

11th Annual S.T.E.M. Research Symposium

Friday, April 5, 2019

9:00 am – 12:00 pm | Andreas 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 Science, Technology, Engineering, and Match disciplines (S.T.E.M.), Humanities, and Social Sciences. Undergraduate students will present posters related to their past and current research in Biology, Chemistry, Computer Science, Health Science, Humanities, Information Technology, Mathematics, Social Sciences, Psychology, and Physics.

**This Event is Organized by Members of
Barry University's STEM Committee**

Sumera Ackbarali, MS | Sabrina Des Rosiers, PhD | Maurizio Giannotti, PhD
Christoph Hengartner, PhD | Ricardo Jimenez, PhD | Peter Lin, PhD
Michael Robinson, PhD | Zuzana Zajickova, PhD | Anita Zavodska, PhD
Sanja Zivanovic, PhD

**We Gratefully Acknowledge
Sponsors from Barry University:**

Department of Biology, Department of Mathematics and Computer Science,
Department of Physical Sciences, Department of Psychology,
College of Nursing and Health Sciences
and
The Dedication of Research Mentors, Support Staff,
and Undergraduate Researchers

Special Thanks for Assisting with the Symposium

Development, Department of Marketing,
Dr. Flona Redway, Ms. Beth Culverson, and Undergraduate Student Volunteers

In Memory of Dr. Teresa Petrino-Lin

We dedicate the 11th Annual STEM Symposium program booklet to the memory of Dr. Teresa Petrino-Lin, Associate Professor of Biology, in acknowledgement of her many contributions to Barry University as an instructor, research mentor, and colleague.

Dr. Petrino-Lin joined the Barry community in 1993, after completing her tenure as a visiting scholar at Johns Hopkins University in Baltimore. As a faculty member at Barry, Dr. Petrino-Lin was a dedicated teacher, academic advisor, principal investigator, research mentor, associate scientist, high school STEM program co-director, and a dear friend. She taught Biological Foundations as well as Human Anatomy and Physiology. She was also an academic advisor for hundreds of Biology majors and was a co-advisor for the Veteran Student Organization. She was the principal investigator on an NSF-Major Research Instrumentation grant and was co-PI on the Department of Energy grant. Along with collaborators including her husband and fellow Department of Biology faculty member, Dr. Peter Lin, she secured funding for the construction of the Core Aquarium Facility, which houses marine and freshwater animals and plant species used by faculty and students for teaching and research.



Dr. Petrino-Lin's research focused on reproductive biology using amphibians and fish model systems as tools for training undergraduate researchers. She mentored 36 undergraduate student researchers, through the National Institutes of Health (NIH) supported Minority Biomedical Research Support (MBRS), Support of Continuous Research Excellence (SCORE), Minority International Research Training (MIRT), Minority Access to Research Careers (MARC), and Research Initiative for Scientific Enhancement (RISE) programs. She also taught the research ethics component to all students in these programs. Through her love of science and her devotion to sharing her passion for discovery and promoting scientific endeavors, she nurtured their scientific investigative growth. Many of her students are now making measurable contributions to the advancement of science. Students co-authored half of her refereed and GenBank database publications, and made 27 presentations at international, national, and local scientific conferences. Dr. Petrino-Lin was also actively involved in bridging the gap between high school and college for economically disadvantaged students, and co-directed the Summer Science Research Program (SSRP), which exposed high school students to hands-on science and the college environment with the goal of inspiring them to pursue postsecondary education.

Dr. Petrino-Lin wrote: *"I do believe that knowledge is easily passed on through hands-on experience along with textbook learning. As a mentor, my goal is to nurture the students' enthusiasm for science, offer support and the means to succeed in a research setting."* That is something she did, and did so well.

Bertina Telusma, (Biology and RISE, '17) was one of the last students Dr. Petrino-Lin mentored in her research laboratory before becoming ill. Bertina is now a second-year PhD student at the Massachusetts Institute of Technology (MIT). *"When I am asked about the mentors who have contributed to my scientific growth, Dr. Teresa Petrino-Lin is always the first person who comes to mind. I truly believe that if it had not been for her mentorship and support, I would not be where I am today,"* Bertina says. *"She played many roles in my life. She offered an ear when I needed support and she pushed me to take responsibility for my actions. Sometimes in life, you need someone to believe in you when you don't believe in yourself. She was that person for me so many times during my time in her lab. I will be forever grateful for who she was and what she brought to my life."* Her former student's quote captures the essence of who Dr. Petrino-Lin was, why we are fortunate to have known and worked with her, and will forever miss her.

Plenary Session

Low-Cost Microfluidic Devices for Biomedical Applications

Presented by

Waseem Asghar, PhD

Assistant Professor
Department of Computer & Electrical Engineering
and Computer Science
Department of Biological Sciences
Florida Atlantic University



The integration of medicine and technology at nano- and micro-scales offers tremendous opportunities for solving important problems in bioengineering, and enables a wide range of applications in diagnostics, therapeutics, and in vitro fertilization. Recently, a number of disease diagnostic assays have entered into the production phase. In this talk, I will cover the challenges and approaches to design smart biosensors with potential applications in HIV disease management, Zika testing, and in vitro fertilization. Novel cellphone based point-of-care (POC) devices and flexible microfluidic platforms will be discussed. Such platforms are used to explore optical, electrical, biophysical, and mechanical properties of biological targets.

Dr. Waseem Asghar is an Assistant Professor in the Department of Computer & Electrical Engineering and Computer Science and the Department of Biological Sciences (joint appointment) at Florida Atlantic University. He received his PhD in 2012 from University of Texas at Arlington. Dr. Asghar held postdoctoral appointments at Harvard Medical School and Harvard-MIT Division of Health Sciences and Technology, and Stanford School of Medicine. He has published more than 40 peer reviewed journal papers, over 35 conference proceedings, two book chapters, and two patents. He is a recipient of various international and national awards including Outstanding STEM Educator Award from The Engineers' Council (2018), Humanity in Science Award (2016), Faculty Mentoring Award (2015), and Nanofab Best Graduate Student Award (2012). He has also been awarded a few prestigious fellowships including the I-Engage Mentoring Fellowship and STEM Fellowship.

Barry University College of Nursing and Health Sciences

Clinical Biology

1. Accelerated Rehabilitation Protocol on Plantar Fasciitis

Alissa Bello and Zacharias Papadakis (Human Performance Laboratory, Department of Sport and Exercise Sciences, Barry University, Miami Shores, FL).

Accelerated rehabilitation protocol in patient diagnosed with plantar fasciitis who underwent a fasciotomy. Approximately 2 million people in the United States are treated yearly for plantar fasciitis. Depending on the severity of pain, the surgeon will advise surgery or not. Fasciotomy has a 95% success rate and rehabilitation is imperative resulting in a rapid recovery. Average recovery time is between 6-10 weeks. Accelerated rehabilitation protocols may reduce recovery time to 4-6 weeks. The patient underwent a fasciotomy that involved cutting part of the plantar fascia ligament to release tension on the ligament. Therapy began with wearing a boot for 2 weeks to avoid forceful impact on the fascia and at home rehabilitation involved ROM for the fascia such as ABC'S, dorsi-flexion and, plantar-flexion. Week 3 she began using a theraband to strengthen the fascia, body weighted exercises, and massage therapy on the gastrocnemius/soleus. At week 4, patient was almost fully recovered without any complications and she began jogging without any pain, just minor discomfort on the incision. Graston technique was used every other day to break down scar tissue on the incision that made a huge impact in her recovery. Mind to body exercises that involved understanding balance, control, and sensation of the foot were conducted establishing patient's confidence for return to play without the psychological effects of the injury. A total of 6 weeks of recovery time before the patient was cleared to begin normal activity. No psychological or physiological were noticed due to a constant support from her athletic trainers and her adherence to a physical therapy program.

Supported by the Department of Sport and Exercise Sciences, Barry University.

