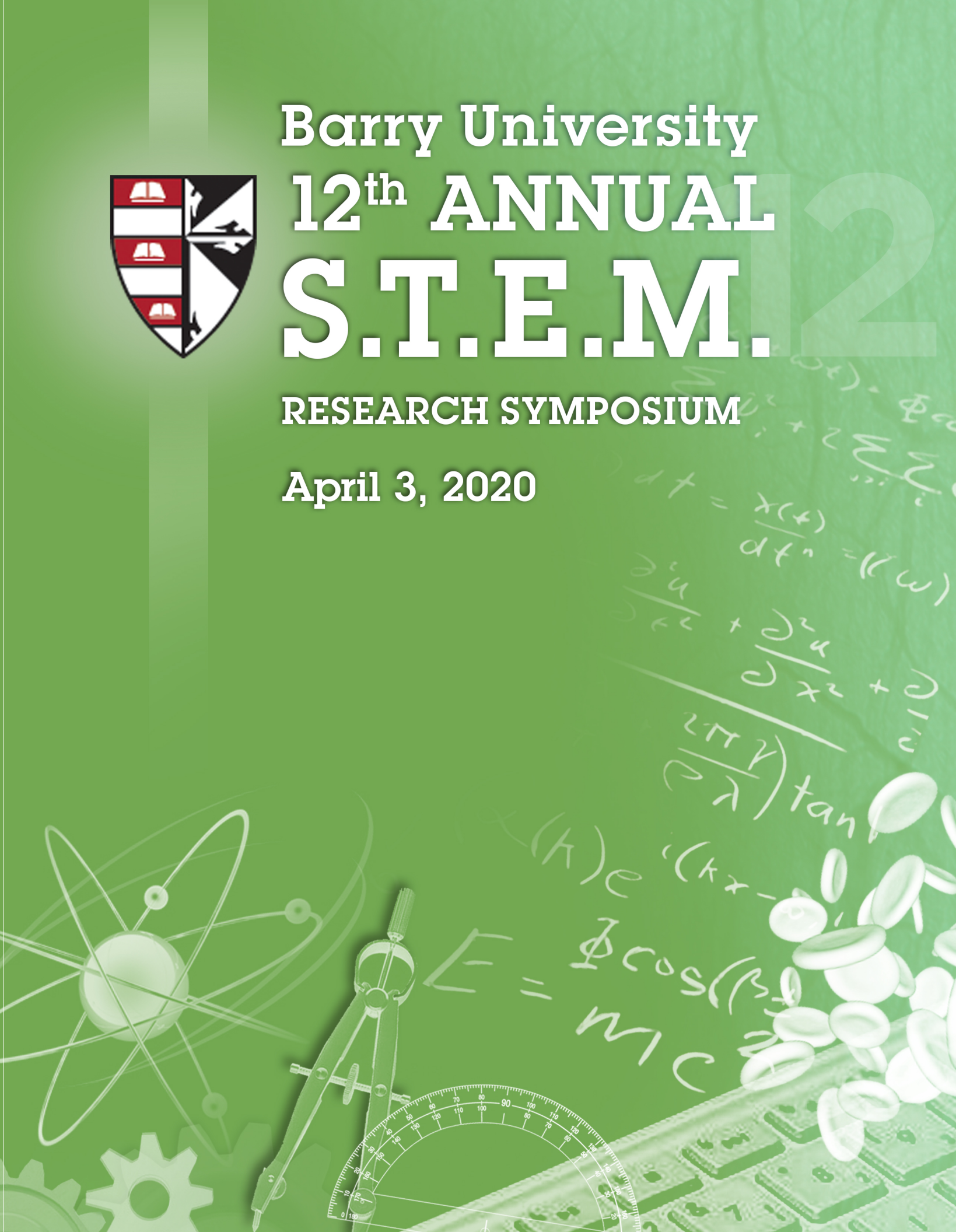
Barry University

12th ANNUAL S.T.E.M.

RESEARCH SYMPOSIUM

April 3, 2020



12th Annual

S.T.E.M. Research Symposium

Friday, April 3, 2020

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 Math disciplines (S.T.E.M.), Medicine, 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, medicine, social sciences, psychology, and physics.

