7th Annual S.T.E.M. Research Symposium

Wednesday, April 1, 2015
9:00 am – Noon
Andreas Building, Room 111
Barry University
Miami, FL

This research symposium is aimed at engaging the Barry community in learning about and sharing in the excitement of ongoing discoveries and research within the S.T.E.M. disciplines (Science, Technology, Engineering, and Math). Undergraduate students will present posters related to their past and current research in biology, chemistry, computer science, health science, information technology, mathematics, psychology, and physics.

This event is organized by members of Barry University's STEM Committee

Sumera Ackbarali, MS
Khaled Deeb, PhD
Sabrina Des Rosiers, PhD
Maurizio Giannotti, PhD
Christoph Hengartner, PhD
Ricardo Jimenez, PhD
Peter Lin, PhD
Adina Oprisan, PhD
Zuzana Zajickova, PhD
Anita Zavodska, PhD

We gratefully acknowledge:
Sponsors from Barry University
Department of Biology
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The dedication of research mentors, support staff, and undergraduate researchers

Special Thanks for Assisting with the Symposium
Division of Institutional Advancement
Department of Brand Marketing and Communications
Dr. Flona Redway, Director, RISE Program
Norma Barrera, Administrative Assistant, RISE Program
Beth Culverson, Administrative Assistant, Department of Physical Sciences
Undergraduate Student Volunteers

Barry University College of Nursing and Health Sciences
Clinical Biology

1. Evaluation of influenza vaccine efficacy using subtype A detection during the 2013-2014 and 2014-2015 influenza season

Rehaf Alabdaly, Mohammed Alharthi, Ali Althaiban, Alicia Graham, Sumera Ackbarali
(Barry University, Miami Shores, FL)

Influenza, commonly known as "the flu" is a viral infection that attacks the respiratory system. Based on the proteins present on the viral surface, Influenza A, B, and C can be divided into subtypes. The purpose of this study was to compare data obtained from the 2013-2014 and 2014-2015 seasons to determine if the influenza vaccine was effective and if there is a higher incidence of infection in colder temperatures. The reporting period for the influenza season is from the 40th week to the 39th week of the following year; in this study, data were collected from the 40th week to the 3rd week of the next year from the World Health Organization FluNet database. The findings of our study indicate that the vaccine was effective in preventing A(H1N1)pdm09 subtype, but was ineffective in prevention of A(H3) and other A viruses of undetermined subtypes. Furthermore, the influenza incidence peaked during the winter months, indicating that colder temperatures are related to higher influenza prevalence.

2. The demonstration of carbohydrates in plant cell walls of alcohol fixed tissue using various staining techniques

Kareem Barrett, Barbara Francisco, Dianna Maldonado, Bernice Tshimbalanga, Daniel Packert
(Barry University, Miami Shores, FL)

Tissues obtained from different plants were sectioned and evaluated for carbohydrate preservation using different staining methods and examined using light microscopy. There are different types of staining techniques that will help identify and improve the clarity of structures found within cells. This experiment sought to find a staining protocol that would best demonstrate carbohydrates in plant cell walls. These stains included Safranin O – Fast Green, Alcian Blue, and Periodic Acid Schiff's. To determine which staining protocol worked best, a selection of root vegetables were used as they are generally the storage organs in the form of carbohydrates. We obtained fresh carrot, cassava, and turnip tissue specimens to process, stain, and evaluate. Evaluations of the stained specimens were viewed under standard light microscopy and graded on the clarity and structures present.

3. The relationship between clinical laboratories and Ebola virus disease prevalence and mortality in Guinea, Liberia, and Sierra Leone during the 2014 outbreak

Erica Nanoo, Krystal Sabdul, Laura Gregoire, Mailyn Morales, Sumera Ackbarali
(Barry University, Miami Shores, FL)

Ebola virus disease (EVD) is a rare and deadly disease that is highly infectious and transmitted by both humans and animals. This study investigates the relationship between confirmed EVD cases, deaths, and

the number of diagnostic laboratory facilities in the three most affected countries of the recent Ebola outbreak: Guinea, Liberia, and Sierra Leone. Data were collected from 35 situation reports published between August 29, 2014 and January 28, 2015 on the World Health Organization's website. It can be concluded that all three countries had a gradual increase in the number of confirmed cases and confirmed deaths. Guinea, Liberia, and Sierra Leone all displayed a high case to laboratory ratio, indicating that the diagnostic capability of each country was limited and may have been a factor in the high number of deaths.

4. Effect of the addition of the fixation step to the microwave tissue processing on the quality of tissue

Anette Sanz, Brian Anderson, Daniel Packert (Barry University, Miami Shores, FL)

In order to preserve the tissue structure for further microscopic observation and disease diagnosis, it is very important to follow the steps considered in the protocols for fixation, processing, clearing, and wax impregnation previous to paraffin embedding and microtomy; the fixation being the most critical step. In this study an analysis of the addition of a formalin fixation step to a microwave processing protocol is done. Twelve fragments of small intestine grossed into sections of 3 and 4 mm and embedded in 12 cassettes were compared. Half of the cassettes were processed in the Pathos Delta microwave processor with 1 hour and 10 minutes formalin fixation step included, while the other half was processed in a Histos 5 microwave processor with no formalin fixation. A positive control of very well fixed tissue and a negative control of unfixed tissue were used as a reference for classification. A qualitative scale score was used to determine the tissue quality. After processing, cut sections were stained with Hematoxylin and Eosin and evaluated using the qualitative scale score. Results were analyzed using the scale score, which was used to determine whether the addition of fixation on the microwave processor provides a better method of tissue processing.

5. Wealth and antiretroviral therapy (ART) coverage in HIV-positive children under the age of 15 in Latin America and the Caribbean

Bernice Tshimbalanga, Melania Vallejo, Leondra Edwards, Sumera Ackbarali
(Barry University, Miami Shores, FL)

According to the World Health Organization, there were approximately 35 million people worldwide living with HIV/AIDS in 2013. Of those, 3.2 million were children under the age of 15. In this study, the relationship between wealth and antiretroviral therapy (ART) coverage among children in Latin America and the Caribbean was investigated. It was hypothesized that ART coverage would be lower in less economically developed countries. Data was collected from the World Health Organization and the World Bank. The results of the study did not support the hypothesis. In some well developed countries with high health expenditure, the amount of children with HIV receiving ART is low while other countries with low health expenditure exhibited higher ART coverage.

Barry University School of Professional And Career Education

6. Psychological neuroscience of MDMA on the brain

Sarah Pedroza (Barry University, Miami Shores, FL)

This poster reviews the psychological neuroscience of MDMA/Ecstasy (methylenedioxy-methamphetamine). It focuses on how this stimulant drug affects the brain's functionality and chemistry through review of MDMA's physical forms, chemical makeup, pharmacodynamics, and pharmacokinetics. The research presented shows that MDMA use is related to an increase in the serotonin level in the brain. This increase results in the user having "feel good effects" and may lead to high tolerance and MDMA addiction. Empirical evidence shows how short-term use causes physical reactions, while long-term use damages the 5-HT serotonin receptors in the brain. The changes that occur through the overuse of MDMA can lead to permanent neuropsychobiological damage, behavioral changes, and psychiatric problems. Treatment issues are addressed.

Barry University College of Arts and Sciences
Department of Biology

7. The effectiveness of low-frequency tacton cues in comparison to audio cues as a means of blind waypoint navigation

Rehaf Alabdaly, Ana Jimenez, Ricardo Jimenez (Barry University, Miami Shores, FL)

Tactons are computer-generated tactile cues which work in conjunction with a vibrotactile device that is placed on the body and mechanically produces sensations on the skin surface. This allows the sense of touch to be used in Human Computer Interaction (HCI). Vibrotactile devices have also been shown to be an effective navigational device for the blind (Brewster, 2004). To this end, a belt prototype with four embedded, low-frequency tactors has been designed. The belt is secured above the waistline and previous work in this lab demonstrated that optimum placement for direction recognition is on the right and left mid-clavicular line and the superior and inferior midline. To test the effectiveness of the belt in blind waypoint navigation, test subjects were blindfolded and asked to navigate a course to a waypoint using audio cues which were then compared to the same navigational course using the vibrotactile belt. In one experimental paradigm, the test subject was guided via wireless communication between the computer and the vibrotactile belt; in the second paradigm the subject was guided via audio cues using a cellphone. Both tactile cues and audio cues are congruent, i.e., "right," "left," "forward," "stop." Test subjects were video-recorded. The number of navigational errors and corrections as well as the time of completion was compared.

Funded by Barry University Department of Biology.

8. Developing a model to study effects of ethanol and thiamine on cultured embryonic rat brain cells

Rayyan Alamoudi, Laura Mudd (Barry University, Miami Shores, FL)

Alcohol can cause neurological effects after exposure in utero (fetal alcohol syndrome or fetal alcohol effect) as well as after exposure post-natally (Riley, Infante, and Warren, 2011). Chronic alcohol abuse in adults can lead to Wernicke-Korsakoff syndrome, brain damage, and memory loss which is initially reversible, but which can become permanent if untreated (Nardone, et al, 2013). This appears to be due to decreases in thiamine content secondary to the ethanol abuse (Nardone, et al, 2013). The purpose of this study is to explore the concept that cultured embryonic rat brain cells can be used to test for putative treatments that will prevent or reverse some ethanol effects. Rat brain cells will be grown in culture. Treatment groups will include control, ethanol-treatment only, thiamine-treatment only, and an ethanol- and thiamine-treatment group. We have previously used a colorimetric stain but are moving to a fluorescent antibody that is more environmentally friendly. We will determine whether we can use this model to measure neuronal survival, neurite number, neurite length, or neurite branching in response to the ethanol and thiamine treatments. In addition, we will use immunocytochemistry followed by the fluorescent microscopy to study effects on proteins that are protective, such as the calcium-binding protein calbindin.