2. Differences in hip adduction and abduction ratio at two different angular velocities

Ana P. Castillo, Maria C. Herrera, and Tal Amasay (Department of Sports and Exercise Sciences, Barry University, Miami Shores, FL)

Groin injuries are common in sports such as soccer. These injuries are associated with quick change of direction or acceleration, and kicking. There is evidence that links decrease in adduction and abduction (Add/Abd) torque ratios as risk factors of groin injuries. The purpose of this study was to explore the relationship between hip Add/Abd torque ratio in college students at two different hip angular velocities, 30 deg/s and 60 deg/s. Thirty-two college students participated in the study, 14 males (2131 years, 81311 kg, 17636 cm) and 18 females (2232 years, 6235 kg, 16336 cm). Before the test, each participant did five minutes warm-up on cycle ergometer. Participants performed five repetitions of hip adduction and abduction using the Biodex, at the two velocities. For each movement, adduction and abduction, the three maximal peak torques were identified and averaged. Torque ratios were calculated for each participant at each angular velocity. Assuming equal variances paired t-test was used to identify differences between group means. The independent variables were leg used and angular velocity. The dependent variable was hip Add/Abd torque ratio. Significant higher ratios were observed during the 30 deg/s than in the 60 deg/s velocities for the left leg, 1.09 vs. 0.93 respectively ($p=0.008$). Same was observed on the right leg for 30 deg/s and 60 deg/s, 1.18 vs. 0.99 respectively ($p= 0.002$). No significant differences were observed between the right leg and left leg at each of the two velocities. At higher angular velocity the hip Add/Abd torque ratio decreased, which may assist in identifying who is at a higher risk for groin injuries.

3. Vestibular ocular reflex therapy to improve motion sensitivity in a patient diagnosed with severe vertigo and postural orthostatic tachycardia syndrome

Jose Lopez and Zacharias Papadakis (Human Performance Laboratory, Department of Sport and Exercise Sciences, Barry University, Miami Shores, FL)

Improve motion sensitivity in patient diagnosed with severe vertigo and Postural Orthostatic Tachycardia Syndrome (POTS) with vestibular ocular reflex therapy. POTS is a type of dysautonomia characterized by orthostatic intolerance resulting in a tachycardic response. Signs and symptoms include dizziness, motion sickness, chronic migraines, and heat intolerance. No direct treatment has been found for POTS. Multi-faceted management has been shown to decrease symptoms of POTS. Management includes medication (salt tablets, fludrocortisone, midodrine, pyridostigmine and/or beta blockers) alongside monitoring pulse and blood pressure, engaging in isometric exercise, modest walking, cardiac rehab, thigh high medical compression stockings, and body positional transitioning exercises. Patient participated in 5 months of VOR cancelation exercises alongside exercises for management of her symptoms: balance exercises, manual therapy, and light muscle strengthening. Patient's motion sensitivity was scheduled for reassessment using the Dizziness and Handicap Index (DHI) and a Patient Specific Functional Scale (PSFS) every four to six weeks. Results showed a decrease DHI score from 74% to 16% disability and an increase PSFS score of 10% to 80% function riding in cars.

Supported by the Department of Sport and Exercise Sciences, Barry University.

Barry University College of Arts and Sciences
Department of Biology

4. Nocodazole-induced growth inhibition of human leukemia cells is linked to downregulation of CAK molecules

Adrian Almeida, Jocelyn Baquier, and Tang Hu (Department of Biology, Barry University, Miami Shores, FL)

A cytoskeleton is present in the cytoplasm of all living cells. The cytoskeleton is composed of three different types of fibers: microtubules, microfilaments, and intermediate. The microtubules play an important role in a variety of cellular processes including maintaining cell structure and pulling chromosomes apart during anaphase. Nocodazole is an inhibitor of microtubule polymerization. Inhibition of microtubule polymerization by Nocodazole often lead to arrest of cells in G2 or M phase. However, it is unclear if any cell cycle regulatory molecules are involved in Nocodazole-mediated cell growth. In this study, we focus on CDK activating kinase (CAK). The CAK is composed of three subunits, CDK7, cyclin H, and MAT1. The cyclin H is regulatory subunit of CDK7 whereas MAT1 determines the specificity of CDK7. Addition of Nocodazole significantly inhibited the growth of MV4-11 and TF-1a cells in culture. The inhibitions were dose-dependent with maximal inhibition being observed at a concentration of 10 μ M of Nocodazole. Less than 1 μ M had no significant inhibitory effect on the growth of the cells, measured by XTT proliferation assay. Paralleled to the changes in the cell proliferation, expression of CDK7 and cyclin H were markedly decreased when Nocodazole were added to TF-1a and MV4-11 cells at concentrations of 5 and 10 μ M. Similarly, Nocodazole at concentration of 10 μ M downregulated the phosphorylation levels of CDK7 and the expression of RNA polymerase II in TF-1a cells. However, Nocodazole had no effect on the expression of MAT1, suggesting that Nocodazole did not interfere with specificity of CDK7. We also found that Nocodazole had no effect on the expression of β -actin, a non-muscle cytoskeleton actin.

Supported by 2017-2018 Faculty Stimulus Grant.

5. **Effect of epicatechin gallate on the growth of human myeloid leukemia cells and the expression of CDK activating kinase**

Gabriela Alvarez and Tang Hu (Department of Biology, Barry University, Miami Shores, FL)

Green Tea is the most widely consumed beverage in the world and is the major source of antioxidant polyphenols. The four major polyphenol catechins found in green tea are (-)-epigallocatechin gallate (EGCG), (-)-epigallocatechin (EGC), (-)-epicatechin gallate (ECG), and (-)-epicatechin (EC). Currently, most of the studies on the biological activity of green tea polyphenols focus on the EGCG, with both stimulatory and inhibitory effects on cancer cells being reported. Our previous work shows that EGCG had no effect on the expression of G1 cyclin-dependent kinases (CDKs) but regulates pRb-CDK complexes. In this study, we examined whether ECG has similar effect on the growth of human myeloid leukemia cells and whether CDK activating kinase (CAK) plays a role in this effect. The CAK is an enzyme complex that can activate all CDKs and is essential for G1 and G2 CDK activities. CAK is composed of three subunits, CDK7, MAT1, and cyclin H. The CAK family is known to be an important regulator of cell cycle progression. Addition of ECG to MV4-11 and TF-1 cells significantly inhibited the growth of the cells evidenced by decreased cell numbers, increased dead cells (cell debris), and disruption of cell structure observed under inverted microscope. The inhibition is dose-dependent with an initial inhibition being observed when 60 μ M ECG applied to the cells and reached to maximal inhibition at the concentration of 250 μ M ECG. However, ECG at the concentrations we tested had no significant effect on the expression of CDK7, pCDK7, and MAT1. In future, we will investigate if ECG at a higher concentration could affect the expression of CAK family proteins.

Supported by 2017-2018 Faculty Stimulus Grant.

6. Epicatechin inhibited growth of human myeloid leukemia cells but had no effect on the expression of CAK

Beatriz Alvarez and Tang Hu (Department of Biology, Barry University, Miami Shores, FL)

The health-promoting effects of green tea are mainly attributing to its antioxidant polyphenols including (-)-Epigallocatechin gallate (EGCG), (-)-epicatechin gallate (ECG), (-)-epigallocatechin (EGC), and (-)-epicatechin (EC). Currently, most of the studies on the biological activity of green tea focus on the EGCG. By using factor-dependent cancer cell lines as research models, both inhibitory and stimulatory effect of EGCG on cancer cells have been reported, which is linked to receptor tyrosine kinase signaling. In addition, the involvement of cell cycle dependent kinases (CDKs) have also been reported. However, our previous studies indicate that EGCG had no effect on the expression of G1 CDKs in human myeloid leukemia cells. In this study, we investigated whether EC stimulates or inhibits the growth of two myeloid leukemia cell lines and the expression of CDK-activating kinase (CAK). The CAK is an enzyme complex that is composed of three subunits, CDK7, MAT1, and cyclin H. Addition of EC to MV4-11 and TF-1 cells significantly inhibited the growth of the cells evidenced by decreased cell numbers, increased dead cells (cell debris), and disruption of cell structure observed under inverted microscope. The inhibition is dose-dependent with an initial inhibition being observed when 100QM EC applied to the cell culture and reached to maximum in the presence of 1000QM EC. However, application of EC up to 1000QM had no any effect on the expression of CDk7, pCDK7, and MAT1 in both MV4-11 and TF-1a cells. Our data show that EC inhibited growth of the human myeloid leukemia cells in culture, but this effect is not linked to the expression of CDK and CAK molecules.

Supported by 2017-2018 Faculty Stimulus Grant.