In an effort to slow the spread of COVID-19 and after careful consideration of restrictions of all gatherings from leading health organizations, the 12th annual S.T.E.M. Research Symposium has been cancelled.

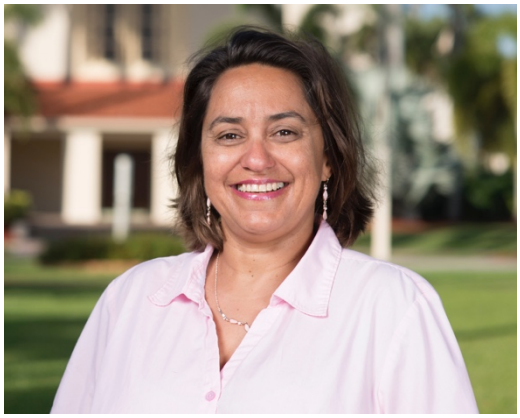
Members of Barry University's S.T.E.M. Committee and all involved in putting together this annual program look forward to celebrating the great achievements within the S.T.E.M. disciplines once the worst of COVID-19 is behind us.

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

Plenary Session

Come talk trash with Barry's resident garbologist



Presented by

Dr. Anita Závodská
Associate Professor of Environmental Sciences
College of Arts and Sciences: Biology Department

Dr. Anita Závodská is an Associate Professor of environmental sciences in the Biology Department of the College of Arts and Sciences at Barry University. She has been at Barry University since 2002 and teaches courses in environmental science and climate change. She is a trained garbologist and conducts international municipal solid waste research. Her other research interests include waste management, recycling, sustainability, and environmental and adult education.

Abstract: Let's talk trash! Learn about garbology, how we study waste and what we learn from it about ourselves, our society and humanity as a whole. We will discuss ecological footprints, chasing arrows and wish-cycling. Hear the garbologist's view on the detrimental societal costs that are created by our disposable economy and personal habits, and learn how we can reverse the trends through recycling and educated personal choices.

Barry University College of Arts and Sciences

Department of Biology

1. **Green tea extracts and catechins caused apoptosis in human myeloid leukemia cells-cytology analysis**

Beatriz Alvarez [1], Izabella Ruiz [2], and Tang Hu [1] ([1]Department of Biology, Barry University, Miami Shores, FL, [2]Department of Clinical 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), (-)-epigallate catechin (EGC), and (-)-epicatechin (EC). Our previous work shows that green tea extract and EGCG inhibit growth of human myeloid leukemia cells through the regulation of pRb synthesis and formation of pRb-E2F complexes. In this study, we focus on cytology analysis of human myeloid leukemia cells in response to green tea extracts and catechins. TF-1a and MV4-11 cells show relatively homogeneous population of medium-size cells with the appearance of blasts. They have a smooth cytoplasmic border with big nucleus/cytoplasm ratio. MV4-11 cells are a little smaller (about 1/3 to 1/4 smaller in diameter) than TF-1a cells in size. Addition of EC, ECG, and EGCG caused cell morphology changes indicated by decreased cell sizes, shrinkage of cell body, and the formation of nuclear fragments in small numbers of MV4-11 and TF-1a cells. However, application of green tea extracts (B-GTE and XH-GTE) caused dramatically condensation of the cell nuclei and significant decrease in their sizes. These changes are dose- and time-dependent with initial nuclear fragments being detected in the cells treated with 2.5% B-GTE and 2.5% XH-GTE for 48 h. The cells treated with B-GTE for 72 h have more profound effect on the morphology of the cell and their nuclei as compared with the cells treated with B-GTE for 48 h. Our data strongly suggest that the green tea extracts and catechins can induce apoptosis in human myeloid leukemia cells. Since the green tea extracts have more profound cell killing effect and produced more highly condensed nuclei, it strongly suggests that some other unknow catechins or non-polyphenols in the green teaextracts may play an important role in green tea-induced growth inhibition and the death of the cells in culture.

