (ΔailΔpla) 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.

23. Ligand Synthesis for Platinum Drugs

Wayman Jones, Adam Fraeyman, Ksenia Providokhina and Klaus Friedrich
Faculty Mentor: Klaus Friedrich, University of Detroit Mercy

Platinum compounds like cisplatin are an essential part of nowadays combination chemotherapy treating cancer. The compounds crosslink DNA, thus leading to cell death. Due to the high growth rates of tumor cells this induced cell death impacts cancer cells the most. While many patients exhibit high initial responsiveness to treatment, eventually many also relapse due to cisplatin-resistance of the cancers. The reasons for this resistance are not well understood; the 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 that allow for observation of DNA crosslinking in cells, the isolation and characterization of the adducts and the optimization of physiological and pharmacological parameters governing cell uptake, adduct formation and cell death. Gaining insight into these aspects will make it possible to focus drug uptake on cancerous cells, thus reducing some of the side effects and also to outmaneuver some of the defenses of cancer cells against medically induced apoptosis.

24. Application of DNA Nanotechnology: Rolling-Circle-Amplification Products (RCP) as Drug Delivery System

Bianca Jones, Cameron Miller, Oskar Franch and Dr. Birgitta Knudsen
Faculty Mentor: Dr. Birgitta Knudsen, Aarhus University

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.

25. Outcomes in Bereaved Dementia Caregivers: A Systematic Review

Mitzi Saunders, Dazja Jones, Nailah Henry and Carla Groh
Faculty Mentor: Mitzi Saunders, UDM

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.

26.

Dr. Kathleen Zimmerman-Oster and Anna Julien
Faculty Mentor: Dr. Kathleen Zimmerman-Oster, UDM

Abstract The Social Change Model (SCM) was designed to help integrate student leadership values and skills to promote socially responsible leadership, self-knowledge, and positive change among student leaders. The Multi-Institutional Study of Leadership (MSL) surveys college and university students internationally to assess the impact of college experience and leadership development initiatives on students. This information is intended to enhance knowledge regarding youth leadership development in order to enhance programming to educate more dependable and socially responsible leaders in higher education.   The MSL assesses the theoretical framework of the SCM and its application. The SCM is composed of several components that are crucial in developing student leadership capacity. Measuring these SCM components via the MSL can assist students and their institutions to improve and facilitate positive social change individually and within their institution or community. The seven values/skills of the SCM include consciousness of self, congruence, commitment, collaboration, controversy with civility, and citizenship, and are each measured using a 5-point scale. This study analyzes students' mean outcomes of the SCM components before college versus senior year, using the delta measure or change over time. More specifically, this study will look at University of Detroit Mercy seniors' SCM outcomes in relation to students' participation in student engagement. The goal of the study is to determine if students who participate in student groups, leadership development opportunities, and overall campus engagement achieve higher SCM outcomes compared to students who do not participate. In addition, longitudinal comparisons across multiple waves of student data collected at all levels of education (freshman, sophomore, junior, and senior) in 2009, 2012, 2015 will be examined to indicate the impact of university programming offered under the auspices of the Institute for Leadership and Service over time.

27. 1,2-Dihydropyridines as synthetic building blocks.

E. Jurado, B. Curtis and W. Arce
Faculty Mentor: Klaus Friedrich, University of Detroit Mercy

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.

28. Exploring Health Behaviors among African American women

Nema Kebbeh
Faculty Mentor: Dr. Dawn Misra, Wayne State University

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 risk of preterm birth. Data were derived from a retrospective cohort study of 1364 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.

29. Manipulating Gene Expression to Make New Discoveries

Shyyaan Khan and Penelope Higgs

Faculty Mentor: Penelope Higgs, Wayne State University

Gene expression is vital to all living organisms because of its role of encoding proteins, which ultimately encodes cell function. By manipulating gene expression, scientists can observe its effects and make conclusions about the importance of certain genes. During this experiment, our goal was to overexpress a WUS gene, which was originally in a cloning plasmid given to us by Dr. Edward Golenberg's Lab, in the pET24 vector. To begin our procedure, we PCR amplified the WUS gene then, using restriction enzymes BamHI and XhoI, cut the original pET24 vector and the PCR product and ligated them in "Vector plus insert" and "Vector only" reactions. Both were then transformed into E. coli Top10, PCR screened to identify which vectors had the WUS gene inserted into them, purified [pSK001], transformed into BL21λDE3 E. coli, and tested for T7 WUS protein overexpression and solubility. Finally, we attempted to purify the T7 WUS protein. We found that T7 WUS protein was overexpressed and soluble from a 5ml culture of our BL21λDE3 E. coli. that was induced for 2 hours, but was not overexpressed in a 500ml culture of BL21λDE3 E. coli that was induced overnight. Also, our protein purification of a 250ml culture of BL21λDE3 E. coli was unsuccessful as most of the T7 WUS protein consisted of insoluble inclusion bodies. Using our newly constructed pSK001 plasmid, Dr. Golenberg will be able to observe how the overexpression of the WUS gene has on certain cells and organisms.

30. The Effects of Smoking Marijuana

Vanessa Lee and Dr. Molly McClelland
Faculty Mentor: Dr. Molly McClelland, University of Detroit Mercy

Purpose: 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. Results: 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. Conclusions: 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.

31. Development of Simpler Walking Code for a Lower-Body Exoskeleton

Li, Yuyi; Zhou, Yang and Chen, Chaoyang
Faculty Mentor: Chaoyang Chen, Wayne State University

The Wayne State Robotic Rehabilitation Lab is developing an electronic system that ambulates a four limb lower body exoskeleton prototype. Currently, five prototype 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 limb. In the prototyping process, reduced complexity of a design allows quicker troubleshooting and revision. The following project investigates whether a single Arduino-based board can consistently ambulate a lower body exoskeleton. A walking algorithm will be developed for the single board and tested on a small exoskeleton. Position sensors will be used to measure the joint angles of the small exoskeleton. Two hypotheses will be tested: 1. the joint angles of the four limbs in a walking motion are consistent over time and 2. the joint angles of the four limbs are comparable to results from previous human gait analysis research.