7. Antibiotic and anti-biofilm activities of acetic acid and honey

Caomie Archelus, Miguel Belaunzaran, Samantha Britz, and Brenda Schoffstall (Department of Biology, Barry University, Miami Shores, FL)

Biofilm is an accumulation of multicellular and sometimes multi-species microbial mass embedded in polysaccharide matrix with adhesive abilities. Complex biofilm has remarkable ability to impede normal immune responses and aggressive anti-microbial medical interventions, leading to difficulties in treating infections of wounds, heart valves, bone tissue, and the oral cavity. Acetic acid and honey have both been identified as natural substances that appear to possess anti-biofilm properties, but it has not been clearly established whether this action is that of an antibiotic (targeting bacterial reproduction) or an anti-biofilm (targeting the polysaccharide matrix) property. In our current investigation, we have tested acetic acid and Miami raised honey using *in vitro* biofilm growth techniques to gain further understanding of the potential for prevention of biofilm formation and/or eradication using these natural substances. We used a robust biofilm-forming strain of *Staphylococcus epidermidis* (RP62A (WT)) and compared *in vitro* treatment responses to non-biofilm forming strains of *Staphylococcus epidermidis*. Low concentrations of acetic acid effectively prevent biofilm formation when applied to planktonic bacteria prior to overnight incubation. Both forms of Miami honey tested (uncapped and capped) appear to have some ability to prevent biofilm formation prior to overnight incubation. At high concentrations, Miami honey appears to have biofilm eradication capabilities comparable to that of acetic acid. This observation suggests promise for use of Miami honey as a compound to control or eradicate established biofilm infections. Future investigations will examine the possibility of a synergistic effect when acetic acid and honey are used in combination.

8. Personality in fruit flies: exploratory flies exhibit flexible laterality

Michelle Gonzalez, Ariana Villarroel, Ryan Napolillo, Binta Sabane, Sharon Sanchez, Joselin Hernandez, Madeline Schoffstall, Ashley Sosa, Tatianna Fox, Yanaivi Roque, Jennie Cochez, Ariane Leconte, Myrlande Desulmat, Waiverly Lablue, Jasmine Ferguson, Libertad Gonzalez, Thaj-Lien Armstrong, Alexia Craig, Diego Aldunate, and Michael Robinson (Department of Biology, Barry University, Miami Shores, FL)

Personality is when individual animals maintain behavioral differences across circumstances. In Y-mazes many fruit flies (*Drosophila melanogaster*) prefer to turn left or right, although many have no preference. We tested if switching was a result of an exploration-biased personality. We used Y-mazes and scored flies with an index of turn consistency (ITC) (i.e., 0 = equal number of left- and right-turns; 1 = always turned the same way). Most flies had a small preference for turn direction (i.e., $ITC > 0$: mean \pm 3SD = 0.490 \pm 0.401; one-sample t-test: $n = 76$, $p < 0.001$). In the second step we observed flies in a petri dish for five minutes. The dish was divided into a circular grid with eight sections. We recorded how many sections were visited in five minutes and when flies visited all sections, how long it took. Flies that varied their turns more also explored more. There was a negative correlation between ITC and the number of sections visited ($r = -0.455$, $n = 76$, $p < 0.001$) and a positive correlation between ITC and the time to move visit all eight sectors ($r = 0.608$, $n = 18$, $p = 0.008$). We conclude that flies that are more flexible in their turn behavior also explore more of new environments and do so more quickly. This is consistent with certain flies having a broader personality of investigative behavior.

Funding was provided by the NIH-NIGMS MBRS RISE: R25 GM059244-18 awarded to Barry University.

9. The effects of SNF5 on pluripotent stem cells

Ariella Gordon¹, Ilana Carmel-Gross², and Achia Urbach² (¹Department of Biology, Barry University, Miami Shores, FL; ²Bar Ilan University)

In 98% of Rhabdoid tumors, an aggressive pediatric tumor of the kidney or the brain, SNF5 depletion is the sole genetic aberration. The smallest changes in external and internal signals can start signal transduction in these cells, which eventually will lead to changes in transcription and epigenetic factors that control the balance between self-renewal and differentiation of pluripotent stem cells. One of the epigenetic factors in cells is the SWI/SNF complex, an ATP dependent chromatin remodeler. The aim of this project was to study the effects of the SNF5 gene on cell differentiation to better understand the inhibition or reversal of Rhabdoid tumors' growth. By using embryonic stem cells with conditional SNF5 knock-out, the cells' morphological changes and gene expression were observed. Additionally, doxycycline was removed from knock-in knock-out cells (KIKO). Doxycycline is an antibiotic inhibitor of SNF. SNF5 expression is depleted when doxycycline is removed from KIKO cells. These cells also curiously detached from the plate. We investigated whether the detachment was a result of differentiation or the cause of it. We hypothesized the differentiation is a result of the detachment. We performed numerous experiments, with the aid of real time PCR, in order to analyze various genes involved and effected by SNF5. A specific gene being analyzed, LOXL1 shows a slight decrease in the KIKO cells without doxycycline. This decrease suggests there is first detachment, which then allows for signal transduction, causing differentiation. Continuing in this direction, new cells are being used with a longer time frame in order to confirm the hypothesis. This project can significantly contribute to the understanding of tumor differentiation mechanisms and preventions.

Supported by the Summer Science Research Internships for Yeshiva University Students at Bar-Ilan University.

10. Antimicrobial mechanisms of trimetazidine inhibition of intracellular *Mycobacterium tuberculosis*

*Llona Kavege*¹, *Pallavi Chandra*², and *Jennifer Philips*² (*Department of Biology, Barry University, Miami Shores, FL; ²Washington University in St. Louis School of Medicine*)

Mycobacterium tuberculosis (Mtb) is responsible for tuberculosis (TB), an infection that primarily affects the lungs. Active TB is the leading infectious disease killer with 1.5 million deaths every year. To exacerbate the matter, the emergence of multi-drug resistant TB has put a strain on modern treatment methods. *M. tuberculosis* is a successful pathogen because it can grow in macrophages, immune cells that usually kill bacteria. This project explores a recent treatment avenue to fight TB using host directed therapies (HDTs); a strategy that targets host proteins to augment host immune responses. The Philips laboratory discovered that inhibition of macrophage fatty acid oxidation (FAO) restricted growth of intracellular Mtb. Treatment with the clinically approved small molecule inhibitor trimetazidine significantly reduced Mtb infection in murine macrophages. Interestingly, it was determined that FAO inhibition was reliant on autophagy. The purpose of this project was to elucidate the pathways through which trimetazidine activates autophagy during FAO inhibition. We tested this by quantifying autophagy flux and phosphorylation of markers of autophagic activation in murine macrophage cells treated with trimetazidine. In addition, we monitored cellular levels of host metabolites such as ATP. Our preliminary results indicate that a decrease in ATP levels in trimetazidine treated cells might be contributing to autophagic induction. Once activated, autophagy results in the elimination of the intracellular Mtb. In conclusion, this project provides essential insight on the pathways activated by host macrophage FAO inhibition mediated by trimetazidine. Once its anti-microbial mechanisms are fully elucidated the use of trimetazidine as a host directed therapy for tuberculosis will aid in developing more effective treatments to tackle resistant forms of the infection.

Supported by the Amgen Scholars Program through the Division of Biomedical and Biological Sciences at the Washington University in St. Louis School of Medicine.

11. Determining the role of mGlu1 receptors in modulating cortico-striatal plasticity

*Lilyveth Mesa*¹ and *Daniel J. Foster*² (*Barry University, Miami Shores, FL; ²Vanderbilt University, Nashville, TN*)

The motor cortex plays a key role in influencing action selection, cognition, and motor learning. The striatum is the main input structure of the basal ganglia and receives projections from several cortical areas, including the motor cortex. Group 1 metabotropic glutamate receptors are highly concentrated post-synaptically in the central nervous system and play a prominent role in facilitating synaptic plasticity. Cortico-striatal synaptic pathology is implicated with diseases in which motor learning and control are compromised such as Alzheimer's disease, Huntington's disease, and Parkinson's disease. We hypothesized that the mGlu1 receptor plays a key role in modulating motor learning plasticity due to a previous study performed in which wild-type mice treated with an mGlu1 PAM outperformed the control group on a rotarod skill test over a five-day training period. To decipher the sub-type specific effects of the mGlu1 receptor on long-term synaptic plasticity of cortico-striatal signaling, optogenetic strategies combined with electrophysiological approaches were utilized to selectively analyze signaling between the motor cortex and striatum in acutely prepared rodent brain slices. In addition, novel pharmacological tools that selectively block or potentiate mGlu1 and mGlu5 signaling were used to determine the function of these receptors in regulating cortico-striatal communication. Preliminary data showed that mGlu1 blocks the LTD-inducing effects of DHPG while mGlu5 did not impair LTD after application of this compound to the striatum. These data indicate that the mGlu1 receptor indeed may have a prominent role in modulating plasticity of cortico-striatal signaling. Collectively, these studies will advance our understanding of how the mGlu1 receptor alters basal ganglia function and help elucidate the potential utility of compounds targeting this receptor in treating diseases associated with dysregulated cortico-striatal circuitries.