Funded by Barry University Department of Biology

2. **Investigation of complex biofilm formation and potential treatment using a zebrafish tissue explant model**

Samantha Britz [1], Erika Pierre [1], and Brenda Schoffstall [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

Many bacterial infections of wounds, heart valves, and bone tissue are diagnosed as complex multicellular microbial structures called biofilm. Biofilm is an accumulation of multicellular microbial mass embedded in polysaccharide matrix with incredible adhesive abilities. Biofilm infections are complex; several species of bacteria, yeast, or fungi may be recruited to the multicellular mass. Complex biofilm has remarkable ability to impede normal host immune responses and aggressive medical interventions. We have established Danio rerio (zebrafish) as an in-vivo and ex-vivo wound model within which formation, growth, and ultimately treatment of biofilms can be analyzed. Additionally, we have previously demonstrated that honey and green tea extract have potential to treat biofilm cultures in vitro. In this study, we use a penetrating burn injury protocol to deliver a deep tissue wound to zebrafish through the muscular tissue just below the dorsal fin. The wound is then infected with bacterial biofilm-forming species including Staphylococcus epidermidis RP62A (WT)--robust biofilm former, Staphylococcus epidermidis (ATCC 12228)-- weak biofilm former, and Staphylococcus aureus (ATCC 6538)--moderate biofilm former/known wound pathogen. Next, the biofilm-infected wound is able to recruit other microorganisms from the aquarium environment. Once multispecies biofilm has been established in the wound, the fish body functions as explant medium for continued biofilm growth. These complex biofilms are then analyzed using established in vitro biofilm research methods including crystal violet assays to assess possible treatments for biofilm infections. Future studies will aim to use honey and green tea as treatments to potentially eradicate the complex biofilm infection in vivo.

Funded by Barry University Department of Biology

3. Bpa, bps, pfas toxicological studies in the zebrafish embryo: is there a lesser evil?

Sidney Burnette, Paige Symonette, Arin Blake, Christianida Mazard, and Stephanie Bingham (Department of Biology, Barry University, Miami Shores, FL)

One of the main chemical components of plastic production is Bisphenol A (BPA). It is found in an array of commercial products including the packaging for products such as food, in baby bottles, and the inner lining of canned foods as well PC products, medical devices, and dental sealants. BPA leaches into our food, beverages, and environment after the ester bonds of the molecules undergo hydrolysis. In recent years, BPA has been implicated in disrupting the reproductive hormone response. Bisphenol S (BPS), a chemical that was introduced as a safer alternative and yet another plastic component, polyfluoroalkyl substances (PFAS) which is similar in chemical properties have also been noted to produce similar effects. In addition, these chemicals are polluting our water supply, providing yet another path for exposure. Here, we are using the zebrafish embryo, Danio rerio, an emerging model system for toxicology research, to catalog the effects of exposure to these pollutants separately, and in combination. Preliminary results confirm previous research in which developmental effects have been reported. In our study, we note that there is suppression of survival, growth, and heart rates as well as overall responsiveness following embryonic exposure during an exposure period that is equivalent to the first 8 weeks of pregnancy when many women are not yet aware that they are pregnant. Our ultimate goal is to examine whether there are lasting effects, such as those on reproductive health, in adults who were exposed as embryos, and offspring of those adults that were never exposed.

Funded by Barry University Department of Biology

4. Prebiotic effects of local raw florida honey on the human gut bacteria lactobacillus acidophilus

Raquel Castillo [1], Oscar Gonzalez [1], Victoria Martinez [1], Anastasia Kotsanis [1], Celia Burgos [1], Jenson Feys [1], Zachary Money [2], Carmen Nieves [1], and Poincyane Assis-Nascimento [1] ([1]Department of Biology, Barry University, Miami Shores, FL, [2]Department of Physical Sciences, Barry University, Miami Shores, FL)

Human health is directly correlated with the condition of its digestive system; more specifically, with the complex network of microorganisms residing in the gut that constitute the gut microbiota. Lactic acid bacteria (LAB) have been linked to health and nutritional benefits for several years. Substances produced by these microorganisms exert many beneficial effects in the gastrointestinal tract, including aiding in digestion and food absorption, supporting the immune system, as well as contributing to physical and emotional health. Lactobacillus, though present in the distal human gut in small amounts, are often correlated with human disease and chronic conditions. Studies show that increasing the numbers of Lactobacillus in the gut help to treat infections and prevent certain chronic illnesses. In this study, we tested the prebiotic effects of local raw Florida honey on Lactobacillus acidophilus derived from the human gut. Bacterial samples were treated with different concentrations of honey and cultured under anaerobic conditions at 37oC. Optical densities were measured to assess proliferation using a spectrophotometer (OD600) 24 hours following honey treatment. Preliminary results demonstrated a significant increase in L. acidophilus proliferation in samples treated with increasing honey concentrations compared to control. The greatest proliferation peak was observed in samples treated with 1% honey solutions, which is consistent with previous findings. These findings reveal a strong prebiotic effect of local raw Florida honey on L. acidophilus from the human gut and suggest that honey consumption may be used as preventive treatment against certain infections and chronic illnesses.