9. Analysis of juvenile and adult color patterns in a territorial damselfish

Bayan Alghamdi, Michael Robinson (Barry University, Miami Shores, FL)

Damselfishes (fam. Pomacentridae) are one of the most important groups of coral reef fishes and use color in a variety of ways including communication and recognition of individuals. In contrast to most vertebrates, many reef fishes, including many damselfishes, are more colorful as juveniles than as adults. This is surprising because bright coloration is typically associated with mating in adults and often increases susceptibility to predators. The most common explanation is that bright juvenile coloration reduces the aggression juveniles receive from adults. This is supported by the widespread presence of such ontogenetic color change in territorial species. To understand better the function of this change, we must first understand the exact nature of the change. Here I describe the ontogenetic color change of the beaugregory, Stegastes leucostictus, an Atlantic damselfish. I used a Jaz spectrometer (Ocean Optics) to quantify light reflectance of several fish. In this species the juveniles start out yellow with a blue dorsum then change to more drab colors with brown sides. Sometimes, however, as adults these fish maintain a yellow tail and some color accents. Juvenile coloration shows high contrast within the fish, whereas adult tends to be more uniform. Juvenile cheeks show a high amount of UV-reflectance, which is surprising because UV is related to aggression in a Pacific species.

Funded by Barry University Department of Biology.

10. Identification and characterization of genetic interactions between cdc13-1 and yKU80 in Saccharomyces cerevisiae

Wesam Azaizeh, *Keiauyndria Edwards*, *Kamren Livingston*, *Christoph J. Hengartner*, *Leticia R. Vega*
(Barry University, Miami Shores, FL)

Telomeres are the physical ends of eukaryotic chromosomes that protect DNA ends from degradation and from end-to-end fusion. Telomeres consist of repeated stretches of C/G-rich DNA ending with 3' single stranded G-rich overhangs. The enzyme telomerase and accessory proteins such as Ku and Cdc13p maintain and facilitate telomere functions. In S. cerevisiae, cdc13-1 is a temperature sensitive allele of Cdc13p, an essential telosome protein that binds to single-stranded G-tails to prevent telomere degradation. The Ku heterodimer, composed of Ku70 and Ku80, functions in DNA non-homologous end joining, recombination, and telomere end protection. Yeast cells lacking Cdc13p or the Ku complex have uncapped telomeres and long single-stranded G-tails. This study examines the effects of mutations in yKU80 on cdc13-1 strains. We introduced a library of 125 mutant yku80 alleles into the cdc13-1 background by plasmid shuffle and determined the effects on viability and telomere end protection of the various yku80 mutant alleles. We found that 30 out of 125 yku80 alleles tested increased the temperature sensitive phenotype of cdc13-1 strains, suggesting a telomeric end protection role for these mutant yku80 alleles. We are currently characterizing the telomere phenotypes of double mutant strains by Southern blot analysis and Slot blot analysis. Initial characterization of cdc13-1, yku80 double mutant strains show that temperature sensitivity may be uncoupled from telomere shortening in these strains.

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11. Enhancement of G-*α* expression with co-expression of Ric8 on a baculovirus genome

KeiAuyndria Edwards[1], *Jacob Mahoney*[2], *Roger Sunahara*[2]
([1]Barry University, Miami Shores; [2]University of Michigan, Ann Arbor)

G protein-coupled receptors (GPCRs) are the largest family of cell-surface receptors in the human genome and play a role in regulating most physiological functions. GPCRs interact with intracellular proteins called G proteins to initiate signal cascades that modulate cellular processes. G proteins are heterotrimeric, containing *α*, *β*, and *γ* subunits. Structural and biochemical studies of receptor-G protein interactions have historically been hindered due to complications with purifying large quantities of protein. However, it was recently discovered that co-expressing G-proteins with chaperones enhances purification. The aim of this study was to enhance G-*α* expression by combining G-*α* with the Ric8 family of proteins on a baculovirus genome. Insertion of G-*α* with the respective Ric8 into a pVL dual vector was attempted in order to generate a baculovirus that expresses both proteins. Through a series of validation steps, it was determined that Ric8 was not successfully inserted. To address this, a new set of restriction enzymes will be tested. The ultimate goal is to examine gene expression of the recombinant virus in insect cells, thereby taking advantage of the ability of these cells to produce large quantities of eukaryotic proteins in a short amount of time. Protein expression will be examined after injecting the recombinant virus into insect cells. Future directions will include observing how receptors interact with different G-proteins to learn why receptors display selectivity for the G-proteins with which they interact.

Supported by NIH-NIGMS RISE Grant, R25 GM059244-14, Barry University; NIGMS 1U19GM106990-01, University of Michigan.

12. Characterization of the viability of wt and cdc13-1 in log and stationary phase.

KeiAuyndria Edwards, *Wesam Azaizeh*, *Leticia R. Vega (Barry University, Miami Shores, FL)*

Telomeres are the physical ends of eukaryotic chromosomes that protect DNA ends from degradation. Telomeres are composed of repeated TG rich DNA sequences that end with 3' single stranded G-rich overhangs. The enzyme telomerase and accessory proteins such as cdc13 maintain telomeres and facilitate telomerase function. In the budding yeast, S. cerevisiae, cdc13 is an essential protein that binds to the single-stranded G-tails to prevent their degradation. The cdc13-1 allele is a temperature sensitive allele of cdc13 that is defective in telomere capping. cdc13-1 mutants strains are inviable at temperatures above 30℃. During previous studies, the plating efficiency of cdc13-1 was noticeably low during stationary phase. This study examines the viability of cdc13 (wt) and cdc 13-1 at both log and stationary phase through quantitative plating. Results show that wt has decreased viability in stationary phase while cdc13-1 actually shows increased viability in stationary phase.

Supported by NIH-NIGMS RISE Grant, R25 GM059244-15, Barry University.

13. The expression of Igf2, Yap1, and phosphorylated-Yap1 proteins in zebrafish proliferating cardiomyocytes

Kayla Garcia, *Fabio Frech*, *Brenda Schoffstall (Barry University, Miami Shores, FL)*

Every year, approximately 1 million people die from heart related disorders; by 2020 it will be the leading cause of death around the world. The inability for an adult heart to regenerate after an infarction makes saving lives affected by heart disease even more difficult. Previous research has showed that human cardiac cells are only able to proliferate until about 20 years of age, with the highest percentage of cell division between birth and the first year of life. Danio rerio (zebrafish) hearts, on the other hand, respond to excessive cardiac overload stress with cardiomegaly via cardiomyocyte proliferation. Using our zebrafish model, we hope to identify specific gene pathways that act as the switch that turns on efficient cardiomyocyte proliferation. We have determined that after 2 weeks of forced overload stress, zebrafish cardiomyocytes begin to actively proliferate. Not only is it important to evaluate which key genes are transcribed during proliferation, it is also important to evaluate the gene products, i.e. protein expression. Because of their involvement in cell division signaling, we have targeted Igf2, Yap1, and phosphorylated-Yap1 proteins as proliferation switch candidates. We have designed immunohistochemical staining experiments and Western blot immunoassays to examine the expression levels of these specific proteins in cardiac tissues of zebrafish. Tissue samples and protein extracts were taken from zebrafish that were put through a rigorous exercise program for 4 weeks to promote excessive cardiac overload stress and cardiomyocyte proliferation. Four time point samples were collected throughout the exercise trial. The focus of these experiments will be to determine if Igf2, Yap1, or phosporylated-Yap1 are highly expressed during the period of active proliferation. If so, they may have potential to be used as a "therapeutic switch" to turn on cardiomyocyte proliferation in human hearts.

Funded by Barry University Department of Biology.

14. Identification and cloning of a possible novel cell cycle regulatory molecule

Tessa Gibson, *Pairat Dolinsky*, *Alejandra Toro*, *Tang Hu (Barry University, Miami Shores, FL)*

CDK-Activating Kinase (CAK) is an enzyme complex that is capable of phosphorylating (activating) all CDKs and is essential for G1 and G2 CDK activities. CAK is composed of three subunits (we temporarily name them as subunits 1, 2 and 3, respectively). The subunit 1 has a molecular size of 35kda. In two human leukemia cell lines, we have detected a possible variant of CAK subunit 1 as well as the subunit, whereas in control NIH/3T3 cell lysates and another leukemia cell line we only detected a normal 35kDa subunit. The variant has a molecular size about 28 kDa. Western blot showed that these cells expressed about equal levels of the subunit 1 and the variant, suggesting that this variant may also play an important role in cell cycle control and transcription regulation in these two human myeloid leukemia cell lines. In order to identify this variant, total RNA was isolated from TF-1 and MV4-11 cells and a control cell line, TF-1a. The total RNA then were reversely transcribed into cDNA by using oligo dT and random hexamers followed by Polymerase Chain Reactions (PCR) using the sense and antisense primers (these primers were designed to carry HindIII and XbaI restriction enzyme recognition sites). The further investigations will involve in restriction digestion, ligation, transformation, sequencing, and functional studies.

Faculty Incentive Grant, NIH-NIGMS MBRS RISE: R25 GM059244-13, and Biomedical Sciences Program, Barry University.