12. Finding the achilles heel of tumors driven by dysregulated ras signaling

Michaela Reyes¹, Jewelia Durant², Stephanie Bouley², Robert Allaway², and Yolanda Sanchez²
(¹Department of Physical Sciences, Barry University, Miami Shores, FL; ²Geisel School of Medicine, Dartmouth College, Hanover, NH 03755)

Neurofibromatosis type 1 is a disease caused by a mutation of neurofibromin 1(NF1). The deletion of the gene results in hyperactive Ras signaling and an increase in cell proliferation. Finding a therapeutic option that can specifically target NF1-deficient tumors would significantly advance our ability to treat sporadic cancers. Our group set out to discover modernistic small molecules that target tumors with NF1 deficiency. *Saccharomyces cerevisiae* is our ultimate screening platform to identify synthetic small molecules that are lethal to cells with NF1 deficiency. In previous research, our group developed and conducted a high-throughput synthetic lethality screen in hopes of discovering molecules that selectively target yeast lacking IRA2, the homolog of NF1. We have identified several lead contenders. A lead candidate known as isoxazoloanthrone Y100 was identified. In the present study, we explore the molecular mechanisms by which Y100 inhibits cell growth or induces cell death in *nflΔ*-deficient yeast and tumor cells. We hypothesize that Y100 and molecules with related mechanisms of action represent a feasible therapeutic strategy for targeting NF1-deficient cells. A cellular thermal shift assay was performed to find potential proteins that bind to Y100 and increase the efficiency of the molecule. Eleven proteins were identified as potential targets. One of these proteins that was examined more closely was PFKB3. Upon investigating the properties of PFKB3 more closely, a known inhibitor, PFK15, was identified. The molecular mechanisms for both Y100 and PFK15 were explored using molecular biology techniques. Our results suggest that Y100 and PFK15 do have similar expression profiles and validation of these findings are still being obtained.

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13. Coconut oil inhibits biofilm formation in two distinct isolates of *Staphylococcus epidermidis*

Sabrina Rodriguez, Genesis Muñoz, Leticia R. Vega, Christoph Hengartner (Department of Biology, Barry University, Miami Shores, FL)

Biofilm formation is a survival mechanism that bacteria have evolved to adapt to host defense systems and harsh environmental conditions. Bacteria in biofilms can exhibit new characteristics and properties, such as increased antibiotic resistance, increased resistance to environmental stresses, increased adhesion to surfaces, and increased pathogenicity. As such, biofilm research takes on great medical importance. A crucial component of biofilms is the polysaccharide matrix that allows adherence of bacteria to surfaces, including medical devices. *Staphylococcus epidermidis* is a bacteria commonly found on human skin that can cause opportunist infections in hospitalized patients. *Staphylococcus epidermidis* isolates exhibit large differences in their biofilm forming capabilities. Previously, we developed qualitative and quantitative methods to analyze biofilm formed in static cultures of *Staphylococcus epidermidis*. Here, we report on the biofilm forming properties of 2 clinical isolates of *S. epidermidis*, RP62A and 1457. We determined that RP62A forms over 3X more biofilm than 1457 in our assay. Next, we examined the biofilm-inhibiting properties of natural oils. Our studies show a statistically significant inhibitory effect of coconut oil on biofilm formation on both isolates tested. The coconut oil's effect on bacterial growth will also be reported. The strong biofilm reduction in the RP62A strain could be used to identify compounds and conditions that reduce or disrupt biofilm formation. Such assays could help identify critical compounds and factors that limit the bacterial biofilm formation of pathogens.

Barry University College of Arts and Sciences

Humanities and Social Sciences

14. The relationship between African syncretic theology in literature and activism in the New World

Michidael Ceard (Honors Program, Major: English, Barry University, Miami Shores, FL)

African syncretic theology is a belief system where African traditional mythology is interwoven with Christian beliefs. These monotheistic religions that adhere to this theological doctrine are known as Africana religions and include the religious traditions of African and African Diasporic peoples as well as religious traditions influenced by the diverse cultural heritage of Africa. These religions in the western world include the practice of Haitian Vodou, Cuban Santeria, and Brazilian Candomblé. In literature, the beliefs upheld by religions adhering to African syncretic theology are highly correlated with the spiritual and physical liberation of oppressed groups and peoples. Sometimes characterized as “black magic,” the effects of its usage are presented positively through various literary texts. Popular authors such as Marys Conde, Toni Morrison, Alex Haley, and Edwidge Danticat explore elements of African syncretic theology through their texts. In these works, thematic elements relating to action, growth, and freedom are always intertwined. In this research, the goal is to examine relationship between the beliefs of these religious groups in the New World in hopes of affirming the correlation between liberation and African syncretic theology in African diaspora literature. A close analysis will be conducted on the beliefs that can sometimes be scattered, in order to gauge the specific effects on the practicing groups’ history, current actions, and understandings. The five books *Krik Krak* by Edwidge Danticat, *I, Tituba, Black Witch of Salem* by Marys Conde, *Segu* by Marys Conde, *Roots* by Alex Haley, as well as *Paradise* by Toni Morrison will be used to conduct this research as other primary and secondary sources are also used to understand the effects of practicing African syncretic beliefs on activism and liberation in the New World.

15. Does dystopian fiction promote or criticize the oppression of women by upholding societal norms

Johania Charles (Honors Program, Major: English, Barry University, Miami Shores, FL)

Dystopian fiction can be described as a genre of fiction that depicts extreme forms of government structure. A dystopia is the opposite of a utopian society in which everything is perfect. In this altered dystopian reality, injustice becomes common. Considering the level of influence literature has been known to have, this research is centered on whether dystopian fiction influences empowerment in the way the text upholds or criticizes gender norms. Four texts have been selected to determine the relationship between dystopian fiction, women and empowerment. The texts are *The Handmaid’s Tale* by Margaret Atwood, *The Power* by Naomi Alderman, *The Uglies* by Scott Westerfield and *Only Ever Yours* by Louise O’Neill. Each text chosen, contains female protagonists living in a society where women are oppressed in one way or another. Textual analysis is the selected method for data collection. The texts are analyzed using a feminist literary criticism approach. The depiction of female characters and plot development is used to reveal certain themes relevant to issues women face in society. *The Handmaid’s Tale* by Margaret Atwood explores the issue of rape, domesticity and the perception of the female body as means of reproduction. *The Power* by Naomi Alderman focuses on ways women are forced to take justice into their own hands because of a failed justice system. It is centered around the “take back the night” movement that demands action against sexual harassment and violence. *The Uglies* by Scott Westerfield addresses societal standards of beauty through a society where women are ugly and cosmetic surgery becomes ideal. *Only Ever Yours* by Louise O’Neill shares a similar message. Women in this environment are created for the pleasure of men.

16. The pivot of modern slavery

Dainely Fabregas (Honors Program, Major: Sociology, Barry University, Miami Shores, FL)

Throughout the globe, sex trafficking affects the most vulnerable and innocent victims. This modern-day slavery is the third largest billion-dollar industry. This violation of human rights overwhelmingly enslaves women and children depriving them of their humanity. Like a business, supply and demand create a need for this industry. While policies and legislation have been set in place to target and combat sex trafficking, the execution of such policies is insufficient. An area of issues that is usually neglected is the relationship between the health and mental state of victims of sex trafficking. This research aims to acquire information about victims, “consumers” that perpetuate this heinous business. Currently, inter-linked organizations engage with victims of sex trafficking within the state of Florida. As a result, this research aims to primarily ethnography. The Glory House of Miami mission is to ensure the safety and rehabilitation of victims. Furthermore, the purpose of this research is to examine mental health among victims. The research ultimately aims to argue the benefits of training opportunities. My research methodology involves a cross-analysis study that evaluates common patterns and observes details upon conversation and interaction. Information deduced would then be transferred to data that would be used to classify patterns based on demographics and racial ethnicity. Therefore, this can be served as a benchmark for law officials or others willing to further this study to create a sustainable solution in the long run. Implementing my attained knowledge to my field of study in order to establish a socio-economic environment among this dilemma, we must start with an initiative and then continue to create a solution.