Funded by Barry University New Faculty Start-Up Research Funds

5. Local raw florida honey enhances proliferation of lactobacillus plantarum derived from the human gut

Michelle Gonzalez [1], Jovelyne Charles [1], Melissa Rigueros [1], Emily Hernandez [1], Amanda Escalera-Torres [1], and Poincyane Assis-Nascimento [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

The gut microbiota consists of trillions of microorganisms that together are often referred to as the bodys second brain. One of the most common Lactobacillus species from this diverse population of mostly bacteria that inhabit our intestines is Lactobacillus platarum. Studies have shown that this species demonstrates inhibitory behavior against pathogens and is thus an important component of our immune system from a young age through adulthood. Honey is well-known as a prebiotic food, which are substances that can influence the proliferation of probiotic species within the gut. In these studies, the effects of local raw Florida honey on the proliferation of L. plantarum was tested at different concentrations compared to broth only treated controls. L. plantarum was treated with different concentrations of honey ranging from 0% to 1.25% under anaerobic conditions at 37oC. Proliferation was quantified by measuring the sample absorbances at OD600 across different conditions, approxixately 24 hours following honey treatment. Preliminary results show a linear increase in L. plantarum proliferation with increasing honey concentrations compared to the broth only treated controls. With the exception of the 0.25% honey treated group, a significant growth increase was observed across all other concentrations; with the 1.25% group revealing a dramatic six-fold (6.3) increase compared to control. These results are consistent with previous findings and reveal that local raw Florida honey is a potent prebiotic for L. plantarum. These findings suggest that consumption of local raw honey may contribute to enhancing the immune system via pathogen inhibition in the gut.

Funded by Barry University New Faculty Start-Up Funds

6. The effects of raw florida honey on the proliferation of the human gut microbiota species bifidobacterium longum

Emily Hernandez [1], Melissa Rigueros [1], Jovelyne Charles [1], Michelle Gonzalez [1], Amanda Escalara-Torres [1], and Poincyane Assis-Nascimento [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

The gut microbiome describes the composite microbial genome found in the mammalian gastrointestinal tract consisting of trillions of microorganisms that impact overall health. Among the probiotic bacteria in the adult human gut, Bifidobacterium longum represents one of the most prevalent bifidobacterial species. Bifidobacteria have a plethora of health benefits including ameliorating symptoms for stress-induced diseases such as Irritable Bowel Syndrome (IBS). Studies show that dynamic changes in gut microbiota resulting from diet alters brain physiology and behavior. Honey is known as a potent dietary prebiotic with the ability to increase proliferation of different gut bacterial species. However, the effects of raw Florida honey on B. longum are not yet known. These studies assessed the effects of local honey on the proliferation of B. longum from the adult human gut. B. longum cultures were grown anaerobically over 24 hours and were treated with different honey concentrations ranging from 0% to 5%. Bacterial proliferation was assessed to determine optimal growth conditions by measuring absorbances at 600 nm using a spectrophotometer 24 hours following honey treatment. Preliminary results reveal a significant increase in proliferation (at the 1.25% and 2.5% concentrations) of B. longum upon treatment with local Florida honey. These studies suggest that small daily doses of local Florida honey may help to reduce symptoms of patients that suffer from IBS.