15. Genetic regulation of the temperature-dependent egg-laying rate in C. elegans

Victoria Hoelscher[1], *Kevin P. McPherson*[2], *Samuel Lasse*[3], *Erik Andersen*[4], *Miriam B. Goodman*[3]
([1]Barry University, Miami Shores; [2]Emory University, Atlanta; [3]Stanford University, Stanford; [4]Northwestern University, Evanston)

In humans, muscle function depends on temperature, but due to genetic complexity, it is difficult to identify genes responsible for this dependence. The genomes of humans and Caenorhabditis elegans contain many homologues, enabling C. elegans research to provide a blueprint for studying temperature-dependent muscle function in humans. Muscle function can be measured quantitatively in C. elegans by tracking egg-laying, since when an egg is laid, the vulval muscles of the worm must contract. These muscles function at different rates across a range of temperatures, meaning that the worms' muscles contract more often at certain optimum temperatures than at others. We have found that the egg-laying rates and optimum egg-laying temperatures also differ among strains of C. elegans, despite the presence of only minor genetic differences. By comparing the egg-laying rates and genomic sequences of two phenotypically divergent strains, N2 (Bristol) and CB4856 (Hawaii), we identified loci within chromosomes IV and X of the C. elegans' genome that may affect muscle function. After specific genes of interest are identified in C. elegans, homologous genes in humans can be studied for their roles in temperature dependence of muscle function.

16. Dioxygen activation by mononuclear non-heme iron oxygenases and the corresponding model complexes

Shanika Kingston[1], *Laura Cunningham*[2], *John Caradonna*[2] *([1]Barry University, Miami Shores; [2]Boston University, Boston)*

The activation of O2 is a process that occurs naturally when enzymes containing iron centers, known as mononuclear non-heme iron enzymes, oxidize challenging substrates. The objective of this project is to develop synthetic model complexes that can mimic the reactivity properties of these mononuclear non-heme iron (MNO) enzymes. The use of iron in these catalytic systems is particularly attractive as this metal is earth-abundant and non-toxic and thus this effort opens new avenues in inexpensive and sustainable catalytic transformations. An N2O1 ligand set and its reaction with a-ketoglutarate to generate the FeII/a-ketoglutarate complex was investigated as an MNO enzyme mimic. We have experimentally observed that the structurally characterized fac-[FeII(N2O1)(sol)3]+ complex: (i) rapidly reacts with a variety of a-ketoacids to form 1:1 complexes, (ii) shows significantly enhanced oxygen sensitivity when coordinated by a-ketoacids, (iii) rapidly decomposes the a-ketoacid ligand to CO2 and the corresponding carboxylate ligand, and (iv) generates an Fe-based reactive intermediate that is kinetically competent. A cyclic reaction was observed, where each mole of a-ketoglutarate added gave rise to 1 mole of H2O, formaldehyde, and succinic acid (completely coupled reaction). A Nash Assay was performed to determine the amount of formaldehyde within a sample. A Karl Fischer titration was used to determine the amount of water within a sample.

NSF-REU, Boston University.

17. The methylation response to ethanol exposure in the zebrafish embryo

Shanika Kingston, *Jessica Smith*, *Brittni Bent*, *Rafael Brango*, *Alec Davila*, *Anna-Lecia Lyn-Cook*, *Stephanie Bingham (Barry University, Miami Shores, FL)*

Environmental and chemical exposures have been associated with disruption of normal epigenetic processes by which gene expression is regulated in the absence of alterations to gene sequences. DNA methylation, the addition of a methyl group to CpG dinucleotides, is a major epigenetic mechanism. Activation or inactivation of genes via inappropriate demethylation or methylation, respectively, may lie at the heart of numerous disorders. For example, in the case of alcohol metabolism, stimulation of irregular pathways may promote developmental deficiencies, such as Fetal Alcohol Spectrum Disorders (FASDs). Here we analyze the epigenetic response to ethanol in the embryonic zebrafish. We hypothesize that exposure to ethanol may lead to aberrant DNA methylation signatures that in turn disrupt regulation of developmentally controlled genes.

Supported by NIH-NIGMS RISE Grant, R25 GM059244-14 and NIH-NIGMS MARC Grant, T34 GM 008021-29, Barry University; Department of Biology, Barry University; Department of Energy Grant DE-FG02-06CH11438.

18. Chromosome end protection and telomere length maintenance in cdc13-1 strains

Kamren Livingston, *Wesam Azaizeh*, *KeiAuyndria Edwards*, *Jovans Lorquet*, *Christoph J. Hengartner*, *Leticia R. Vega (Barry University, Miami Shores, FL)*

The physical ends of eukaryotic chromosomes are called telomeres, which function to protect DNA ends from degradation and end to end fusion. They consist of stretches of repeated C/G-rich DNA ending with a 3' single stranded G-rich overhang. The maintenance and function of telomeres are facilitated by the enzyme telomerase and its accessory proteins. Cdc13p is an essential, G-strand binding protein that functions in telomere protection and in telomerase recruitment. cdc13-1 is a temperature sensitive allele of CDC13 that is defective for telomere end protection and, at elevated temperatures, exhibits extensive C-strand specific degradation and shows a G2/M cell cycle arrest. At permissive temperatures for growth, however, telomere length and end protection are similar to wild-type. Ku is a non-essential heterodimer composed of Ku70p and Ku80p. Ku plays multiple roles in DNA metabolism including non-homologous end joining, recombination, telomerase recruitment, and telomere end protection. The capping function of yKU is necessary in G1. cdc13-1, yku80 double mutant strains exhibit enhanced temperature sensitivity and impaired growth. This study examines the effect of a panel of mutations in yKU80 on cdc13-1 strains. Cells were monitored for growth at permissive and semi-permissive temperatures and telomere lengths were assayed by Southern blot. We also examined genetic interactions between cdc13-1 and yku80 mutant alleles and Pif1p, a helicase that inhibits telomerase activity. Our results suggest that Pif1p activity helps to promote normal telomere length at permissive temperatures in cdc13-1 strains, perhaps by removing telomerase that is telomere associated via an interaction with yKU.

*NIH-NIGMS MARCU*STARGrant, T34 GM008021-29, Barry University*. *NIH-NIGMS MBRS RISE: R25 GM059244-15 and NIH-NIGMS/NCI MBRS SCORE,5SC 2CA 138567.*

19. Spatial and temporal expression of the glycoprotein ependymin in the zebrafish embryo

Breyonna Maddox, *Natalie Izaguirre*, *Elizabeth Nguyen*, *Gabriela Toro*, *Stephanie Bingham (Barry University, Miami Shores, FL)*

Ependymin is a brain-specific glycoprotein with previously identified roles in neural plasticity and refinement. High concentrations of ependymin can be found in the extracellular fluid (ECF) of specific fishes and plays a role in synaptic plasticity during learning and memory, particularly during memory consolidation. Our results suggest that in addition to these already established functions, *epd* also influences the initial stages of neuronal patterning. The purpose of the current study is to map the developmental expression pattern of *epd* in the vertebrate model system zebrafish, Danio rerio in situ hybridization. To perform this developmental analysis, a DNA construct was created for in vitro synthesis of sense and antisense in situ probes targeting *epd*. This analysis will allow us to more clearly define the role of *epd* in nervous system development.

Supported by MBRS RISE grant R25GM059244-14, Department of Biology, Barry University; Barry University Minigrant; Department of Energy Grant DE-FG02-06CH11438.

20. Diverse UV-reflectance patterns in several Caribbean damselfish genera

Kevin McCarty, Michael Robinson (Barry University, Miami Shores, FL)

Ultraviolet (UV) radiation (200-400 nm) is located toward the short wavelength, high frequency end of the electromagnetic spectrum. Although ultraviolet radiation is not visible to the human eye, some animals, including many coral reef fishes, can perceive it. For example, two species of Pacific coral reef damselfishes (Pomacentridae) possess complex ultraviolet facial patterns that they can recognize and use for territorial aggression, identification, or other forms of communication. We used a UV-photography system to record the UV-reflectance of three species of Atlantic damselfishes: yellow tail (Microspathadon chrysurus), beaugregory (Stegastes leucostictus), and bicolor (Stegastes partitus). The fishes were placed into a small, single-sided UV-transparent Lexan aquarium, which enabled us to photograph the fishes without harming them. The yellow tail and the beaugregory both had obvious ontogenetic changes and an overall decrease of the UV-reflectance patches throughout their bodies. The yellow tail showed an overall UV-reflectance intensity around the occipital, suborbital, and preopercular regions, while both the beaugregory and the bicolor showed similar UV-reflectance patterns along the anal fin during the juvenile stage. These complex patterns could likely be used for identification of individuals, mating selection, or aggressive territorial competition.

Funding provided by a Barry University Faculty Senate Mini-Grant.

21. Stereotaxic coordinates of the brain of guinea pigs

Alice Nakasone[1], *Hsiu-Wen Irene Tsai*[2], *Paul W. Davenport*[2] *([1]Barry University, Miami Shores; [2]University of Florida, Gainesville)*

Although much research is done with a mouse model, a guinea pig model is preferentially used for cough stimulation experiments because a mouse is unable to cough. Currently, there is no literature that provides stereotaxic coordinates of the guinea pig brain. The purpose of this project was to study stereotaxic coordinates for future experiments, specifically for locating regions such as the amygdala, periaqueductal gray (PAG), and nucleus tractus solitarius (NTS). The amygdala is part of the limbic system and is involved in the recognition of our emotions and motivations. PAG is involved in homeostatic regulation of salient functions such as pain, anxiety and autonomic function. NTS is the site of integrating and processing peripheral afferents such as respiratory and cardiovascular afferents. The guinea pigs were sacrificed and their brains were harvested for histological analysis. The fixed brains were coronally and sagittally sectioned into 40 μm thick slices with a microtome for cresyl violet staining. The obex was used as a rostrocaudal zero reference point for the coronal sections, and the midline was used as a dorsoventral zero reference point for sagittal sections. The results showed the stereotaxic coordinates for amygdala (coronal: +1.90 to +2.388 cm; sagittal: +0.488 cm), PAG (coronal: +1.636 to +2.004 cm; sagittal: +0.248 cm), and NTS (coronal: -0.008 to +0.408 cm; sagittal: +0.248 cm). The results will be used to define the locations of the amygdala, PAG, and NTS in guinea pigs for multi-electrode array recording during swallow and cough stimuli.