32. Propylene glycol anti-freeze effects on Dreissena bugensis with relations to contamination preventions

Alejandro Lozano, Karim Alame and Donna Kashian
Faculty Mentor: Donna Kashian, Wayne State University

Dreissena bugensis (quagga mussels) is non-indigenous invasive species that inhabits the Great Lakes, and in part due to its ability to rapidly reproduce and outcompete native species, it has caused major environmental and economic impacts. The establishment of the quagga mussels in the Great Lakes serves as an example of the importance of taking measures to prevent a widespread increase in other bodies of water. The focus of the experiment is to evaluate the effects that propylene glycol anti-freeze has on adult and veliger (larval) mussels when exposed to a chosen period of time and provide sufficient evidence to consider it as a solution to disinfecting the hull of vessels to prevent spreading. To evaluate this, I conducted experiments to determine what exposure was toxic to both adults and veligers. Acute test, 24 hours, were conducted to provide suitable treatment concentrations to be used in the chronic test (6 days) to determine mortality rates at a 25%, 10%, 5%, 2.5%, and 1% solutions for veligers while 20%, 12.5%, 10%, 7.5%, and 5% were used to determine adults mortality. The veligers were collected from the Detroit River and brought back to the laboratory and then inserted into a well plate with different concentrations while being observed under an inverted microscope. In a separate experiment, adult mussels were placed into jars with different concentrations and then were observed for any indications of fatalities. The results from both the acute and chronic veligers test gave affirmation that the anti-freeze was immediately effective at concentrations of 25% and higher which resulted in a 100% mortality rate. The test on adult mussels also showed similar results with a 100% mortality rate at 20% concentration for both the acute and chronic test. The use of anti-freeze, at a 25% concentration, as a hull disinfectant to prevent quagga mussel spread should result in the deaths of any quagga mussels that may travel in vessels along different bodies of water. Boats equipped with anti-freeze should be less concerned with possible contaminations.

33. Does KIBRA Genotype Affect Memory Performance and Brain Activity in Older Adults?

Sukria Malique, Zac Fernandez, Jessica Hayes, Patrick Pruitt and Jessica Damoiseaux
Faculty Mentor: Jessica Damoiseaux, Wayne State University, Institute of Gerontology

Memory deterioration often accompanies aging, but the biological basis of this process is not yet well understood. A single nucleotide polymorphism (SNP) of the KIBRA gene (in which a C-allele is substituted for a T-allele) has been linked to memory performance (Papassotiropoulos et al., 2006) potentially through the role of the KIBRA protein in synaptic plasticity (Heitz et al., 2016). CC homozygotes tend to demonstrate poorer memory performance than T-allele carriers, though previous investigations of group differences have found mixed results regarding both memory performance (Need et al., 2008) and response of memory-related brain regions (Kauppi et al., 2014). Given the link between KIBRA and memory, as well as the critical importance of understanding aging-related memory deterioration, this study seeks to investigate differences in memory performance and memory-related brain activity between older adult KIBRA T-carriers and CC homozygotes. Fifty-one healthy, elderly participants (34 T-carriers and 17 CC homozygotes) performed a visual memory encoding task during fMRI acquisition, followed by memory retrieval outside the scanner. Results show that there is no significant difference between the older adult T-carriers and CC homozygotes in brain response to memory encoding. In addition, there is no difference between the groups in memory accuracy. Overall, our findings do not support the previous literature that found significant difference in memory performance and brain response between KIBRA CC homozygotes and T-carriers. Future studies should investigate how the influence of KIBRA genotype on memory encoding in older adults is differentially affected by stimulus type (e.g. visual, verbal, auditory).

34. Expression of Novel E1-E6 CAPZA2-MET Fusion Protein in Glioblastoma Brain Tumors

Margaret E. Martinez and Tamia M. Waller
Faculty Mentor: Dr. Ana deCarvalho, Wayne State University and Henry Ford Hospital

Glioblastoma (GBM) is the most aggressive primary central nervous system tumor. Long-term survival for GBM patients is rare; the genetics of GBM tumors is heterogeneous. The oncogene MET is over-amplified in 4% of GBM cases submitted to The Cancer Genome Atlas (TCGA), which, in healthy cells, codes for a membrane receptor tyrosine kinase involved in embryogenesis and wound repair. Activation of MET in GBMs may contribute to proliferation, survival, and invasion of cancer cells. Previous research identified and sequenced three different MET fusions to the adjacent gene CAPZA2. These fusions were discovered in two patient-derived GBM cell lines (HF3035 and HF3077) that presented an over-amplification of MET. The goal of our research was to drive the exclusive expression of the novel fusion protein CAPZA2 (E1) to MET (E6) to observe the stability and location in a PDX model. Methods included transformation via pcDNA3.1(+) mammalian expression vector into NEB 5-alpha E. coli cells, followed by the transfection of our plasmid from bacteria into the primary cell line HF3253, a cell line with low levels of endogenous MET. Furthermore, immunohistochemistry staining of the transfected HF3253 cells was done to determine the presence and location of the MET fusion. We predict that, if present, the resulting MET fusion transcript is stable and results in a gain of function, conferring a survival advantage and making it a possible drug-therapy target. This research can contribute to potent therapy plans to fight GBM and other cancers that utilize MET over-amplification and mutation.

35. Inside Look: Transition from Child to Adult Healthcare Services for African American Adolescents with Type 1 Diabetes

Shelbi Matlock and Dr. Patricia Rouen
Faculty Mentor: Paricia Rouen, University of Detroit Mercy

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.