17. Platform-K solutions simplified & verified

Stefan Jugmohan (Honors Program, Major: Finance, Barry University, Miami Shores, FL)

Platform-K is an upcoming application aligned to merge solutions, less fortunate individuals, and society. Currently being developed, the platform has a mission to democratize the verification process by enabling victims, prospective volunteers and donors to make their best decision based on their choice of shelter or aid through public reviews, credentials and a verified stamp. All local NPOs, NGOs and sources of aid will be loaded into Platform-K in a listing format. However, only few will receive a verified stamp next to the organization's listing on the platform based on the review and approval of their incorporation documents, financials and other relevant documentation. An official panel of professionals such as lawyers, accountants and community leaders will be created to approve verification requests by organizations listed on the platform. The “K” refers to a homeless man named Kenneth who was mistreated for a disease and left on the streets due to a lack of solutions. As a result, he died within a few days due to negligence. Statistics and reports have proven that numerous non-profit and non-governmental organizations misuse monetary donations for ulterior motives. This was the fulcrum on which Platform-K was conceptualized. An impenetrable application to promote accountability, transparency and fairness. Users will be enabled to filter through organizations within a couple seconds based on geographic location, demographics, reviews and numerous similar components that will aid in a user's best alternative possible whether they choose to donate, volunteer or enroll into one of these organizations. As stated by the founder, “through a few clicks, we can revolutionize philanthropy by implementing measures to promote security, accountability and transparency; all merged into one platform.” Access to the platform will be free to users. The beta testing phase is scheduled to launch on May 10, 2019, and will be accessible to chosen participants only.

18. Transplant ethics committee: role and approach toward ethical assessment of living organ donation

Llona Kavege¹ and Teck Chuan Voo² (1Department of Theology and Philosophy, Barry University, Miami Shores, FL; 2National University of Singapore, Yong Loo Lin School of Medicine, Centre for Biomedical Ethics)

Living donor donations (LDDs) are an alternative to the shortage in cadaveric organ donations in order to supply viable organs for persons suffering from End Stage Kidney Disease or End Stage Liver Disease. In 2012, World Medical Association guidelines established that the primary motivations behind LDDs should be altruistic, benevolent, just, and equitable. Furthermore, such motivations should not be undermined by financial incentives or other pressures. Potential flag-raising concerns in LDDs include crippling power dynamics, a lack of informed consent, and duress. In Singapore, the LDD process includes a medical evaluation and investigation of the potential donor by a transplant team in order to ensure they are mentally fit and able to provide informed un-coerced consent. The final step of the process is an assessment by an independent transplant ethics committee (TEC). The TEC is the gatekeeper of the Singaporean LDD process however, the extent of its role and the appropriate assessment methods have not been precisely defined and have left room for subjective judgements and a discrepancy in past rulings. The purpose of this project was to analyze and define the role of a TEC in the LDD process and design a framework to guide the donor assessment process. We identified key factors and stressors that TEC assessments should focus on and developed a three-pronged model consisting of a verificative, interrogative and facilitative approach. Ultimately, our goal is to use this model to enhance donor welfare and develop a method that can be standardized for the majority of TEC assessments.

19. America's newest phenomenon: Financial illiteracy

David Rodriguez (Honors Program, Major: Management, Barry University, Miami Shores, FL)

Financial illiteracy is the newest phenomenon, and nobody seems to be aware of it. Most financial experts assumed that following the tragic 2008 recession, Americans would be more cautious regarding their personal finances. Researchers have found that Americans are more or less in the same situation financially than they were before. How can this be? In the country of freedom and opportunity, known for its economic prowess, the citizens are practically clueless to basic financial principles. There are a couple of theories as to why this is happening, some being as outrageous as the government wanting to keep the population unaware to placing the responsibility on the individual and their indifference towards the subject matter. It may be possible that the financial institutions do not want the common American to become aware of basic financial principles. America's educational system is also partly guilty for not stressing the importance of being financially competent upon entering the "read world." A study was recently conducted and its findings revealed that two-thirds of Americans could not pass a basic financial literacy test. The number is down five percentage points since 2009. People work extremely hard and still find themselves struggling financially. This should not be the case when there are so many people and institutions that are willing to help. Another study's findings indicate that 18% of Americans are spending over their household income, 21% have past-due medical bills, and 32% pay the minimum balance on their credit cards. There is a common theme among these statistics; and it is debt. This paper examines a new social phenomenon, debt as a form of financial cancer. The goal of this paper is to also provide practical solutions and serve as a diagnosis to this financial cancer.

Barry University College of Arts and Sciences

Department of Mathematics and Computer Science

20. The effect of early immersion in computer science on underrepresented middle school girls via a summer outreach coding camp

Terrence Chan, Sabrina Meli, Sandra Armstrong, Sanja Zivanovic
(Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

An unequitable access to computing technology leads to a digital divide. Young girls' perceptions of technology are impacted by socioeconomic status and stereotypes which can affect their computing self-efficacy and interest in pursuing a career in computer science. To address the issue in Miami, Florida, Barry University conducted a two-week summer coding camp (SuCCess) in June 2018. The camp participants were underrepresented middle school girls in the Miami-Dade area. The camp curriculum consisted of the fundamentals of coding; logic, loops, and statements. The participants utilized Scratch, a game-based program developed by MIT, designed for ages 8-16. The girls were placed in groups with different levels of expertise and collaboratively created a socially aware game in reference to issues within their community. Each girl was given a leadership role within the group to empower their strengths and encourage an increase in self-efficacy in computer science. Survey instruments were implemented to gather data with regard to computer science interest levels before and after the camp. Additional data collected included experiences, future expectations, and sense of competence. Parent feedback was collected at the end of the program to gain a parental perspective of the participants' interest in the camp and to further pursue coding. The empirical data collected will gain insight by which to create programs to address the digital divide.

21. A course schedule planner

Matthew Chiarella and James Haralambides (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

Currently, students spend a great deal of time ensuring their courses are in order. They can retrieve their transcripts from Web Advisor but tracking their undergraduate progress, credits, and course requirements is ultimately up to them. Consequently, a tool to plan their academic career would take a great deal of headache away from already stressed students and may even save them time and money. The main goal of the Schedule Planner is to retrieve a student's transcript, compare registered and passed courses against degree requirements, and formulate a viable schedule based on user-defined criteria. The designed application is a prototype and only includes selected majors, being that every major requires different courses and each major has many exceptions and equivalencies per course. It aims to provide users with a potential course schedule that they can then discuss with their advisor. Program parameters include load balance across course categories such as core courses and general education courses, weekly course distribution, and daily course schedule span by identifying time gaps between courses. Students may place a relative weight on the parameters indicating their preferred course schedule characteristics. Working students, for example, may opt for a shorter daily time span while commuters may opt for tighter weekly schedule distributions. The program could potentially warn users that their semester looks light on course load, or that the selected courses are not an optimal match. Ideally, the program will work on portable devices, such as cellphones, as well as on desktop computers. However, the graphical user interface and some programming features may be different on the mobile version. The Schedule Planner will attempt to be as user friendly, interactive, and effective as possible to encourage students to take control of their own academic future.

22. An auto-academic scheduler

Jose Gomez and James Haralambides (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

The Auto-Academic Scheduler is an application that pieces together voice-interactive functionality, data analytics, and powerful logistics with student transcripts to provide students with a comprehensively reliable and dissolute advisee experience. The application profiles students by their transcript information, pursuing degree, and academic decisions. The transcript gives the program an in-depth overview of what students accomplished during their time in college. In doing so, it obtains sufficient information to predict their academic potential. Students can view a degree-specific audit of their transcript, view a course catalog specific to their needs, and run a schedule building service that seeks to meet their immediate demands. The degree audit grants clarity in viewing the transcript by means of subject categorization for course groups such as general education courses, core courses, specialization courses, co-requisites, courses in the minor, etc. In addition to this auditing service, the application provides a detailed course listing that identifies complete as well as incomplete subject categories. For the latter, it enlists all possible courses that may satisfy the missing credits per subject category. Students that wish to build a course schedule could proceed to the scheduling service. The scheduling service asks students a series of meaningful questions pertaining to their immediate preferences or needs toward the upcoming semester. Depending on how students answer these questions, and in combination with historical data retrieved from the transcript, a series of patterns detected in previous schedules, and the university's course offerings for the semester to come, the program formulates a collection of plausible schedules for the students, and displays them in full detail. In just minutes, students are able to comprehend their transcript, strategize toward their future, and have a fully authentic and actualized schedule for the next semester ready to go.