NIH – Short Term Training, #83224. College of Medicine, University of Florida.

22. Examining the effects of paternal ethanol exposure on zebrafish development

Peter Nwokoye, Joanna Conley, Mariana Ruiz, Shanika Kingston, Mandy Carper, Breyonna Maddox, Kelly Hills, Rafael Brango, Natalie Izaguirre, Bertina Telusma, Chuco Glen, Teresa Petrino-Lin, Stephanie Bingham (Barry University, Miami Shores, FL)

Embryonic ethanol exposure results in several developmental and physiological defects leading to Fetal Alcohol Syndrome Spectrum Disorders (FASD). While the precise mechanisms of FASD are poorly understood, evidence suggests that alcohol interferes with many molecular, neurochemical, and cellular events that occur during development. Research efforts investigating FASD have heavily focused on the effects of maternal alcohol exposure and as a consequence, little is known about the effects of paternal alcohol exposure. Using zebrafish as a vertebrate model, we are investigating the effects, if any, of paternal ethanol exposure on events surrounding embryogenesis. Male fish are exposed to ethanol for several days prior to breeding. Embryos are then collected and observed for phenotypic responses in terms of survival, morphology, etc. Preliminary results suggest that while paternal exposure on its own results in a decreased number of offspring, there are no obvious phenotypic effects. Interestingly, however, there may be a potentiation of the effects of maternal exposure if both maternal and paternal exposure are performed.

Supported by MBRS RISE grant R25GM059244-14, Department of Biology, Barry University; Department of Energy Grant DE-FG02-06CH11438.

23. Trade-offs in mate choice: female house crickets (Acheta domesticus) pay no cost by mating with sexy males

Eva Paulus, Gabriela Lin, Gabriela Hernandez, Celia Oni, Pedro Sanchez, Shakore Whitter, Basha Gerstenfeld, Natalie Govea, Hannah Gokingco, Bianca Sanon, Aris Johnson, Josh Pass, Michael Robinson (Barry University, Miami Shores, FL)

By not mating at random, “choosy” females benefit from increasing their offspring’s number and/or genetic quality. Previous results indicated that symmetry (i.e., developmental stability from better genes) in male house crickets (Acheta domesticus) is positively correlated with immune function (i.e., genetic quality) and components of the chirp (i.e., signal to mates). Trade-offs are common in nature, however, because organisms have limited resources and multiple needs. We tested whether males that maintain symmetry have lower quality gonads representing a fertilization cost to females that choose more symmetrical males. Asymmetry in the tibia and the wings of adult male crickets (ca. 6 weeks and older) were correlated indicating that asymmetry is an overall phenomenon and not more or less likely to appear in structures important to mate choice (i.e., the chirp-producing wings). Testes were removed, weighed, washed, and frozen (-80℃) in PBS until processing. We thawed the testes and measured protein concentration with a Coomassie assay. The testes of more symmetrical males had higher masses and tended to have greater protein concentrations, although this latter effect was not statistically significant. These results imply that quality males also have better gonads and that females do not pay a fertilization cost by mating with males that also provide better genes. In addition, if a developmental trade-off exists, it is not strong enough to affect the development of high-quality male crickets.

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24. Wound healing and infection in adult Danio rerio wild type zebrafish

Jessica Ricketts[1], *Precious deVerteuil*[2], *Victoria Hoelscher*[1], *Brenda Schoffstall*[1]
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Danio rerio (zebrafish) share many physiological and genetic characteristics with humans, making them an attractive model system for scientific research. Zebrafish have been shown to completely regenerate significant portions of heart, fin, and tail tissues without loss of function or formation of permanent scar tissue. However, the healing response following deep tissue burn puncture wounds has not yet been described for zebrafish. We have hypothesized that zebrafish should completely regenerate skeletal muscle and surrounding tissues in response to this type of injury, making them an interesting wound-healing model. Our initial investigations indicate that deep tissue burn puncture wounds of this type require approximately 30 days to heal, with minimal to no external scarring visible. We have also screened wounds for infection that occurs during the healing process, and have begun to identify the endogenous bacteria that cause these infections. Follow-up studies include time point sampling for analysis of the wound healing process at tissue and molecular levels, as well as investigation of bacterial biofilm formation and specific identification of bacterial species causing infection during the healing process. Our preliminary results support the use of zebrafish as a model to investigate cellular and molecular regeneration and healing processes following deep tissue burn puncture wounds. Findings could translate into applications for treatment of burn puncture wounds to skeletal muscle in humans, such as those inflicted during military combat.

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25. CDC bioreactor for cultivation of Staphylococcus epidermidis biofilm under flow conditions

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(Barry University, Miami Shores, FL)

Infectious disease resulting from bacterial invasion is a leading cause of death. Certain species of bacteria can form biofilm, communities of bacteria embedded in a polysaccharide matrix. Accumulation of biomass from these bacteria has been shown to increase resistance to antimicrobial agents relative to their planktonic forms. Biofilm formation begins with bacteria adhering to a surface, followed by the recruitment and accumulation of various different bacterial species. *Staphylococcus epidermidis* is a part of the normal human skin ora and has the ability to form robust biofilm when adhered to a biological surface or medical device. The purpose of this study was to compare biofilm formation in *S. epidermidis* under static conditions vs. ow conditions, which closely resembles an environmental niche. We setup a CDC bioreactor in our lab to study bacterial growth under ow conditions. Biofilm formation was investigated for two wild type *S. epidermidis* strains , as well as three mutant strains 1457 aap*δ*, 1457 ica*δ*, and 1457 aap*δ*/ica*δ*, which are deficient in biofilm formation. We found that the RP62A (WT) strain of *S. epidermidis* was able to form a most robust biofilm, compared to 1457(WT) and to the mutant strains of 1457. Our studies also confirmed that ica and aap play important roles in the formation and accumulation of biofilm in *S. epidermidis*. These findings lay the groundwork for future studies of biofilm formation using the CDC bioreactor flow system.

DARPA grant BAA 10-55 (G. Packert/Barry University).

26. A zebrafish model for studying chromosomal disorders

Mariana Ruiz, *Nicole Schtupak*, *Christina Dumpman*, *Kellina Langaigne*, *Stephanie Bingham*
(Barry University, Miami Shores, FL)

The term nondisjunction refers to the unequal distribution of chromosomes in daughter cells during cell division. Chromosomal abnormalities resulting from nondisjunction are a leading cause of miscarriage, mental retardation, and birth defects in the United States. In this study we use Danio rerio (zebrafish) as a model for studying chromosomal abnormalities via karyotyping analysis in embryos. We are examining the association between aneuploidy events and the incidence and severity of defects in the zebrafish embryo by exposing embryos to stressors that will induce nondisjunction. To our knowledge, this is the first time the zebrafish model has been used for such an application. Embryos are allowed to develop to 24 hours post fertilization so that gross morphological and physiological features can be assessed. Next, the embryos are treated with a microtubule destabilizing drug to arrest the cells in metaphase so that the chromosomes are in their condensed, replicated state and readily visible. The cell homogenate is transferred onto slides and the chromosomes stained with either DAPI or anti-phosphohistone-3 and visualized under epifluorescence. Now that the procedure has been developed, we can extend the analysis to our stressor-exposed embryos in an attempt to correlate the incidence and severity of defects to specific chromosomal abnormalities. Danio rerio is a widely used model system among several of biological disciplines, and has become a preferred model of vertebrate research because of its ease of use and the fact that its genetic and physiological characteristics are highly conserved from zebrafish to mammals. For these reasons, we feel that use of this model system for this study will provide important insights into the mechanisms underlying chromosomal abnormalities.

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27. DNA structure-related sequence features in prokaryotes, fungi, and large viruses

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Prokaryotes, fungi, and large viruses are very diverse in their nucleotide and oligonucleotide composition as well as the presence of various sequence patterns that can locally affect the physical properties of the DNA molecule. A survey of such sequence patterns was recently performed in prokaryotes using a program specifically designed to perform such genome comparisons. This survey indicated some universal trends among all prokaryotes as well as differences among different species, which were in some cases related to the organisms' adaptations to specific habitats, particularly optimal growth temperature. We now extended this survey to include available complete fungal genomes as representatives of eukaryotes as well as large viral genomes. One might expect that the differences in DNA organization in a prokaryotic cell, in eukaryotic nucleus, and in a virus, as well as differences in enzymatic machineries processing and maintaining the DNA could create distinguishing features of these organisms. Consequently, this could influence the content of such sequence patterns that affect DNA structure. The results indicate significant differences between prokaryotes and fungi and some shared trends as well as some differences between prokaryotes and viruses. For example, palindromes are more strongly overrepresented in viruses than in bacteria but less in most fungi.