36. CRISPR-Cas9 Deletion of ZCF28 and ZCF34 and Effects on Candida albicans Biofilm Formation
***Please italicize Candida albicans

Diana McMahon, Alex Jackman and Jonathan S. Finkel Ph.D.
Faculty Mentor: Dr. Jonathan Finkel, University of Detroit Mercy

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 and ZCF34 as transcription factors relevant to adherence. In this study, the mechanisms by which the two transcription factors regulate adherence will be determined. Using the CRISPR-Cas9 system, we will delete these transcription factors and replace them 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 factors. Then, the targets of ZCF28 and ZCF34 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 and ZCF34 transcribe can be determined, leading to known protein targets for drug therapy. ***Please italicize ZCF28 and ZCF34 and NAT1

37.

Tierra Modock, Moriah Thomas, Marion Van de Huevel and Marhorie Beeghly
Faculty Mentor: Marjorie Beeghly, Wayne State

In the experiment conducted, several participants (a parent and their child) were asked to perform two tasks. Those tasks were an etch-a-sketch and free play task. They were recorded during the tasks and the recorded videos were coded using different scales regarding the interaction of the task. The scales focused on were positive affect, negative affect, engagement, and non-compliance. The codes given were used to see if the mother's level of stress was related to the interaction during the tasks.

38. Preliminary Analysis of The Effects Marijuana Has on Texting and Driving

Mohammed Mohammed, Briana Murdock, Rimzim Taneja, Ki-Jana Malone, Brandon Buchanan, Christofer Smith, Doreen Head and Randall Commissaris (Advisor)
Faculty Mentor: Randal Commissaris, Wayne State University

Texting and driving has shown itself to be dangerous time and time again. Another dangerous impediment to driving is drugs; with the rapid rise of medical marijuana use and the overuse of opioid prescriptions, driving under the influence, and also texting while driving under the influence, is becoming more and more likely. In this on going study, we examine the risks associated with texting and driving while under the influence of marijuana. Two sets of Participants, a control group, and a medical marijuana group drove in a fixed-base driving simulator (2001 Chevy Impala), where we sent four text messages, two being short (i.e., one-word) messages and two being longer messages. Participants were asked to read, re- type and re-send the messages while continuing to drive normally. Drives were videotaped, and the videos were rated 1-4, 1 being perfect and 4 a catastrophe, and the data of the drives was also recorded, and eye glance data was also analyzed. In this preliminary study looking at initial data, we compared medical marijuana users with nonusers, and looked at their ability to drive in a car simulator while given the distraction of texting.

39. Perception of Nurses from a Kenyan Perspective

Muli, Mary-Jacqueline RN, BSNc. and McClelland Molly, RN, PhD, ACNS-BC, CMSRN
Faculty Mentor: McClelland Molly, RN, PhD, ACNS-BC, CMSRN, University of Detroit Mercy

A 2016 study explored a cultural approach to the perception of nurses as scientist (Muli & McClelland 2016). The participants in that study were American, Canadian and Kenyan. The results from that study showed a possible cultural divide between how the North American participants and the Kenyan participants perceived nurses. A literary review revealed that there have been no studies done to investigate what role culture plays in the perception of nurses as scientists. 50 electronic invitations were sent to participants who self-identified as Kenyans living in the diaspora. Of the 28 who showed interest, 12 participated in the questionnaire/interview survey. The Four main themes emerged from the study were nursing as a science, nursing as a profession, nursing as a practice and gender disparities in nursing. It was concluded that nurses were viewed in supportive roles and only considered as scientists because of the collaboration of other disciplines like medicine. Professionally, nurses were said to have been "ordained" to what was referred to a "noble calling". Nurses were perceived as confident and autonomous in their practice but thought to be undervalued even though they were deemed nurturing and important. The gender disparities in the profession were attributed to the traditions and culture of a predominantly patriarchal society. It was concluded that there were unclear definitions about the perception of nurses as scientists, and that the culture, tradition and gender assignments play an integral part in the reconciliation of gender roles.

40. How do Multiple Myosin Molecules Transport a Large Vesicle?

Efren Munoz, Jr.
Faculty Mentor: Dr. Takeshi Sakamoto, Wayne State University

Myosin 5c is a non-processive motor protein found extensively in the vesicle transportation of secretory vesicles. In vertebrates, myosin 5 (Myo5) consists of three isoforms, named myosin 5a, 5b, and 5c. The ability of Myo5 molecules to move continuously along actin filaments (i.e. processivity) is required for efficient cargo transport in cells. This physical property has been well addressed in Myo5a and 5b, which demonstrate processive movement as a single molecule. In contrast, Myo5c shows no processivity as a single molecule, although it is found in cargo and is believed to participate in cargo transports. This raises the possibility that multiple Myo5c molecules should transport cargos. Previous studies of Myo5c in our labs has determined that the processivity of the protein along actin filaments increases as two dimers of Myo5c molecules were attached to DNA scaffolds. This confirms the theory that Myo5c requires multiple molecules connected to one piece of cargo to carry out useful functions. In this experiment, we create mutant forms of Myo5c that will attach a biotin molecule to the tail region of Myo5c, allowing it to attach to spherical beads of various radii. The beads will be coated with avidin via biotin, effectively allowing us to test how processive Myo5c is with the beads as an artificial vesicle. The results of this experiment will illustrate a useful model for the dynamic movement of Myo5c as it transports cargo towards the peripheral of a cell.

41. Preliminary Analysis of the Effects Marijuana Has on Texting and Driving

Briana Murdock, Mohammed Mohammed, Rimzim Taneja, Ki-Jana Malone, Brandon Buchanan, Christofer Smith, Doreen Head and Randall Commissaris
Faculty Mentor: Randall Commissaris, Wayne State University

Texting and driving has shown itself to be dangerous time and time again. Another dangerous impediment to driving is drugs; with the rapid rise of medical marijuana use and the overuse of opioid prescriptions, driving under the influence, and also texting while driving under the influence, is becoming more and more likely. In this on going study, we examine the risks associated with texting and driving while under the influence of marijuana. Two sets of Participants, a control group, and a medical marijuana group drove in a fixed-base driving simulator (2001 Chevy Impala), where we sent four text messages, two being short (i.e., one-word) messages and two being longer messages. Participants were asked to read, re- type and re-send the messages while continuing to drive normally. Drives were videotaped, and the videos were rated 1-4, 1 being perfect and 4 a catastrophe, and the data of the drives was also recorded, and eye glance data was also analyzed. In this preliminary study looking at initial data, we compared medical marijuana users with nonusers, and looked at their ability to drive in a car simulator while given the distraction of texting.