23. Additive technology: 3D printed corrective eyewear

Ironelly Ozuna Hernandez, Mary Jane Franco (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

People with visual impairment face various problems in their daily life, as the modern assistive devices are often not meeting the consumer requirements in term of price and lifetime. The average price for eyeglasses ranges from \$159 to \$500, but with 3D printing, the price is reduced by 92%. This project presents a new design of assistive 3D glasses for visually impaired people. The objective is to assist in multiple daily tasks using the advantage of wearable design format. The design of the glasses allows customizing each individual's glasses to fit their needs. The project presents only the frame part of the glasses. The building cost is low and the building time is low as well. Experiment results demonstrate that the prototype is working as intended.

24. Embedded image steganography

Kyle Lothian and James Haralambides (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

We are designing an application that will securely and automatically send a steganographically hidden image to a user-selected email address. The application is embedded on a Raspberry Pi 3b+ board equipped with a 1.4 GHz 64-bit Quad-Core Processor, 1 GB of RAM, and 2.4/5 GHz dual band wireless LAN. An additional 16 GB of storage is provided by a micro SD card connected through the board's USB port. The image is initially generated using a 5 MP mini camera video module connected to the board. Our algorithm encrypts the smaller, guest image into a larger, host image using secure image steganography. A Linear Feedback Shift Register (LFSR) is employed to introduce randomness to the process of encrypting bit information of the guest image to pixels of the host image. Pixel alteration in the host image is minimal and not visually detectable. The encrypted image is compressed using non-loss compression mechanisms to reduce transmission delays while at the same time preserving its original bitmap structure. Image transmission to a user-specified email address is facilitated by the integrated Wi-Fi component on the board. The embedded design can be used in a variety of applications including the secure transmission of personal data such as the transmission of medical images, in document authentication techniques such as digital watermarking, and the secure incorporation of metadata information within media files, especially in cases these are stored in large media databases. While steganography is not the most secure layer of protection on its own, it does add a certain comfort to know that your data is not entirely exposed. In the future, more advanced encryption techniques may be implemented through the Raspberry Pi kit, making embedded image steganography a solid and secure portable application module.

25. Different Approaches to Solving the Basel Problem

Melody Williams, Brittany Reynolds, Kerri Richardson, Tracey Presume and Lubomir Markov (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

Several solutions to the famous Basel Problem are considered, including the original one given by Euler in his 1734 paper "De Summis Serierum Reciprocarum". Of particular interest to us are a group of modern solutions which reduce the problem to an evaluation of a double integral via a change of variables. Probably the shortest such solution is suggested by Kalman in his paper "Six Ways to Sum a Series" in the *College Mathematics Journal*, Volume 24, 1993. We study Kalman's solution carefully and supply all the steps that have been omitted by the author.

26. A Mathematical Model to Minimize the Cost of a Healthy Meal Based on Food Ingredients Available in Florida

Kerri Richardson, Tracey Presume, Jai N. Singh (Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

According to an estimate of the [United Nations Food and Agriculture Organization](#) (FAO), approximately 815 million of the 7.6 billion people in the world are suffering from chronic undernourishment. There are approximately 11 million people undernourished in developed nations as well. In this paper, we present a mathematical model (A Linear Optimization (LO)/Linear Programming (LP) model) to select a set of food items that will satisfy a set of the daily nutritional requirement at the minimum cost. In this model, the objective is to minimize cost and the constraints are to satisfy the specified nutritional requirements for a 2,200 calories meal.

27. Printing movement: 3D printed exoskeleton hand to aid in rehabilitation

Melody Williams and Mary Jane Franco (Department of Match and Computer Science, Barry University, Miami Shores, FL)

Within the field of rehabilitation, exoskeletons have become a tool to aid in increasing life functionality after physical trauma. In designing exoskeletons of any kind, there are factors that must be recognized to assure best possible application usage. In the construction phase, factors such as safety, durability, cost and fit are some aspects that are considered. Factors in the phase of physical health include type of trauma, weight, level of limb function and amount of activity to be achieved. Exoskeletons are currently in use to resolve certain limitations with rehabilitation and to elevate the benefits that physical rehab already provide. Unfortunately, there are still limitations in existence that hold back exoskeletons from being applied clinically and its availability to those who greatly could be of use to them. In this research, the limitations of exoskeletons and how 3D printing can potentially help in dissolving these limitations will be highlighted and further elaborated. Upon the ending of this project, a prototype of an exoskeleton hand was printed. The hand indeed demonstrated the lessening of the limitations of cost, wearability and complexity. With further progress of this project, an ability to change the resistance provided by the elastic bands will be implemented as well as engraving within the joint segments to represent the order of assembly of the hand. Using 3D printed exoskeletons with the advancement of computer technologies can have huge potential to completely change the field of medical rehabilitation, but more trials using 3D printing will have to be done to confirm their use in clinics and in homes.

Barry University College of Arts and Sciences

Department of Physical Sciences

28. Teaching electric circuits and fractals to children. New approaches and ideas

Samantha Britz¹, Maurizio Giannotti¹, Llona Kavege¹, Lilyveth Mesa¹, Tracey Presume², Brittney Reynolds², Kerri Richardson² and Sanja Zivanovic² (¹Department of Physical Sciences, Barry University, Miami Shores, FL; ²Department of Mathematics and Computer Science, Barry University, Miami Shores, FL)

We discuss new ideas to teach elementary school students about currents, electric circuits, and fractals. For example, we use the analogous of cars moving on a busy road to describe currents, tunnels to describe resistors, and toothpicks and marshmallows to build mathematical objects known as fractals. This analogy allows understanding easily and in an intuitive way certain advanced properties of electric circuits such as series and parallel of resistors and develops deeper appreciation for mathematics through beautiful geometric figures that involve in time. We have used this approach in a recent event with the students of the North Miami Elementary (NME) School.

29. The effects of cross-linkers on the separation of organo-silica monoliths

Audreena Ingham and Zuzana Zajickova (Department of Physical Sciences, Barry University, Miami Shores, FL)

This review evaluates the effect of various cross-linkers on column performance of monolithic stationary phases, which are applied as highly porous separation media in high performance liquid chromatography (HPLC). The high porosity maximizes the diffusional mass transfer and column permeability. Therefore, the greatest advantage of monoliths is the ability to separate a mixture of compounds with low resistance to hydraulic flow. Consequently, this allows for fast separations at high flow rates without the high-pressure requirement. Amid two major kinds are inorganic, silica-based or organic, polymer-based monolithic columns. Traditionally, polymer-based stationary phases are utilized for separation of large molecules, while silica-based are more suitable for small molecules. More specifically, the effect of polarity and size of cross-linkers on the separation performance of polymethacrylate-based monoliths is considered in this review. Typical mixtures for monolith preparation consist of a monomer, a cross-linking monomer, an initiator, and a porogen-forming solvent(s). The resulting monoliths with cross-linked polymers are mechanically stable, resistant to heat and attack by solvents. The hybridization of cross-linkers affected monolith's porosity and retention properties. Column efficiency of small analytes improved significantly with increasing number of repeat non-polar methylene groups in the cross-linker molecules. This can be attributed to a formation of higher proportion of small pores. On the other hand, cross-linkers with higher polarity produced monoliths with an increase in pore size. Furthermore, the efficiency of monolithic columns for polar low-molecular compounds was shown to depend rather on the polarity than on the size of the cross-linker molecules. The advancement and research done on monolithic columns would aid in faster analysis, which would be of interest to high-throughput environments such as pharmaceutical, food and agricultural industry.