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28. The potential for igf2 and yap1 genes as a proliferation switch in zebrafish cardiomyocytes

Johan Sanchez[1], *Nicole H. Lopez*[2], *Brenda Schoffstall*[1] *([1]Barry University, Miami Shores; [2]Georgia Regents University, Augusta)*

Approximately 1 million people die annually from heart related disorders; the discovery of a "cardiomyocyte proliferation switch" may contribute to therapeutics that could solve this problem. Previous research has demonstrated that human cardiac cells are only able to proliferate until about 20 years of age, with the highest percentage of cell division between birth and the first year of life; the adult human heart has no ability to regenerate after myocardial infarction. Conversely, adult Danio rerio (zebrafish) hearts respond to excessive cardiac overload stress with cardiomegaly via cardiomyocyte proliferation. We have used a zebrafish model to identify specific gene pathways that may act as the switch that turns on efficient cardiomyocyte proliferation. Because of their involvement in cell division signaling, we have targeted igf2 and yap1 as proliferation switch candidates. Timed heart tissue samples were taken from zebrafish that were put through a rigorous exercise program for 4 weeks to promote cardiomyocyte proliferation. The igf2 transcription levels appear to increase significantly during week 3 of the exercise trial, and decrease drastically during week 4, while yap1 transcription levels appear to essentially be the same as controls during weeks 1-3 of the exercise trial, then decrease during week 4. Because phosphorylated Yap1 protein is inactive, our current and future studies focus on the hypothesis that dephosphorylation of Yap1 protein holds the key to its ability to act as a proliferation switch. Either igf2 or yap1 may prove to be the "therapeutic switch" that can turn on cardiomyocyte proliferation in human hearts.

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29. In vitro transcription of probes for the in situ detection of Pc2 Polycomb2 (cbx4) expression in zebrafish (Danio rerio) embryos

Bertina Telusma, Chuco Glen, Stephanie Bingham, Gerhild Packert, Y-W. Peter Lin, Teresa Petrino-Lin (Barry University, Miami Shores, FL)

The Polycomb (Pc) and trithorax group genes (trx) are known to play important roles in maintaining transcription patterns during embryogenesis in many species. It has been determined that Pc genes function specifically as repressors by modifying the chromatin state thereby silencing targeted genes. Our lab has previously cloned several Danio rerio (zebrafish) polycomb genes. Based on our knowledge that these genes function as epigenetic molecules that define the pattern of expression of genes during development, we hypothesized that they will be expressed at critical stages of embryogenesis. Therefore, the objective of this study is to determine the spatial and temporal expression patterns of Pc2 (cbx4) in the zebrafish embryo. This process entails the in vitro synthesis of antisense RNA probes, followed by in situ hybridization on whole mount zebrafish embryos beginning with the 2-cell stage to 30 hours post fertilization. It is hoped that determination of the precise spatial and temporal expression patterns of Pc genes will provide additional clues to the mechanisms by which they regulate gene expression and cell fates/embryonic regionalization.

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30. Multiple fluorescent labeling of proteins involved in meiotic silencing by unpaired DNA (MSUD)

Bertina Telusma[1], *Hua Xiao*[2], *Patrick Shiu*[3] *([1]Barry University, Miami Shores*; [2]*UNKNOWN,* [3]*University of Missouri, Columbia)*

Protein localization studies are an integral part of our effort to understand the mechanism of meiotic silencing by unpaired DNA (MSUD), a silencing pathway that targets unpaired genes in fungi, Neurospora. Although previous studies have shown that some MSUD proteins are found at the nuclear periphery, little is known about the mechanism regulating their localization. Many approaches for studies of protein dynamics rely on fluorescent labeling where a fluorophore is fused to a protein of interest. Previously, we were able to establish interaction between two MSUD proteins (each linked to a different fluorophore, i.e., green and red fluorescent proteins) by demonstrating that they colocalize in the cell. However, as more MSUD factors are being discovered, the need to simultaneously label many proteins in Neurospora becomes increasingly important. In this work, we have developed a multi-tagging system based on the fusion constructs of GFP (green), mRuby (red), and mNeptune (light blue). Three MSUD proteins thought to have intimate interaction (SAD-1, 2, and 3) were fused to these fluorescent markers, enabling us to follow them during sexual development. The simultaneous localization of these and other proteins will provide further insights into the mechanism involved in the assembly of the MSUD machinery.

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31. Role of cdc2 in PMA-induced leukemia cell differentiation

Daria Vasilyeva, *Pairat Dolinsky*, *Shashana Fiedler*, *Alice Nakasone*, *Verronika Laguerre*, *Marithza Gaspard*, *Heather Silverstein*, *Gerhild Packert*, *Tang Hu (Barry University, Miami Shores, FL)*

The critical role of cdc2 (CDK1) in G2-M transition of the cell cycle control in mammalian cells has been well documented. However, whether this pluripotent CDK regulates cell differentiation is unclear. Thus, the effect of phorbol 12-myristate 13- acetate (PMA) on cell differentiation and the expression of cdc2 in a human myeloid leukemia cell line, TF-1a, were investigated. When TF-1a cells were treated with 10−5, 10−6, and 10−7 M PMA for 48 and 72 h, they showed marked macrophage-like changes, evidenced by significant decrease in nucleus/cytoplasm ratio and increase in the expression of IL-1*β*. PMA treatment also caused time-dependent inhibition of cdc2 in both cytosol and nucleus of the cells, with maximal inhibition being observed by 48 and 72 hours, which paralleled with the cell differentiation course. In contrast, there was no significant cell differentiation and inhibition of cdc2 being observed in control human myeloid leukemia TF-1 and MV4-11 cells in response to PMA treatment. PMA treatment also rapidly induced phosphorylation of MAPK kinase (MEK and p44/42 MAPK), which persisted for 24 h, after which MEK and ERK returned to base level, at which time the expression of cdc2 was still significantly downregulated, as compared with control cells treated with DMSO. Pretreatment of TF-1a cells with sense cdc2 partially inhibited PMA-induced IL-1ß. Moreover, cells treated with PMA showed marked reduction in the level of cdc2-pRb complexes. Taken together, our data suggest that that inhibition of cdc2 is required for late differentiation of TF-1a cells in response to PMA stimulation. Whether activation of MAPK pathway inhibits expression of cdc2 is currently under investigation.

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32. Conditions affecting the wound healing process of adult Danio rerio wild-type zebrafish

Kevin Williams, Victoria Hoelscher, Johan Sanchez, Jessica Ricketts, Brenda Schoffstall
(Barry University, Miami Shores, FL)

Danio rerio (zebrafish) share many physiological and genetic characteristics with humans, making them an attractive model system for scientific research. We have recently established zebrafish as a wound-healing model to study regeneration of tissues following deep tissue burn puncture wounds. Preliminary investigations have focused on the healing process, the length of time necessary for full regeneration, and identification of endogenous bacteria that cause infections during the healing process. During these investigations, we have observed that fish recovering in a group tank with antibiotic/antimycotic treated water appear to fully regenerate tissues at the wound site within ~30 days, while those recovering in isolated tanks with untreated water appear to fully regenerate within ~20 days. To better understand why healing occurs faster in isolated tanks (in the absence of antibiotic/antimycotic), we have developed three hypotheses. We speculate that faster healing is enabled in the isolated tanks due to differences in either (A) oxygenation, (B) mobility, or (C) food competition. To test these hypotheses, we have established methods comparing these conditions during the healing process in group tanks vs. isolated tanks. Our earlier results support the use of zebrafish as a model to investigate cellular and molecular regeneration and healing processes following deep tissue burn puncture wounds. We now need to better understand the conditions affecting the regeneration process. Our findings could translate into applications for treatment of burn puncture wounds in humans, such as those inflicted during military combat.

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Barry University College of Nursing and Health Sciences

33. Relationship between GPA and time management behavior

Jacqueline Faluade, Gizem Kahveci, Jorge Lopez (Barry University, Miami Shores, FL)

Introduction: Successfully combining the tasks of learning copious amount of new material, taking rigorous examinations, and participating in extracurricular activities force students to master a level of organization previously unrealized. Many students approach this daunting task by sacrificing essential components necessary for their physical and psychological well-being such as sleep. Adequate amounts of sleep not only contribute to physical health, but it has significant influence on cognition. The present study examined the correlation between time management behavior (TMB) and grade point average (GPA) as well as sleep and daytime habits with GPA of graduate students in the Biomedical Sciences (BMS) program at Barry University (BU).

Methods: 32 graduate students in the BMS program at BU completed the TMB questionnaire, the Sleep and Daytime Habit questionnaire, and self-reported their current GPA. Pearson's correlation coefficient was utilized to determine relationships between GPA and TMB variables and GPA and variables measured by the Sleep and Daytime Habits scale.

Results: Students that reported higher GPAs perceived themselves as being more in control of their time ($r = 0.383$, $p = 0.049$), habitually broke down complex projects into smaller, more manageable tasks ($r = 0.426$, $p = 0.027$), tended to look for ways to increase efficiency in work activities ($r = 0.364$, $p = 0.062$), and periodically assessed adherence to a predetermined schedule ($r = 0.361$, $p = 0.065$) more frequently than students with lower self-reported GPAs. Additionally, students with higher GPAs woke up later on both weekdays ($r = 0.401$, $p = 0.038$) and weekends ($r = 0.394$, $p = 0.042$) than their peers with lower GPAs.

Conclusions: This preliminary data suggests that individuals with better time management skills have better academic performance. Surprisingly, participants with later wake-up times throughout the week also self-report higher GPAs. However, the present data did not explore whether the later bedtimes were the result of longer sleep times.

Faculty Incentive Grant FY15 to Dr. Jorge Lopez.

34. The relationship of sleep latency and sleep efficiency with time management behaviors

Gizem Kahveci, Jacqueline Faluade, Jorge Lopez (Barry University, Miami Shores, FL)

Introduction: The transition to graduate school can be very distressing to most students. Recent studies have established a relationship between students' time management behaviors and academic performance. Furthermore, previous works have established a role for sleep in cognition. The purpose of this study is to establish the relationship of time management behaviors with sleep parameters in graduate students.