42. An Exploration in The Graduate Admissions Process: Gender Bias in Faculty Letters of Reference

Jennifer Nava and Annmarie Cano
Faculty Mentor: Annmarie Cano, Wayne State University

Much of the research looking at implicit gender bias in letters of reference has been for faculty positions in STEM related fields, however the purpose of this study is to examine gender bias in letters of reference being used for the graduate admissions process. We tested whether gender differences are consistent across disciplines (e.g., STEM, social and behavioral sciences), race, and age. We also attempted to examine letter writers' gender as it pertains to language usage and potential bias. Letters of reference were de-identified and then coded through the use of the text analysis application Linguistic Inquiry and Word Count (LIWC2015). Through LIWC the letters were analyzed word for word and placed into one of ninety word categories after being compared to the pre-existing internal dictionary (Pennebaker et al., 2001). After coding, all data was entered into a de-identified database that is not linked to a master list. It was hypothesized that, in comparison to male applicants, letters for female applicants would be shorter, include more personal attributes and fewer performance attributes as well as contain more references to weaknesses. The current study serves as a means of achieving equitable access throughout the graduate admissions process.

43. Effects of MCP-1 chemokine on Ovarian Cancer cell viability

Jada Nelson, Ramandeep Rattan and Shailendra Giri
Faculty Mentor: Ramandeep Rattan, Henry Ford Health System

Ovarian cancer is a lethal gynecologic disease with limited detection and therapeutic treatments due to its unknown 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. Monocyte Chemoattractant Protein (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 overexpression in ovarian cancer patients. Research has shown that MCP-1 is a negative regulator of AMPK which regulates the metabolism and energy levels of cells in the body. Also, current research studies show that when MCP-1 is bound with its preferred receptor, CCR2, it promotes adhesion and invasion of ovarian cancer cells which can lead to tumor progression. My research examines the impact of cell proliferation on ID8 ovarian cancer cells treated with MCP-1. All cells were treated with a different dose of MCP-1 and examined at variable time intervals. MTT Assay was used to determine cell viability, Western blot technique was used to identify specific proteins that are activated by MCP-1 in ovarian cancer cells, and lastly, RT- PCR was done to confirm CCR2 expression in ovarian cancer cells. The goal of this experiment is to study the pathway that MCP-1 uses to increase cell proliferation of ovarian cancer cells through inhibition of AMPK expression. Ultimately discovering a way to inhibit MCP-1 expression and the progression of Ovarian Cancer.

44. Exploring the Depth of Rule Abstraction using Honeybees through T Maze Testing

Shyra J. Northington
Faculty Mentor: Karen E. Doyle, Marygrove College

Honey bees live without a prefrontal cortex so can they grasp the concept of rule abstraction in sequential learning? In the brain, the prefrontal cortex is where decision making takes place. Without the help of a prefrontal cortex honeybees shouldn't be able to solve complex cognitive tasks, in previous studies it has been demonstrated that they sometimes can (McKinnon, 2014). This experiment is geared towards determining if a prefrontal cortex is needed to utilize the concept of rule abstraction. Using a three-choice T maze system, the honeybees come into contact with two different choices of left or right (which are detector tubes) at each T maze piece. The maze pieces and the rule of the maze alternated each day. According to the rule of the day the maze pieces will lead outside in an alternating fashion (either left, right, left or right, left, right). After completing the series of choices correctly in the maze the honeybees will be able to forage freely. This research will lead to further knowledge of the cognitive capabilities of honeybees, as well as offer further understanding and information on rule abstraction and honeybees.

45. Quantitation of RNase E Cell Cycle Regulation

Nathaniel Nunez, Nadra Al-Husini, Obaidah Bitar, James Aretakis, Mohammed Bharmal and Jared Schrader
Faculty Mentor: Jared Schrader, Wayne State

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 levels 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. Correlation between Human Papilloma Virus, Herpes Simplex Virus, and Progression of Cervical Cancer

Darlene Okpokpo and Dr. Robert Akins
Faculty Mentor: Dr. Robert Akins, Wayne State University Medical School

Human papillomavirus (HPV) is thought to be the most common sexually transmitted viral disease in the United States. There are over 200 types of HPV that can be grouped into two categories: High-risk and Low-risk HPV types. This is based on their association with cervical cancer. The most prevalent risk types include are HPV-16, -18, -31, and -33. Infection with high-risk HPV types interferes with the ability of cervical epithelial cell proteins to regulate the cell cycle, which is a first step toward cervical cancer. There is some evidence that other viruses or bacteria that are located in the vaginal-cervical niche, may serve as cofactors in the development of cervical cancer. My hypothesis is that infection with Herpes Simplex Virus (HSV) type 1 or 2 contributes to HPV co-infection or progression to cervical cancer. This predicts that a correlation will be observed between patient samples that are positive for high-risk HPV or cytologically abnormal cervical epithelia, and patient samples that are positive with HSV 1 or 2. Vaginal swabs and pap smear samples were collected from the Wayne State University Women's Health Clinic, and the DMC Clinical Microbiology lab. Using nested qPCR with primers specific for HSV1 and HSV2, I have determined which samples were positive for either target, and compared this data to clinical and histological data and to qPCR data results with HPV primers. Data in progress indicate that there is no correlation between vaginal presence of HSV1 and infection by HPV16 or any HPV genotype, Spearman's r <0.13, despite a 75% incidence of HSV1 in the clinical samples. HSV2 was not detected in these samples. It is still possible that HSV1 may be correlated with progression to cervical cancer from HPV infection. Fully understanding the interactions of these two viruses can give allow a better understanding of why some high risk HPV patients never develop cervical cancer or do so more slowly, while others progress rapidly from infection to cancer.