30. Synthesis of potent and functionally selective dualistic muscarinic antagonists as therapeutic agents for the treatment of neurological and peripheral disease states

Emily Londono, Chelsea Martin, John Boulos (Department of Physical Sciences, Barry University, Miami Shores, FL)

Muscarinic receptors are known to play important biological roles and are drug targets for several human diseases including Parkinson's or chronic obstructive pulmonary disease. Muscarinic receptors are widely distributed throughout the body with five subtypes known as M₁ – M₅. Novel long acting muscarinic antagonists are being synthesized and will be tested for biological activity in Chinese hamster ovary (CHO) cells expressing individual subtypes of muscarinic receptors. Muscarinic antagonists can block either the orthosteric or allosteric sites of these receptors, thus preventing the binding of the endogenous neurotransmitter acetylcholine. Dualistic antagonists, on the other hand, block both receptor sites simultaneously with both higher potency and receptor selectivity to elicit distinct signaling profiles. The design of these ligands made use of current orthosteric (direct binding to the protein binding site) and allosteric (binding elsewhere and causes a change protein conformation) models of drug-receptor interactions together with chemical motifs known to achieve muscarinic receptor selectivity. The 4-hexyloxy-1-[2-(4-oxidobenzoyloxy)ethyl]-1,2,3,6-tetrahydropyridin-1-ium derivatives are currently being synthesized from salicylaldehyde in a multi-step synthesis. Salicylaldehyde is first deprotonated at the hydroxyl group with sodium hydroxide to form the corresponding salt, 2-(sodiooxo) benzaldehyde, which is then reacted with 1-bromohexane to form the corresponding ether, 2-(hexyloxy) benzaldehyde via an S_N2 reaction. Both structures are confirmed by proton NMR spectroscopy. The final products (tetrahydropyridin-1-ium salts) will be made in subsequent steps starting with this ether.

Supported by Barry University Department of Physical Sciences.

31. Synthesis of novel functionally selective and long-acting muscarinic antagonists

Lilyveth Mesa and John F. Boulos (Department of Physical Sciences, Barry University, Miami Shores, FL)

Muscarinic acetylcholine receptors, belonging to the G protein-coupled receptor (GPCR) family, are known to play important biological roles due to their extensive distribution in various tissue types. Due to highly conserved orthosteric site amongst the receptor family, the design of bitopic ligands that are both selective and efficacious in binding to specific muscarinic receptor subtypes is essential for the therapeutic treatment of certain neurological and peripheral disease states. In this research, 4-hexyloxy-1-[2-(4-oxidobenzoyloxy)ethyl]-1,2,3,6-tetrahydropyridin-1-ium and 4-hexyloxy-(4-oxidobenzoyloxy)-3-quinuclidinyl-1-ium derivatives were synthesized and found to non-competitively antagonize functional response to carbachol with high potencies in the nanomolar range. Under washing condition, half-life of antagonistic action was several hours for several of these compounds. Overall, these compounds were found to be potent long-acting antagonists. These novel prototypical functionally selective antagonists may be of therapeutic interest for the treatment of several disease states concomitant to muscarinic receptor dysfunction such as Parkinson's and chronic obstructive pulmonary disease (COPD).

32. Mechanochemistry leads to a series of diarylporphyrins

Michaela Reyes¹, Austen Henderson², Joshua Ruppel², Tamara D. Hamilton¹ (1Department of Physical Sciences, Barry University, Miami Shores, FL; 2Division of Natural Sciences & Engineering, University of South Carolina Upstate, Spartanburg, SC 2930)

Diarylporphyrins have substituents in only two of the four methine bridge positions and are fascinating synthetic goals due to their unsymmetrical nature, the possibility of forming isomers, and the possibility of “scrambling”; a process whereby substituents migrate to neighboring meso-positions. They are also useful precursors to porphyrins with unsymmetrical substitution patterns (A₂B₂-type porphyrins), used in photodynamic therapy, as supramolecular building blocks, for toxicology studies and other applications. Previously, we have shown that the four-fold acid-catalyzed condensation of aldehyde and pyrrole yielded a tetra-substituted porphyrin using mechanochemical techniques, without a solvent present. In this study, we grind equimolar amounts of dipyrromethane and benzaldehyde in a ball mill in presence of an acid catalyst. Following this, the reaction mixture is oxidized using 2,3-Dichloro-5,6-dicyano-1,4-benzoquinone to yield porphyrinic products, as evidenced by UV-Vis and proton NMR spectroscopy. The products can be purified using small plug of alumina, followed by silica. Our results suggest that with each replication of the experiment we are obtaining 5,15-diphenylporphyrins and never 5,10-diphenylporphyrins which suggests that scrambling is not taking place. The results also show that we are getting an average percent yield around 12% compared to literature yield of 9.5%, and Eco scores of -17.55 and -109.25 respectively. These results suggest that this is a better method than others due to the higher yield and that the mechanochemical technique is more environmentally friendly. Studies are ongoing and being further extended as we are now investigating the use of different aldehydes such as 4-Fluorobenzaldehyde, 2-Naphthaldehyde, and 3,4-dihydroxybenzaldehyde, to test the generalizability of this mechanochemical reaction.

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33. Determination of catechins in green tea extracts using high performance liquid chromatography coupled with photodiode array detection and electrospray ionization mass spectrometry

Sidney Vest and Zuzana Zajickova (Department of Physical Sciences, Barry University, Miami Shores, FL)

Catechins are plant-based flavonoids that are credited with an antioxidant activity. In this project, high performance liquid chromatography coupled with photodiode array detection and electrospray ionization mass spectrometry was utilized for the determination of catechins and caffeine in four green tea extracts. The separation was achieved using an aqueous methanol gradient and a silica-C18 Brownlee Choice column. The mobile phase was enriched with 0.1% acetic acid for an enhanced positive mode electrospray ionization response. The identity of analytes was confirmed by comparing retention times, UV, MS and MS/MS spectra with corresponding standards. All four green tea extracts were determined to contain (-)-gallocatechin, (-)-epigallocatechin, caffeine, (-)-epigallocatechin 3-gallate, (-)-epicatechin, and (-)-epicatechin 3-gallate.

Barry University College of Arts and Sciences
Department of Psychology

34. Relationship between Age, Parent-Adolescent Acculturation Conflict, and Self-Esteem in Immigrant Adolescents.

Yenetsa Alejo, Derek Frias, Kendra Lopez, Sabrina Des Rosiers, Guillermo Wated
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Researchers who study adolescents have differentiated adolescence into three distinct periods: Early adolescence ranging from age 10-13, middle adolescence from about 14-17 and late adolescence about age 18-21. Primarily, adolescence has been characterized as a period of preparation that include fundamental psychosocial changes that prepare the individual for the transition to adulthood. Studies of changes in self-esteem defined as the way individuals evaluate the self, show decline in self-esteem over the course of adolescence (e.g., Jacobs et al 2002). Other studies have suggested that self-esteem increases during adolescence (e.g., Cole 2001) and yet others have argued for the stability of self-esteem during adolescence (Fredericks & Eccles, 2002). However, one consistent finding in the literature is that adolescents' self-evaluations (that is, self-esteem) are more likely to fluctuate during early and middle adolescence compared to late adolescence. In addition, studies have reported that fluctuations in self-esteem are partly influenced by contextual factors. For example, studies of immigrant adolescents have found that parent-adolescent conflict acculturation is one contextual factor that is associated with adolescent's self-esteem. Based on current evidence, self-esteem represents an important factor that contribute to well-being during adolescence (e.g., Rhee et al., 2003). Consequently, the examination of factors associated with self-esteem among immigrant adolescents is a noteworthy research endeavor. The present study will examine whether differences in age (early vs middle adolescence) and in parent-adolescent acculturation conflict (low conflict vs high conflict) are associated with levels of self-esteem. These findings may inform about factors that are related to adolescents 'well-being.

35. Motivation for continued education, perceived employability and retention in college students

Ida Andersson, Guillermo Wated, and Sabrina Des Rosiers
(Department of Psychology, Barry University, Miami Shores, FL)

There has been a steady drop in the employment rate among young adults (ages 20-24 years) in the U.S.A. (National Center for Education Statistics, 2018). A factor that has been identified as crucial in the attainment of gainful employment among young adults is a college education (National Student Clearinghouse Research Center, 2018). In fact, the National Center for Education Statistics (2018) reported that the employment rate was higher for those with higher levels of educational attainment such as a bachelor's degree among young adults. Yet, college dropout rates in the U.S.A. continue to decline (Organization for Economic Cooperation and Development, 2014). According to Tinto's (2015) theory of students' persistence, two factors that contribute towards dropout rates in college students are students' level of motivation and perceptions about their own education's related outcomes. In particular, "motivation for continued education" is considered essential in predicting emerging adults' participation in continual education (Hubackova & Semradova, 2014). Motivation for continued education refers to students' perceptions about positive experiences in an academic year and whether these experiences motivate them to continue their schooling (Studsrod & Bru, 2009). Furthermore, qualitative data hints toward the positive relationship between perceptions of employability (employability from the perspective of undergraduate students) and retention (Rothwell & Arnold, 2007; Yorke & Thomas, 2010). Therefore, the purpose of the present study was to document the relationship between motivation for continued education and perceptions of employability with intentions to quit among college students. The results of a multiple

regression analysis revealed that the linear combination of motivation and perceptions of employability was significantly related to intentions to quit, $F(2, 202) = 40.73$, $p < .011$, $R^2 = .29$ *Adj. R^2* = .28. These findings have important implications for implementing strategies that can increase college students' retention.