Methods: The study consists of 32 graduate students in the Biomedical Sciences program at Barry University self-completing a time management behavior questionnaire and wearing an actigraph for five consecutive days. The actigraph provides objective measures of sleep parameters such as sleep latency and sleep efficiency. Pearson's correlation coefficient was utilized to examine the relationship between sleep latency and time management variables as well as sleep efficiency and time management variables.

Results: Participants with shorter sleep latency (SL) reported scheduling activities ($r = -0.334$, $p = 0.062$), working while waiting ($r = -0.365$, $p = 0.040$), and leaving a well-organized workspace ($r = -0482$, $p = 0.005$). Similarly, those who had high sleep efficiency (SE) reported better time management skills. They reviewed their daily activities ($r = 0.340$, $p = 0.057$), set priorities ($r = 0.413$, $p = 0.019$), and left a well-organized workspace. In contrast, those longer SL showed poor time management behaviors. These subjects reported preference to work in a disorganized workspace ($r = 0.342$, $p = 0.056$), time spent scheduling as wasteful ($r = 0.342$, $p = 0.066$), had their creative ideas when they were disorganized ($r = 0.323$, $p = 0.071$), and underestimated the time to accomplish tasks ($r = 0.327$, $p = 0.068$).

Conclusions: Time is a limited resource and the preliminary results suggest that those who demonstrate good sleep latency and sleep efficiency tend to have better ability to organize their time and accomplish their tasks.

Faculty Incentive Grant FY15 to Dr. Jorge Lopez

Barry University College of Arts and Sciences
Department of Mathematics and Computer Science

35. Power consumption comparisons for cryptographic algorithms on mobile devices

Lukas Bijaminas, Hugo Torres, James Haralambides (Barry University, Miami Shores, FL)

We present an analysis of performance and battery power consumption of cryptographic algorithms on mobile devices. Analysis has been performed on encryption ciphers Blowfish, Triple DES and AES, as well as Miller-Rabin's and Solovay-Strassen's primality test algorithms. Ciphers and primality test algorithms are used in cryptography and may appear as embedded software components in security systems. The objective of this project is to identify a correlation between algorithmic efficiency and power consumption for mobile devices, as they are the ones most affected by the underperformance of software applications. With the increasing number of the cyber-attacks and exploits, and with the recent discovery of domestic spying being carried out by governments everywhere, data security has never been more important. Moreover, the number of portable devices is growing faster than ever and increasing power autonomy through extended battery run times is becoming a great challenge. Embedding power-lean security services on portable devices is one of the most explored issues in today's mobile computing. We have designed a mobile application for Android devices that relates algorithmic complexity to power consumption. The application provides an interactive graphical user interface that allows users to select a cipher or a primality test algorithm and specify the number of execution iterations. A larger number of iterations is recommended to minimize side effects such memory paging and CPU scheduling issues. In order to eliminate compiler or interpreter code optimization issues, a single programming language platform has been used. The average time to complete a single iteration and the corresponding battery charge that is attributed to the algorithm are reported. Power consumption results are compared against those observed under idle conditions, for better accuracy. All algorithms are tested under identical application loads. This restricts the number of CPU-running applications to those strictly required by the operating system.

36. Software development of a tacton interface to determine effectiveness of tacton parameters in object recognition

Claudionor Borges da Silva, Ana Jimenez, Ricardo Jimenez (Barry University, Miami Shores, FL)

Tactons are tactile cues which work in conjunction with a vibrotactile device that is placed on the body and mechanically produces sensations on the skin surface. This allows the sense of touch to be used in human computer interaction (HCI). Tactons have been shown to enhance desktop interaction (Brewster & Brown, 2004). Defining tacton stimuli parameters and data structures as well as determining tacton recognition rates is an ongoing pursuit (Craig, Rhodes, Busey, Kewley-Port & Humes, 2010). This work describes the software development process of the experimental interface to be used to determine a computer user's ability to associate vibrotactile stimuli of 4 tactons encoded with 4 different sinusoidal waveforms with two objects in sequence on the computer screen. The test subject will need to identify objects in sequence from a total of 20 distinct data items.

37. Embedded music composition

Julian Dasilva, *Luis Khawly*, *James Haralambides (Barry University, Miami Shores, FL)*

We are designing a system to auto-generate electronic music on Field Programmable Gate Arrays (FPGAs). The design is implemented on a Spartan 3e starter board. Music note generation and sequencing is realized with the use of a random number generator. Parameterization of note ranges for consecutive notes has a direct influence on the quality of synthesized music. Keeping note distances in the range [-3, 3] tends to produce more realistic effects. Electronic music generation is based on the implementation of fundamental frequencies that are then synthesized to produce sounds that simulate the characteristics of various musical instruments and voice effects. We use the Serial Peripheral Interface (SPI) of the FPGA to communicate digital values representing notes to the Digital-to-Analog Converter (DAC) of the board and finally to audio output devices for music reproduction. All musical notes are constructed by the introduction of varying delays on a fundamental sinusoid signal. Sample values of the sinusoid are stored in block RAM and interface SPI. A finite state machine applies the appropriate amount of delay according to the note generated. We create note frequencies that are based on the equal tempered tuning process. The formula used is: 440 Hz X $2^{\wedge}(n/12)$, where 440 Hz represents the frequency of note A4 (note A in the fourth octave) and n represents the positive or negative distance of the note from A4 in half-tones (semitones). An extension of the process allows for the generation of a wide range of notes using minimal space requirements and a small additional processing overhead. In addition to tones and semitones, the smallest interval in Western music, the system is capable of producing notes in the maqam melodic system used in traditional Arabic music. Maqams are suitable for improvisation and are the main focus of this work.

38. Effect of substance abuse on prenatal development

Alexia Pavlovic, *Tony Wallner (Barry University, Miami Shores, FL)*

Prenatal cocaine, tobacco, and alcohol abuse continues to pose documented as well as irreversible neural, developmental, and physical health risks for a developing fetus. The primary objective of these various studies address how developmentally fatal prenatal substance exposure is to a developing fetus, as well as throughout the child's life span. This report will provide information for the most common drugs involved in prenatal exposure: nicotine, alcohol, and cocaine. The intent of this literature review is to discuss the effects on brain development in regards to development, memory, cognition, intellect, and physical composition. Almost all drugs are known to cross the placenta and have some effect on a fetus. Reviews of data regarding the prevalence of exposure and available studies for identifying exposure are outlined, and current information regarding short- and long-term outcomes of exposed infants through adolescents is explored. Two different kind of studies have been used: observational and experimental (mostly using mice).

39. Efficiency of air conditioning at Barry University

Riann Zabaleta[1], *Stanley Morisseau*[2], *Wesam Azaizeh*[1], *Daria Vasilyeva*[1], *Megan Henneberry*[1], *Cassandra Denning*[1], *Kevin McCarty*[1], *Michael Wise*[1], *Maurizio Giannotti*[1], *Sanja Zivanovic*[1], *Victoria Hoelscher*[1] *([1]Barry University, Miami Shores*; *[2]Doctors Charter High School, Miami Shores)*

After years of complaints from professors, staff, and students that certain rooms and/or buildings at Barry University are very cold, we decided to look into efficiency of air conditioning that is in use. There are several items that can be looked into when it comes to improving A/C efficiency such as temperature of the room, humidity, air quality, the A/C unit itself, and level of CO2 in the room. For the purpose of this project we will focus on evaluating room temperature and humidity based on the outside climate conditions. In particular, we will collect temperature and humidity measurements of several classrooms. To do this, we will use the Arduino platform to develop an economical temperature and humidity logger. Arduino is an open-source microcontroller unit that utilizes an 8-bit AVR chip and other hardware which allows it to be easily programmable and interfaceable. We will interface an Arduino UNO R3 with a data logging shield for SD data storage and real-time clock capabilities, and an HTU21D-F high precision temperature and humidity sensor. The Arduino is programmed to awaken from sleep at set intervals of time to write the sensor values to the SD card. Once data is collected, we will compare it with recommended room temperature and humidity, calculate possible energy savings, and essentially obtain cost savings.

Barry University College of Arts and Sciences

Department of Physical Sciences

40. Synthesis of creatine pyruvate via acid-base reaction

Joshua Alayon, *Tony Wallner* (*Barry University, Miami Shores, FL*)

Creatine is an organic acid found in vertebrates which helps to provide energy to all of the cells of the organism, primarily to the muscular cells and cells of the brain. Creatine kinase phosphorylates creatine into phosphocreatine, which can then assist in the rephosphorylation of ADP into ATP, which is used for energy. Approximately half of the body's creatine stores are derived from animal food products, with vegetarians having much lower serum concentrations of creatine than non-vegetarians. The remaining half of the body's creatine stores are produced in the liver and kidney. Genetic abnormalities which cause a deficiency in enzymes which assist in the synthesis of creatine in the body are related to several neurological and muscular disorders. Supplemental creatine is known to be a safe compound for helping to add muscle mass to the body, to improve muscular strength, and to increase the body's ability to adapt to, and heal after, strenuous resistance exercise. Pyruvate, the conjugate base of pyruvic acid, is synthesized in the cell from glucose, and is used in both aerobic and anaerobic cellular metabolism. Several studies have shown the efficacy of supplementing pyruvate in order to increase endurance. Creatine anhydrous and pyruvic acid were combined in several acid-base reaction trials to synthesize creatine pyruvate, in order to yield the supplemental benefits of both creatine and pyruvate. Additionally, the solubility in water of the synthesized creatine pyruvate was determined and compared, to creatine monohydrate. The synthesized products were then analyzed using NMR spectroscopy in order to ascertain their structure and determine whether creatine pyruvate was formed.