47. Cognitive Bias Testing in Mice

Jace Paupert, Ian Moore, B.A. and Elizabeth M. Hill, PhD.
Faculty Mentor: Dr. Elizabeth Hill, University of Detroit Mercy

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 will compare males and females. Results and implications will be discussed.

48. Relationship Between the Digestive and Excretory Tract with the Neuroendocrine System

Jolani Perez, A'Tearea Boggan, and Gregory Grabowski

Faculty Mentor: gregory grabowski, university of detroit mercy

The Malpighian tubules and Gastro-Intestinal (GI) tract in Madagascar hissing roaches carry out excretion and digestion, respectively, much in the same way as humans do. PAS-Orange G and haematoxylin-phloxine histochemical techniques are staining procedures used to localize epithelial cells that secrete the hormones. PAS-orange G cells stain basophils magenta, acidophils yellow, nuclei black, and chromophobes pale blue, while haematoxylin-phloxine stain pancreatic B cells blue, A cells red, and D cells red. Localized epithelial cells are suspected of secreting hormones in the Malpighian tubules and GI tract that signal/regulate excretion and digestion, the goal is to find where they are in relation to the ganglia and neurons. Roach ganglia are responsible for sending action potentials that initiate and carryout 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. 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 reoxidized 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.

49. Cognitive Ability and Social Behaviors in Preterm Born Children

Tiara Perkins*, Da' Jonae Foster, Dana Anderson, David Chen and Noa Ofen
Faculty Mentor: Noa Ofen, Wayne State University

Abstract Previous research indicates that children born preterm (37 weeks) compared to those born at full term are more susceptible to emotional and behavioral problems as well as cognitive deficits. However, it is not clear whether the occurrences of the emotional and behavioral problems or cognitive deficits in children that were born preterm differ by the child's age at assessment. In this study, we investigated emotional and behavioral measures and cognitive functioning in children born preterm compared to age matched children born at full term. Participants were healthy 5-6 years-old children born either at full-term (n = 35), or children born at preterm (n = 33), recruited from the Metro Detroit area. Participant completed tests of cognitive abilities (e.g., Pair Cancellation task from WOJO III (Woodcock-Johnson Test of Cognitive Abilities, the 3rd version, WJ-III For each assessment we looked at specific measures such as School T-scores, Total Problems, etc.) and parents completed the CBCL (Child Behavior Checklist (CBCL) and the BRIEF (Behavior Inventory of Executive Function (BRIEF). Overall, in this sample we did not find any significant differences between the scores of participants based on term status. For several of the cognitive and Social Behavioral scores there were numerical differences that did not reach statistical significance levels. These null findings may indicate lack of power to detect effects or the possibility that However, we do not have enough power to make any generalities about term status and cognitive functioning and behavior, or assume any significant differences between preterm and full-term children. term status has minimal effect on cognitive and social behavioral measures at the age tested in this study. Future analyses will incorporate a larger set of cognitive measures and neuroimaging data collected from the majority of participants.

50. FexNi2-xP Nanoparticle Assemblies for Potential Magnetic Refrigeration

Mikaylah N. Poli, Malsha A. Hettiarachchi and Stephanie L. Brock
Faculty Mentor: Stephanie L. Brock, Wayne State University

Magnetic refrigeration (MR) technology has attracted scientific and public attention due to its level of efficiency and environmental friendliness. Incredibly, MR technology can reach lower temperatures than conventional vapor compression, while simultaneously being less harmful to the environment. Magnetic refrigeration technologies rely on the magnetocaloric effect (MCE), a process in which magnetic materials absorb or expel heat by magnetizing or demagnetizing. In this project, our primary focus is on FexNi2-xP (x=1.2 and 1.4) nanoparticles because these phases have shown promising MR properties in previous studies. We seek to prepare discrete nanorods of FexNi2-xP (x=1.2 and 1.4) and assemble them into porous nanostructures. To synthesize these FexNi2-xP nanoparticles, we combined nickel(II) acetylacetonate (Ni(acac)2), iron pentacarbonyl (Fe(CO)5), and tri-n-octylphosphine (TOP) in the presence of octylether and oleylamine as the solvent and stabilizing agent, respectively. The solution was then heated at 350°C for 10 h to produce rod-shaped nanoparticles. These reaction conditions were further altered to obtain different size/aspect ratios of nanorods. The above-mentioned nanorods were then subjected to oxidative assisted sol-gel formation to obtain porous gel networks. Their magnetic properties will be studied as a function of nanorod size and nanostructure density. These gel networks are further expected to optimize MCE properties and target potential MR materials.

51. THE EFFECT OF A NONSENSE MUTATION IN FBN1 GENE ON AORTA WALL STRUCTURE AND ANEURYSM FORMATION IN MARFAN SYNDROME

Alejandro Ponce, Student Home Institution: Wayne State University Faculty Sponsor: Dr. Li Li, Mentor Research Institution: WSU Center for Molecular Medicine and Genetics Lab partner: Xiaohua Dai, Mentor Research Institution: WSU Center for Molecular Med
Faculty Mentor: Dr. Li Li, Wayne State

Marfan Syndrome (MFS) is a genetic disorder caused by mutations in the FBN1 gene which can be fatal in some cases due to aortic dissections and rupture. There are many different mutations in FBN1 that can lead to MFS, but its severity is highly variable even in family members. These mutations could be a missense or nonsense mutation. Our lab's aim is to analyze the genetic mechanisms of Nonsense Mediated mRNA Decay (NMD) and its connections to the pathogenesis of MFS. We then generated mice with the Q2469X (C > T) nonsense mutation in the FBN1 gene using CRISPR/Cas-mediated genome engineering. The objective of my project was to validate the nonsense mutation in Q2469X mice and evaluate the aortic wall structure integrity. The genotyping was determined by enzyme digestion of PCR product and Sanger sequencing and aortic wall structure was evaluated by histology analysis. In the future, FBN1 expression levels will be determined not only in the different genotypes of Q2469X, but they will be compared to the MgR mice strain (a classic Marfan mouse model). We expect to see a difference in the aortic wall structure when comparing the different mice with FBN1 mutations.