36. Differences in Language Preference and Acculturation in Recently Immigrated Adults and Adolescents

Farah Calvaire, Sabrina Des Rosiers, Guillermo Wated
(Department of Psychology, Barry University, Miami Shores, FL)

Current data from the Pew Research Center (2018) regarding demographic changes in the United States indicate Hispanic self-reported identification tend to decline overtime. For example, among US-born children with one parent of Hispanic heritage 92% identify as Hispanic. This percentage drops to 77% among individuals of the next generation also of Hispanic ancestry. This pattern shows that the course of language preference among Hispanic immigrants and people of Hispanic ancestry is similar to that of individuals from other immigrant groups (Smith, 2006). Studies showed that language preference differs by nativity (Marrow, 2009). For example, first generation Hispanic are more likely to choose English as their preferred language compared to foreign-born Hispanics. Acculturation, the psychological change that occurs in practices, values and identities (Schwartz et al, 2010) has been used as a concept to explain changes in language preference overtime. Studies found that individuals who assimilate that is, those who acquire the new culture and reject the culture of ancestry are more likely to select English as their preferred language (Tran 2010). One area of research in acculturation that requires further investigation is differences in language preference between adolescents and adults. Current literature reports that children are more likely to acquire the language of the receiving culture at a faster pace compared to adults (e.g., Fortuny et al., 2009). However, fewer studies have studied this pattern in recent immigrants. It is important to evaluate whether Hispanic adults and adolescents who have recently immigrated in the US for less than 5 years differ on Spanish language preference. The findings of the present study can inform regarding differences in cultural integration between adults and adolescents.

37. Elements to Success: Academic Hardiness, Perceived Employability and Retention in College Students

Alicia Carabarin, Guillermo Wated, and Sabrina Des Rosiers
(Department of Psychology, Barry University, Miami Shores, FL)

Because economic opportunity in the U.S.A. is increasingly centered on successful completion of post-secondary education, those who lack a college degree can face tremendous barriers to employment (Lotkowski et al., 2004). Consequently, there is growing pressure on universities to create environments that not only attract but also retain students. Two factors that have been documented to be significantly related to intentions to quit school are academic performance and academic hardiness, which refers to students' willingness to engage and commit to academic work (Spratt, & Taff, 2013; Lifton et al., 2006). For instance, Battin-Pearson et al. (2000) found that students who are successful in academic endeavors are more likely to be retained, while Lifton, et al. (2000) documented that students who displayed greater academic hardiness were less likely to drop out of school. Nevertheless, there is little empirical evidence regarding the impact that perceived employability may have above and beyond these established predictors. Perceived employability refers to individuals' appraisal of their own chances of being employed in light of self-perceived skills, abilities, and resources associated with employment (Fugate, et al., 2004). Participants were 205 (82% women) college students. Hierarchical regression analysis was used in order to test the study's hypothesis. GPA ($\beta = -.11$, $p = .08$), and academic hardiness ($\beta = -.40$, $p < .001$) were entered in Step 1, $F(2, 202) = 21.56$, $p < .011$, $R^2 = .18$, *Adj. R^2* = .17. Perceived employability ($\beta = -.18$, $p = .009$) was entered in Step 2, F Change (1, 201)

= 7.05, $p = .009$, $R^2 = .20$, $Adj. R^2 = .19$, $R^2 Change = .03$. The results suggested that perceived employability predicted intention to quit school above and beyond all other predictors. These findings can have important implications for managing students' retention at post-secondary institutions.

38. Differences in Acculturation and Depression among Immigrant Adolescents

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Depression is a disorder that is manifested by feelings of sadness, frustration, and hopelessness about life. Individuals who are depressed often report lethargy, inability to concentrate, loss of pleasure in activities and disturbance in sleeping patterns and appetite (Cohen et al., 2018). Studies show that 20% to 50% of adolescents experience low to moderate levels of depression and about 5% suffer from chronic depression (American Psychiatric Association, 2013). The experience of depression severely interfere with social and academic tasks expected of adolescents. One factor that has been associated with depression in immigrant youth is the process of acculturation. Schwartz and colleagues (2010) proposed that acculturation occurs because of change that occur in behaviors, values, and identifications when an individual from a different cultural background encounters a new culture. During the process of acculturation, adolescence face many challenges such as acquiring a new language and responding to the demands of their heritage culture (Ward et al., 2018). In fact, many adolescents find themselves speaking English at school and Spanish at home (Halle et al., 2014). Research shows that the challenges of acculturation are associated with the likelihood of depressive symptoms in immigrant adolescents (Lorenzo-Blanco et al., 2015). The purpose of the present study is to assess differences in acculturation patterns and depressive symptomatology in adolescents.

39. Descriptive Analysis of Emotional Self-regulation, Social Support, and Perceived Employability in a Diverse Sample of Emerging Adults

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Emerging adulthood is a developmental period that spans from the late teens to the mid-to late-twenties (e.g., Arnett, 2013). Research indicates that emerging adulthood is a self-focused time of the lifespan characterized by continued identity search in a number of domains include career orientations. As a result, occupational choice and goals represent central developmental tasks of emerging adulthood. Emerging adults must select and manage stressful life roles and improve the skills they need for success. Perceived employability, the individual ability to obtain sustainable employment that matches one's skills and knowledge set (e.g., Chen and Lim, 2012) is one such factor that has been associated with success in the work place. Studies that have examined predictors of perceived employability indicate that individual characteristics such as ability to respond to occupational stress effectively (e.g. Gyorkos et al 2012) predicts perceived employability. Contextual characteristics like social support also positively correlate with perceived employability. Most studies have evaluated the relationship between individual-level and contextual-level predictors of perceived employability in adult workers. Given that, the transition to the workplace represents a salient task for emerging adults, the examination of individual and contextual correlates of perceived employability remain an important area of research for expanding knowledge regarding factors that contribute to successful transition in emerging adulthood. .To that end, the present investigation will use archival data from the Family Processes and Transition to College (FPTC) study (Wated & Des Rosiers 2018) to evaluate whether emotion regulation and social support predict perceived employability in a diverse sample of emerging adults. This has the potential to inform about personal and contextual attributes that are associated with perceived employability in diverse groups of emerging adults.

40. Helicopter Parenting and Intentions to Quit in Millennial College Students

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The Millennial generation is the cohort of students born after 1982 and before 2004 (Pizzolato & Hicklen, 2011). Ahsdown and Faherty (2015) found that millennials' parents are more likely to over parent; a parenting style referred to as helicopter parenting. Several studies have noted that parental involvement in their children's education is strongly linked to academic success (e.g., Benner, Boyle, & Sadler, 2016). It has been predicted that too much parental involvement, such as in the case of helicopter parenting, can influence deleterious outcomes such as intentions to quit school among college students (Lynthcott-Haims, 2015). No studies have been conducted to assess the role of helicopter parenting as a precursor for intentions to quit school above and beyond known predictors of students' success such as GPA, family support and self-esteem. Participants ($N = 128$) were 88% female with a mean age of 19.65 years ($SD = 2.06$). They were predominantly sophomores in college (37.50%). The Studsrod and Bru (2009) scale was used to gauge participants' intentions to quit school ($\alpha = .75$). To evaluate participants family support, the Perceived Social Support from Families Scale (Procidano & Heller, 1983) was used ($\alpha = .94$). The Rosenberg Self-Esteem Scale (1965) was used to assess self-esteem ($\alpha = .89$). Helicopter parenting was measured using LeMoyne and Buchanan's (2011) ($\alpha = .74$). Hierarchal regression analysis showed Helicopter parenting ($\beta = .19$, $p = .048$) predicted intention to quit school above and beyond all other predictors, F Change (1, 104 = 4.02), $p = .048$, $R^2 = .15$, Adj. $R^2 = .12$, R^2 Change = .03. These findings can have important implications for informing parents regarding the influence of their involvement on college students' academic lives.

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