41. MESAPlot: A python graphical interface to study stellar simulation data

Wesam Azaizeh, Daria Vasilyeva, Michael Wise, Maurizio Giannotti, Sanja Zivanovic
(Barry University, Miami Shores, FL)

We present a python graphical and dynamical interface to study the output from the MESA software in a friendly and economical way. MESA stands for Modules for Experiments in Stellar Astrophysics and is an open source code used by thousands of scientists worldwide. The interface collects and analyzes data from hundreds of output files and provides thousands of possible publishable-quality plots and several tools to study the results. The interface has been completed and was released last summer. It is currently used in dozens of localities in North and South America, Europe, and Asia.

42. Metal-organic assemblies of tetrasubstituted porphyrins

Miriam Basden, Megan Knol, Tamara Hamilton (Barry University, Miami Shores, FL)

Metal-organic polyhedra (MOPs) are 3-D structures consisting of organic ligands as the edges or faces and metal ions as the corners, able to encapsulate molecules and be hosts to a myriad of chemical reactions. Meso-tetrasubstituted porphyrins are large, aromatic macrocycles shaped like squares with substituents at the corners able to act as a catalyst. The goal of this research is to synthesize four meso-tetrasubstituted porphyrins which would be used to form porphyrin-walled MOPs; metal-organic cubes (MOCs) in particular. Tetrakis (3-pyridyl) porphyrin (3PP), tetrakis (2-pyridyl) porphyrin (2PP), and tetrakis (2, 3-dimethoxy) porphyrin (2, 3-diOMeP) have been synthesized and purified, and synthesis of tetrakis (3, 4-dimethoxy) porphyrin (3, 4-diOMeP) is underway. In the case of the latter two products, the methoxy groups will be removed to yield tetrakis (2, 3-dihydroxy) porphyrin (2, 3-diOHP) and tetrakis (3, 4-dihydroxy) porphyrin (3, 4-diOHP). These tetrasubstituted porphyrins were chosen because of their ability to act as exo-dentate ligands. Several attempts at self-assembly of 3PP with metal salts have been made with varying metals, anions, reacting and precipitating solvents and reaction conditions. One result yielding crystals suitable for X-Ray crystallography was obtained and the structure will be presented. Although not an MOC, the structure shows promise for future isolation of porphyrin-walled MOCs.

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43. Mechanochemistry: a greener alternative for the synthesis of biologically important porphyrin targets

Diana Cordero, Tamara Hamilton (Barry University, Miami Shores, FL)

Solvent-free syntheses of organic compounds are of increasing prevalence due to their “greener” aspect when compared to solvent-based synthesis. The success of solvent-free synthesis has been shown in the past with the production of tetraphenylporphyrin (TPP) and other meso-substituted porphyrins with the use of mechanochemistry, resulting in significant yields. This work presents our progress toward solvent-free synthesis of three porphyrin targets; porphine, bis-pocket porphyrin and octaethyl porphyrin (OEP) applying mechanochemical techniques. Each of our targets is relevant as a model compound for biological studies and is synthesized in-solvent giving very low yields (Porphine <10%; bis-pocket

porphyrin 1%) or in very high-dilution conditions to give moderate yields (300L benzene for 10g OEP – 52% yield). We are investigating mechanochemical synthesis of these three porphyrin targets. Isolated yields and green chemistry metrics for the mechanochemical synthesis will be reported. These targets are characterized using UV-Vis Spectroscopy and 1H Nuclear Magnetic Resonance Spectroscopy to verify the presence and yield of the porphyrin molecule.

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44. Analysis and quantification of D-aspartic acid in marine bivalve mollusks

Ramon Gutierrez, Ayelet Delascagigas, Travis Comnick, George Fisher
(Barry University, Miami Shores, FL)

For centuries marine bivalves (particularly oysters) have been thought to possess aphrodisiacal properties. Recently researchers have shown that the amino acid D-aspartic acid (D-Asp) occurs endogenously in several species of bivalve mollusks. D-Asp has also been found in the nervous and endocrine systems of many vertebrates and invertebrates, where D-Asp has physiological importance as a neurotransmitter and a hormone regulator. We are analyzing and quantifying D-Asp in some marine bivalves such as oysters, clams, and mussels. D- and L-Asp are isolated from homogenized tissues and separated from other amino acids by anion exchange chromatography. The D- and L-Asp are then derivatized with o-phthaldialdehyde (OPA) and N-acetyl-L-cysteine (NAC) to form a pair of fluorescent diastereomers which can be separated and quantified by high performance liquid chromatography (HPLC) on a reversed phase C-18 column, eluted isocratically with sodium citrate-methanol (NaCit-MeOH) buffer, and fluorescence detection. The results and significance of these analyses will be reported.

Funded by Department of Physical Sciences.

45. Characterization and the effect of pH and temperature on the degradation of creatine ascorbate, di-creatine ascorbate, and creatine di-ascorbate

Megan Henneberry, Tony Wallner (Barry University, Miami Shores, FL)

The purpose of this research is to use proton H-NMR to characterize three newly synthesized creatine salts: creatine ascorbate, di-creatine ascorbate, and creatine di-ascorbate. Additionally data from the stability study to determine the kinetic degradation and shelf life of the three compounds will be reported. The effect of different temperatures, solvents, and pH will be observed for the three creatine salts over a 45-day time range to explore the effect on kinetic degradation. Comparison of these results to previous studies on the degradation of other creatine salts performed within our research group will be presented.

46. Preparation of hydrophobic thermally polymerized sol-gel monolithic columns for reversed-phase liquid chromatography using "single-pot" approach

Rebecca Hernandez[1], *Zulema Rodriguez*[1], *Lucas Narciso Meirelles*[1], *Frantisek Svec*[2], *Zuzana Zajickova*[1] *([1]Barry University, Miami Shores; [2]Lawrence Berkeley National Laboratory, Berkeley)*

A "single-pot" approach for fast preparation of hydrophobic thermally polymerized sol-gel monolithic columns for reversed-phase liquid chromatography was studied. These columns were prepared in the presence of an aqueous acid catalyst, free radical initiator, porogen, and monomers including 3-(trimethoxysilyl)propyl methacrylate (MPTMS), ethylene dimethacrylate (EDMA), and octadecyl methacrylate (ODM). Alternatively 1-octadecantiol (ODT) was used instead of ODM. The effects of ratio of MPTMS to ODM or ODT, and ratio of MPTMS to EDMA were examined by observing changes of morphology of the monoliths. The presence of the crosslinker (EDMA) proved to be necessary for attaining white opaque materials. The C18-EDMA-MPTMS and EDMA-MPTMS monolithic capillary columns exhibited enhanced retention factor for benzene, and better stability in the aqueous mobile phase compared to columns made from MPTMS alone. We also used the faster photopolymerization reaction for the preparation of monolithic columns. However, significantly reduced retention was observed compared to that found for columns prepared using thermal initiation. The "single-pot" approach demonstrated here confirms its potential applicability for the preparation of monoliths using a wide variety of monomers.

Supported by the National Science Foundation CBET-1066113 award.

47. Entrainment sublimation for purification of mechanochemically-synthesized

Victoria Hoelscher, Tamara Hamilton (Barry University, Miami Shores, FL)

Mechanochemistry is becoming increasing popular in the solvent-free production and purification of compounds since these processes yield fewer waste products and cost less than traditional solvent chemistry. This makes them ideal reactions for experimentation regarding the synthesis of porphyrins. As a model reaction, benzaldehyde and pyrrole are ball-milled in the presence of an acid catalyst for 10 minutes. This produces a cyclized precursor to a porphyrin, which is then oxidized to produce tetraphenylporphyrin (TPP) and a number of undesirable byproducts. Our research focuses on purifying TPP by separating it from the mechanochemical reaction mixture via entrainment sublimation. During this processes, a nitrogen carrier gas passes over the sample in a Pyrex processing tube while being heated by a tube furnace. TPP is sublimed away from its impurities and subsequently deposited in a cooler area of the tube. Since TPP sublimes at around 400◦C, this process has been carried out at various temperatures near this point using different nitrogen gas flow rates. Also, different aldehydes have been tested and used to form porphyrins with different R-groups attached to the methine bridges. The highest yield we have obtained is 6.4%, using 2-chlorobenzaldehyde as a starting material. The conditions will continue to be optimized for various aldehydes in an attempt to raise yields to levels that match or surpass traditional solvent-chemistry yields.

Supported by the Physical Sciences Department.

48. Service-learning in the Physical Sciences: context and experience with CHE 135

Renata Kuninari do Nascimento, Tamara Hamilton (Barry University, Miami Shores, FL)

Service-learning is an approach to teaching that is becoming more and more widespread, due to the demonstrated benefits to student learning and to communities. In a service-learning course, students apply knowledge acquired during classes to some project in the community, such as presentations, fairs, public education, or community-based research. Even so, there are fewer examples of service-learning reported in Physical Sciences disciplines than others. Those reports were analyzed and an overview of published literature in service-learning will be presented. In addition, we will present a service-learning project from a chemistry course CHE 135 at Barry University, for non-science majors. The course has been active for three semesters. The students were tasked with modifying a hands-on experiment they performed in the class to make it appropriate for a younger age group, then presenting and discussing all concepts from the experiment with children from the Girl Scouts of Tropical Florida, or from schools near Barry's campus. As a result of this project, students self-reported gaining confidence, expanding learning, and solidifying chemistry concepts learned in class. They also report having gained good leadership experience, and having enjoyed this engagement with community members. As a result, this engagement benefits both the students and community partners. The presentation will also identify next steps for meaningful pedagogical research in physical sciences service-learning.