52. Expression and Targeting of PI4KIIIα and Sac1in Prostate Cancer

Madeleine E. Reardon, Louie Semaan and Sreenivasa R. Chinni
Faculty Mentor: Sreenivasa R. Chinni, Wayne 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.

53. Examining Rule Abstraction in Honeybees Through Use of a T-Maze

Alexandria D. Rogers
Faculty Mentor: Dr. Karen E. Doyle, Marygrove College

Past research has shown that honeybees demonstrate the ability to complete complex tasks such as mazes and differentiating between different colors or numbers despite only having approximately 1 million brain neurons and no brain cortex (Menzel, 2012). The purpose of this experiment is to examine whether or not a honeybee performs rule abstraction. Researchers created a 3-choice T-maze with an alternating right or left turn pattern to assess whether honeybees use rule abstraction to learn to navigate the maze. Bees are allowed to choose continuously in the maze until they make a correct choice. This experiment will provide evidence to help researchers determine whether a brain cortex is required for an animal to use rule abstraction when solving a pattern. Preliminary data may show evidence of this rule abstraction.

54. The Immediate Physiological Effects and Social Implications of Vaping

Channing Sesoko, Zia Muntford and Molly McClelland
Faculty Mentor: Molly McClelland, UDM

The Immediate Physiological Effects and Social Implications of Vaping Channing Sesoko, Zia Muntford, Molly McClelland University of Detroit Mercy, Detroit, MI 48221   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.

55. Negativity Bias towards Neutral Faces: Brain Correlates and Perceived Trustworthiness

Limi Sharif, Brian Silverstein, Narcis Marshall, Hilary Marusak, Craig Peters, Farrah Elrahal, and Christine Rabinak
Faculty Mentor: Christine Rabinak, Wayne State University

Negativity bias is the tendency to interpret neutral or ambiguous events and stimuli (e.g., neutral facial expressions) as negative. Individual differences in negativity bias, as well as higher negativity bias, has been observed in patients with depression and anxiety. The current study aims to test whether negativity bias is present while individuals judge the trustworthiness of neutral faces, and in brain responses to these expressions. Participants completed an emotional faces appraisal task (EFAT) which involved viewing and subsequently rating the trustworthiness (0-100 scale: 0 = not trustworthy, 100 = trustworthy) of three types of emotional facial expressions: fear, happy, neutral. Simultaneous electroencephalography (EEG) was collected and we focused on the late positive potential (LPP), an event-related potential (ERP) that has been shown to increase in amplitude in response to emotional stimuli and the magnitude of the emotion. Results showed that neutral faces were rated as less trustworthy (43.31±14.68) compared to both fearful (47.94±14.37) and happy faces (61.81±12.40), p's < 0.05. Further, LPP amplitude did not significantly differ between neutral and fearful or happy faces, however individuals with lower trustworthiness ratings for neutral faces showed larger LPP amplitudes in frontal (1.88 μV±3.46), central (3.61 μV±3.14), and parietal brain regions (4.91 μV±3.38). Together, these results suggest that neutral faces may not be interpreted as 'neutral', and that trustworthiness of neutral expressions is related to the amount of emotion-related neural processing. These results have implications for trust and interpersonal relationships.

56. Preconditioned Uterine Muscle Cells Protein Secretome

Arren E. Simpson and Judith A. Ingles
Faculty Mentor: Jennifer Condon, Wayne State University

Normal gestational length is between 40-42 weeks, whereas preterm birth is delivery prior to 37 weeks. Currently, a lack of diagnostic predictors or preventive treatments for the onset of preterm birth, results in 15 million babies born prematurely in the US annually; with Detroit having the highest preterm birth rate at 18%. Our laboratory has demonstrated that activation of the non-apoptotic form of caspase-3 in the uterine muscle cell is crucial for the maintenance of a non-contractile, quiescent state during pregnancy. Normally, caspase-3 activation is associated with cell death however, during pregnancy uterine muscles cells display enhanced cell viability. The pregnant uterus experiences and accommodates multiple physiological and biochemical stressors across gestation. We speculate these act in a preconditioning manor to equip the uterine muscles cells to escape cell death, maintaining caspase-3 mediated quiescence. We propose that preconditioned uterine muscle cells generate and transmit a protective, anti-apoptotic uterine secretome, which communicates with adjacent cells and is also found in the circulation. Utilizing, an in vitro model of SILAC labeled, chemically preconditioned uterine muscle cells, components of the resulting Secretome are currently being identified and quantified through LC/MS/MS. Our preliminary data demonstrates that preconditioned cells secrete a unique protein profile with elevated levels of BIP, Collagen 3 alpha and fibronectin. We will test these factors for the role in enhanced cell viability and propagation of the preconditioned phenotype. Overall, these results are important due to their prospective role in potential biomarker development and novel therapeutics for the prevention of preterm birth.

57. Exploring the Relationship between Caregiver Depression and Adolescent Asthma Control and Morbidity

Scotti Smith, Cheryl Miree, MS and Christine LM Joseph, PhD, MPH
Faculty Mentor: Christine LM Joseph, PhD, MPH, Henry Ford Health System

Background: Past research has found that caregiver depression tends to be higher among children and adolescents with chronic illnesses, like asthma. Caregiver depression has also been linked to poorer asthma control and higher asthma morbidity. **Objective:** To explore the relationship between caregiver depression and indicators for asthma control (daytime/nighttime symptoms, nighttime symptoms, restricted activity, school absences), and asthma morbidity (ER visits, hospitalizations). **Methods:** We used data from a randomized controlled trial conducted in 6 Detroit public school students with asthma symptoms (9th-11th grade) and their caregivers. Caregiver depression was defined as displaying 4 or more depressive qualities for 8 or more days over a 2 week period, measured using the Patient Health Questionnaire within the baseline survey. All bivariate associations with $p<0.10$ were explored further using multivariate analysis. Odds ratios (OR) and corresponding 95% confidence intervals were used to describe associations between caregiver depression and teen asthma control/morbidity. **Results:** The analysis sample included 355 teens and caregivers; 80% of teens were diagnosed with asthma, 58.3% were female, and mean age = 15.9 years (sd=1.2). Bivariate analysis showed an association between daytime symptoms and caregiver depression, OR=2.83 (0.85-9.49), p=0.079. This OR was reduced to 1.64 (0.46-5.94) in the multivariate analysis, after adjusting for demographics and potential confounders, suggesting other factors contribute to the relationship observed between caregiver depression and teen asthma control/morbidity. **Conclusions:** We observed elevated ORs for caregiver depression and daytime symptoms, however, further research is needed to determine whether daytime symptoms, in addition to the other covariates, have an association with caregiver depression.

58. Characteristics of Vaginal Enterococcus Faecalis: A Reservoir for Resistant Strains?

Omni Sullivan
Faculty Mentor: Robert Akins, Wayne State University

Bacterial vaginosis (BV) is a condition that occurs when the normal vaginal flora such as lactobacilli is disrupted and replaced by an overgrowth of pathogenic bacteria such as gardnerella vaginalis, prevotella, and anaerobic species such as peptostreptococcus, fusobacterium, and bacteroides. The combination of these bacteria not only produce unpleasant symptoms such as odor, abnormal discharge, and itching, but they also cause a much higher risk of contracting HIV and premature birth in pregnant patients with the infection. Patients with BV are most commonly prescribed metronidazole, clindamycin, and/or vancomycin to treat the infection but recurrence of BV is very common. Our research specifically looks at the bacteria enterococcus faecalis and its resistance to these medications, which could be the cause of recurrence of BV. We will be testing the resistance of enterococcus faecalis collected from vaginal swabs from a clinic against several different medications that are most commonly given to treat BV. To accumulate our enterococcus stocks, we are testing the use of Nutrient Agar plates with incorporated clindamycin antibiotics rather than Nutrient Agar plates with incorporated 6.5% Sodium because of its resistance to clindamycin. We hope to be able to find that enterococcus faecalis is one of the bacteria associated with recurrence due to its resistance to these medications and the bacteria not allowing the normal vaginal flora to become dominant again.

59. Spirodela polyrhiza's Gene Expression Response to Phosphorus

Royce Swasey and Stokes Baker
Faculty Mentor: Stokes Baker, University of Detroit Mercy

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.

60. GUIDING NEURONAL AND GLIAL CELL PERFORMANCE BY ELECTRICAL STIMULATION THROUGH A CONDUCTIVE CARBON NANOTUBE/HYALURONIC ACID AMALGALMATION

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Faculty Mentor: Harini G. Sundararaghavan, Wayne State

Noteworthy clinical challenges ensue in the treatment of peripheral nerve and spinal cord injuries (SCI). Functional loss caused by peripheral nerve injuries (PNI), whether triggered by trauma or surgical difficulties, affect 1 million people in the United States per annum. Axons stemming from the proximal nerve segment must bridge the injury gap and reconnect with the distal end to reinnervate target tissue for function to be restored. Customized cues can consent biomaterials to be tailored to mimic a suitable microenvironment that stimulates the processes of cell migration and axonal elongation and target that are compulsory for complete repair. Bioelectricity plays its most prominent role in the body in the form of electrical signals throughout tissues in the nervous system, influencing a wide variety of active and passive biological functions ranging from movement and thinking to sensory perception and respiration. The previous work im the current study produced a conductive biopolymer composite by integrating carboxylated multi-walled carbon nanotubes (COOHMWCNTs) as the conductive elements into a hyaluronic acid (HA) based nanofibrous scaffold (HACNT). It is hypothesized that scaffold conductance is achieved via charge hopping from one MWCNT to the next, analogous to electrical conductance achieved in reedy polymer films containing carbon nanotubes (CNTs). The current preliminary assessed the proliferation of L929 cells on HA and CNTHA scaffolds to determine material biocompatibility. In the future, we will evaluate cell migration and primary neuron behavior on this material.

61. Effects of KDM4A and KDM4B Knockdown in "Drosophila melanogaster", and Genetic Interactions Between KDM4A and KDM4B with SIN3

Sonny Tang, Valerie Barnes, and Lori Pile
Faculty Mentor: Lori Pile, Wayne State University

The histone deacetylase associating protein SIN3 and histone lysine demethylase homologs KDM4A and KDM4B are regulatory proteins of transcription activity. Whether proteins that regulate these two distinct enzymatic activities interact with each other has not been determined. The results of this work are expected to provide more information about the genetic and biochemical interactions between the two genes, and possibly improve our understanding on the genetic regulation of these genes. To do this, we utilized transgenic Drosophila melanogaster that carry genes of interest. Fly lines were crossed to generate progeny that can define the nature of KDM4A and KDM4B knockdown, and assess possible partnerships and associations with SIN3. So far, the crosses have revealed that ubiquitous knockdown of KDM4A is lethal, and that KDM4B knockdown yields no changes in phenotype. KDM4A and KDM4B are hypothesized to interact with SIN3, and results indicate varying degrees of interaction. Further work may offer more definitive conclusions, and lead toward more understanding of SIN3 with KDM4A and KDM4B.