Supported by the Department of Physical Sciences.

49. Thiophene N-substituted tetrahydropyridinium salts as functionally selective muscarinic partial agonists

Peter Nwokoye, John Boulos (Barry University, Miami Shores, FL)

Several thiophene N-substituted tetrahydropyridinyl compounds were synthesized and found to inhibit the specific binding of the antagonist [3H]N-methylscopolamine in radioligand muscarinic assays. All compounds were found to be selective partial agonists. Compound 7A in particular was found to be an absolute M2 selective partial agonist in functional assays. This compound stimulated GTPγS binding that reached about 76% EMAX of the full agonist carbachol and only activated M2 receptors. Other compounds were found to be potent and efficacious M2 partial agonists. Compound 7A and other analogs contain the NCCSC backbone which serves as a novel scaffold for the design and synthesis of agonists with absolute muscarinic functional selectivity.

Research was supported by the Department of Physical Sciences

50. Hybrid monolith: surface modification and "single-pot" approach

Zulema Rodriguez[1], *Frantisek Svec*[2], *Zuzana Zajickova*[1] *([1]Barry University, Miami Shores; [2]Lawrence Berkeley National Laboratory, Berkeley)*

High performance liquid chromatography is the most widely used analytical technique aimed at separation of a mixture of analytes. Separation takes place inside of a column containing a stationary phase. Nowadays, traditional particle packed columns are being replaced with monoliths allowing faster and highly efficient separations. Our research aims at preparation of organo-silica hybrid monoliths

benefiting from the presence of dual functionalities. More specifically, preparation of a parent monolith using 3-(trimethoxysilyl)propyl methacrylate (MPTMS) as a monomer, aqueous hydrochloric acid as a catalyst, azobisisobutyronitrile as an initiator, and toluene as a porogen is being pursued. Furthermore, the goal is to improve the suitability of the parent monolith for separations in reversed-phase liquid chromatography, the most widely utilized separation mode. This is done by increasing the surface hydrophobicity using photografting with octadecyl methacrylate (ODM) or thiolene click chemistry with 1-octadecanthiol (ODT) in a presence of a photoinitiator. In addition, attempts were made to prepare hydrophobic monoliths utilizing the "single-pot" approach by addition of monomers such as ethylene dimethacrylate (EDMA) and ODM during the free radical polymerization of the initial solution. Both, surface modification as well as "single-pot" approach, resulted in increased retention factor of benzene attesting to increased surface hydrophobicity of the monolith. The "single-pot" approach allows for faster preparation however conditions must be modified with added monomer.

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51. Evaluation of mechanochemical oxidizing agents for porphyrin synthesis

Taylor Sabol, *Hannah Shy*, *Tamara Hamilton* (*Barry University, Miami Shores, FL*)

Solvent-free chemistry is becoming crucial due to the demand for waste reduction
and cost efficiency. Porphyrins are synthesized by a process in which large amounts of solvent for an acid-catalyzed condensation of pyrrole and aldehyde are used. This is then oxidized to create the porphyrin. We are investigating a solvent-free approach using a ball mill in order to produce the cyclized product, which is then analyzed by UV-VIS spectroscopy to confirm the presence of the fully-oxidized porphyrin. We have been successful using a solvent-free approach for the condensation step and preliminary success with oxone as the mechanochemical oxidizing agent with a 8.1% yield. Here we will present an optimization study, where we varied factors such as length of grinding time, size of grinding balls, presence of different grinding agents, molar ratio and tested various oxidizing agents including oxone, hydrogen peroxide, and sodium ethoxide. A comparison of ball-mill grinding to hand grinding was also made.

This research was supported by a Cottrell College Science Award from the Research Corporation for Science Advancement [No. 19762].

52. Nanoparticle encapsulation by self-assembling DNA polyhedral cages

Jessica Smith (Barry University, Miami Shores, FL)

Deoxyribonucleic acid (DNA) is a self-assembling molecule that forms a double helix by joining complimentary base pairs together. DNA is ideal for use in the building of self-assembling nanostructures for the development of new nanotechnology. The predictability, rigid structure, and very precise pattern of recognition between complementary nucleotides in DNA allows for optimal structural control. Structurally stable polyhedral DNA cages with dimensions similar to that of proteins and protein complexes can be made using rigid double helices connected by branch junctions. These DNA cages can encapsulate other molecules and release them upon delivery to target cells. Polyhedral cages can be made through self-assembly quickly and with high yield. The ability for polyhedral DNA capsules to function as delivery capsules was demonstrated through the encapsulation of gold nanoparticles in

solution by self-assembled icosahedral cages. The icosahedral cages were constructed from three different five-way junctions. The encapsulation of the gold nanoparticles shows the DNA cage's ability to pick up and encapsulate target molecules which it can then deliver to specified cells. DNA nanostructures like these cages have many biochemical applications including drug delivery which could help in the treatment of diseases as well as applications in the development of nanoelectronic and nanophotonic devices.

53. A series of meso-tetrasubstituted porphyrins synthesized using mechanochemistry

Qiwen Su, *Tamara Hamilton*, *Paula Mackin (Barry University, Miami Shores, FL)*

Porphyrins are useful molecules, not only as model compounds for biological systems, but also for their demonstrated catalytic, optical, and magnetic properties. Currently, the protocols for synthesizing and purifying porphyrins require a large amount of solvents which are toxic to the environment, and still yield only a small amount of product. However, it is possible to eliminate the solvent used for the cyclization step of porphyrin synthesis via mechanochemistry. Using the method of ball-mill grinding an equimolar amount of pyrrole and an aldehyde in the presence of an acid catalyst followed by oxidation of the intermediate yields an amount of tetraphenylporphyrin similar to amounts obtained through traditional synthesis. UV-Vis spectroscopy and 1H Nuclear Magnetic Resonance spectroscopy have been used to confirm the yields and purity of synthesized porphyrins. Through the use of mechanochemical synthetic protocol, it was possible to isolate yields and characterize a series of tetra-aryl and tetra-alkyl-substituted porphyrins, including some that are usually difficult to obtain from in-solvent synthesis. This study shows that applying mechanochemistry can provide access to porphyrins in yields as good as or better than those obtained in solution without need for solvent in the cyclization step.

Supported by the Research Corporation for Science Advancement Cottrell College Science Award (No. 19762) and the Physical Sciences Department.

54. Comparison of different approaches in extraction of a parameter in a linear fit

Daria Vasilyeva, *Maurizio Giannotti*, *John Goehl (Barry University, Miami Shores, FL)*

We discuss some aspects of the linear fit analysis. We show that the same data set may give different results for a physical parameter, depending on how the parameter is extracted. In particular, we discuss the effects of axes exchange and of raising the data to a power. We analyze the compatibility between different approaches.

55. Quantitative analysis of the induced currents in circuits with variable geometry and magnetic fields

Daria Vasilyeva, *Wesam Azaizeh (Barry University, Miami Shores, FL)*

It is known that a variable magnetic flux induces a current in a closed conductive loop. If this current is non-constant, it generates another variable magnetic field which, in turn, generates another current and so on. These additional contributions (AV-currents) have always been ignored. Here we calculate them and show that they are indeed small in any practical situation. Interestingly, however, in certain cases

the AV-currents may be larger than the original currents albeit only for extremely short time intervals. We describe a perturbative methodology to calculate these currents and discuss some of their characteristic features.

Barry University College of Arts and Sciences

Department of Psychology

56. Which has the greatest effect on depression in Hispanic adolescents? Parental or adolescent well-being?

Elizabeth McNally[1], Danielle Fair[1], Sabrina Des Rosiers[1], Seth J. Schwartz[2], Jennifer Unger[3], Lourdes Baezcondi-Garbanati[3], Daniel Soto[3] ,Juan Villamar[4] ([1]Barry University, Miami Shores; [2]University of Miami, Miami; [3]University of Southern California, Los Angeles; [4]Northwestern University, Evanston)

Research suggests that both parental well-being and adolescent well-being contribute to adjustment outcomes among adolescents (e.g., Giannakopoulos et al., 2009). In general, current evidence indicates parental well-being is directly and indirectly related to adolescent adjustment and adolescent well-being is directly associated with healthier adolescent mental health outcomes. For example, adolescents who report high self-esteem and optimism are least likely to experience depressive symptoms. Current research is limited with regards to whether parental subjective well-being accounts for more of the variability in adolescent psychological outcomes (e.g., Li, 2015) above and beyond the adolescent report of well-being. The current study evaluated whether parental well-being accounted for more of the variability in depression above and beyond adolescent well-being. The sample for the present study consisted of 252 Hispanic families. Data were drawn from an archived longitudinal study of Hispanic adolescent health (COPAL; Schwartz, et al., 2012). Parental well-being was measured by the Satisfaction with Life Scale (Diener et al., 1985). Adolescent well-being included optimism measured by the Children's Hope Scale (Edwards et al., 2007) and self-esteem measured by the Rosenberg Self-Esteem Scale (Rosen- berg, 1965). Depression was measured by the Center for Epidemiologic Depression Scale (Radloff, L. 1977). Results from hierarchical multiple regression revealed that adolescents' well-being significantly predicted depression and accounted for a significant amount of the variability in depression $R2 = .28$, $F(2, 246) = 49.96$, $p < .001$). The hypothesis that parental subjective well-being would account over and above adolescent well-being was not supported $R2$ change = .003, $F(1, 243) = .91$, *ns*. These findings have important implications for preventive interventions that seek to improve adolescent psychological health.

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