62. Physical Symptoms, Alcohol Use, Mood, and Family Functioning in Male Victims of Partner-Violence

Aleksandar M. Tasich

Faculty Mentor: Dr. John H. Porcerelli, University of Detroit Mercy

There are relatively few studies in the literature that have conducted research into the impact of male victims of intimate partner-violence (IPV). Therefore, the aim of this research is to aid in filling the gap in the research on victimized males of IPV. We compared victims of IPV with a control group made up of non-victimized men matched for age, race, education, marital status and income. Dependent variables include alcohol use (CAGE questionnaire), family functioning (APGAR questionnaire), and physical and mood symptoms (MILCOM Health History questionnaire). Archival data were obtained from a larger study on the health effects of partner-violence in men and women from primary care clinics in the Metro Detroit area. Victimized men were matched with one control subject from the non-victimized group. This matching procedure was followed by data analysis comparing physically-victimized (N = 16), psychologically-victimized (N = 19), and control subjects (N = 35). Men who reported either physical or emotional IPV were found to have a greater number of mood (depression and anxiety) symptoms than men without a recent history of IPV. It was also found that men in the IPV Physical abuse group reported lower levels of family functioning (e.g., support) than either non-victimized men or men who reported IPV emotional abuse.

63. The Effects of Paternal and Maternal Cohabitation on Stress Levels in Pregnant African American Women

Leigha Thomas and Dawn P. Misra
Faculty Mentor: Dr. Dawn P. Misra, Wayne State University

Stress during pregnancy is a risk factor for preterm birth in pregnant women. Some literature suggests that paternal support during pregnancy could decrease maternal stress levels and adverse health outcomes (such as preterm birth) in women. However, there has been little research done to examine if the mother's stress is alleviated or increased by paternal cohabitation. Studies have also rarely focused on Black families. Using a cohort study of preterm birth in Black women in Southfield, Michigan (N=1410; 71% response rate), we compared perceived stress levels in pregnant African American women according to whether or not the father of their baby lived at home. Data were collected from in depth interviews about the mother's childhood, young adulthood, and pre-pregnancy status, as well as medical records. Mothers were asked their marital and cohabitation status in relation to the father of the baby. Levels of stress were measured by Cohen's Perceived Stress Scale. Women who reported having the lowest levels of perceived stress were the most likely to report that the father of their baby was living in the household. Our results suggest that paternal cohabitation during pregnancy relates to lower maternal stress. Therefore, paternal cohabitation may reduce risk of preterm birth among Black women by reducing levels of maternal stress.

64. Examining Atrazine Accumulation and Histological Changes in the Hepatopancreas of Crayfish Post-Exposure

Daniel Dayfield, Victoria Torres, Kathrine Yacoo and Danielle Maxwell
Faculty Mentor: Kendra Evans, University of Detroit Mercy

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). In addition behavioral changes were observed post treatment. It is of interest to correlate physiological and behavioral 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, deuterated atrazine (ATR-d5), was included in the analysis and will be used to improve the accuracy and precision of the ATR quantitation.

65. Bioinformatic analysis of molecular barcodes for the detection and identification of aquatic organisms

Xavier Walker, Adrian Vasquez and Jeffery Ram Ph. D
Faculty Mentor: Dr. Jeffrey Ram, Wayne State University

Bioinformatic analysis of gar primers enabled the determination of whether previously designed primers were likely to produce false positive or false negative PCR products. This work is part of a recently accepted publication on gar primers, of which I am a co-author. 1 PCR amplification and sequencing, followed by bioinformatics analysis of Lebertia water mites increased the number of sequences and confidence (through those increased numbers) that these barcode sequences could be used to identify a particular type (possible newly identified species) of Lebertia water mite.

66. Cloning of MET/CAPZA2 fusion into NEB 5-alpha E. coli for observation of protein stability

Tamia M. Waller and Margaret E. Martinez
Faculty Mentor: Ana C. deCarvalho, Henry Ford Hospital

Glioblastoma (GBM) is the most aggressive primary central nervous system tumor. Long-term survival for GBM patients is rare; the genetics of GBM tumors is heterogeneous. The oncogene MET is over-amplified in 4% of GBM cases submitted to The Cancer Genome Atlas (TCGA), which, in healthy cells, codes for a membrane receptor tyrosine kinase involved in embryogenesis and wound repair. Activation of MET in GBMs may contribute to proliferation, survival and invasion of cancer cells. Previous research identified and sequenced three different MET fusions to the adjacent gene CAPZA2. These fusions were discovered in two patient-derived GBM cell lines (HF3035 and HF3077) that presented an over-amplification of MET. The goal of our research was to drive the exclusive expression of the novel fusion protein CAPZA2 (E1) to MET (E6) to observe the stability and location in a PDX model. Methods included transformation via pcDNA3.1(+) mammalian expression vector into NEB 5-alpha E. coli cells, followed by the transfection of our plasmid from bacteria into the primary cell line HF3253, a cell line with low levels of endogenous MET. Furthermore, immunohistochemistry staining of the transfected HF3253 cells was done to determine the presence and location of the MET fusion. We predict that, if present, the resulting MET fusion transcript is stable and results in a gain of function, conferring a survival advantage and making it a possible drug-therapy target. This research can contribute to potent therapy plans to fight GBM and other cancers that utilize MET over-amplification and mutation.

67. Visible Light Induced Photocatalytic Hydrogen Evolution Using a CdS-Ni2P Hybrid Aerogel System

Kody Whisnant, Da Li and Dr. Stephanie L. Brock
Faculty Mentor: Dr. Stephanie L. Brock, Wayne State University

Due to the increasing global energy demand and the climate change impact of CO_2 from energy production, it is essential to construct clean energy production and storage systems. Photocatalytic evolution of hydrogen from water by visible light serves as a promising and appealing pathway. CdS nanoparticles are good visible light absorbers but not efficient hydrogen evolution catalysts, while Ni_2P is shown to be an exceptional electrocatalyst for the hydrogen evolution reaction (HER). Integration of Ni_2P nanoparticles with CdS nanoparticles using a sol-gel approach is expected to yield a hybrid system that will enable the efficient transfer of photo-generated carriers on CdS to catalytically active Ni_2P sites. In this work, the assembly of pre-formed nanoparticles to make CdS-Ni_2P hybrid aerogels will be described and photocatalytic HER data will be presented. The performance of these novel architectures will be compared to CdS-Ni_2P nanoparticles and CdS aerogels. The role of interparticle coupling, porosity, and surface passivation on catalytic efficiency will also be discussed.