Funded by Barry University New Faculty Start-Up Research Funds

7. Ovarian cancer study: review of a phase 3 clinical trial using taxol® (paclitaxel), paraplatin® (carboplatin), and bavencio® (avelumab)

Raven Kpassou [1], Kira Spearman [1], and Yu-Wai Peter Lin [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

This review analyzes published data on the efficacy of avelumab, a programmed cell death ligand-1 (PD-L1) check point inhibitor, in increasing the survival of patients with ovarian epithelial carcinoma. We present a typical case of the progression of ovarian cancer treatment focusing on the aspects of surgery, chemotherapy and hospice. Here we report on the analysis of the findings of the clinical trial Avelumab in Previously Untreated Patients with Epithelial Ovarian Cancer (JAVELIN OVARIAN 100-NCT02718417). This published 2016 clinical trial tested a combination of platinum-based treatments (carboplatin and taxol), as well as, the immunotherapeutic agent avelumab. Carboplatin and taxol were previously demonstrated effective as frontline treatment in newly diagnosed ovarian cancer patients. Avelumab was previously proved effective in metastatic Merkel cell carcinoma (MCC) patients. This reported clinical trial contained three arms. In the chemotherapy phase, group A & B were treated with carboplatin, taxol and a placebo. Group C was treated with carboplatin, taxol, and avelumab. In the maintenance phase, group A was observed while group B & C were treated with avelumab. There was no significant difference in terms of the Progression-Free Survival (PFS) between the three treatment arms as assessed by the Blinded Independent Central Review (BICR) committee. This interim analysis led to the termination of the trial in Dec. 2018 due to futility of efficacy.

8. Investigation of potential for green tea and honey as natural anti-biofilm agents

Erika Pierre [1], and Samantha Britz [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

Biofilm is an accumulation of multicellular microbial mass embedded in extracellular polymeric substance (EPS) with adhesive abilities. Biofilm infections lead to difficulties in treating wound infections. Honey and green tea extract have been previously identified as substances that possess anti-biofilm properties; preventing single-species biofilm formation. In wound infections, biofilm typically involves multiple species of microorganisms. We utilize in vitro biofilm growth and mixed bacterial cultures to investigate potential for prevention and/or eradication of biofilm using green tea and honey. Our study uses model strains: Staphylococcus epidermidis RP62A (WT)--robust biofilm former, Staphylococcus epidermidis (ATCC 12228)-- weak biofilm former, Staphylococcus aureus (ATCC 6538)--moderate biofilm former/known wound pathogen, and Pseudomonas aeruginosa (ATCC 9027)--moderate biofilm former/known wound pathogen. Preliminary findings suggest that 20% green tea extract can prevent single species bacterial growth and biofilm in planktonic cultures, but is incapable of disrupting established biofilm. In contrast, 1% honey can prevent biofilm formation in all three Staphylococcal species, and disrupt established Staphylococcal biofilm. In mixed species cultures, co-incubation of S. aureus with S. epidermidis RP62A appears to have an antagonistic effect on the ability of RP62A to form a robust biofilm. Co-incubation of P. aeruginosa with S. aureus appears to have a synergistic effect on S. aureus biofilm formation. With mixed cultures, 20% green tea extract and 3% honey are capable of preventing biofilm when added to planktonic mixed cultures before incubation, 3% honey reduces biomass of established mixed biofilm, but 20% green tea has no effect on established mixed biofilm.

Funded by Barry University Department of Biology

9. Assessing differences between filtered versus unfiltered honey as a prebiotic for bifidobacterium adolescentis

Melissa Rigueros [1], Emily Hernandez [1], Jovelyne Charles [1], Michelle Gonzalez [1], Amanda Escalera-Torres [1], and Poincyane Assis-Nascimento [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

Honey adulteration has been an increasing concern as a result of its high demand and market value as a superfood. This ancient prebiotic food contains oligosaccharides which are beneficial for the growth of probiotic species that constitute the human gut microbiota. Bifidobacteirum adolescentis is one of the many probiotic species found in the intestines that influence communication between the gut and the brain. Recent studies in animals have reported improvements in anxiety and stress when treated with Bifidobacterium supplements. In this study we compared the effects of filtered versus unfiltered market brand organic honey on the proliferation of B. adolescentis from the adult human gut. Cultures were grown anaerobically for 24 hours at different concentrations of each honey solution ranging from 1.25-5% compared to no honey treatment. Bacterial growth concentrations were measured at an optical density of 600 nm using a spectrophotometer to assess changes in proliferation. Preliminary results showed a direct correlation between increasing concentrations of honey and the proliferation of B. adolescentis across all treatment groups. Additionally, samples treated with unfiltered honey show a trend towards a higher increase in proliferation compared to the corresponding filtered samples (with the exception of the 5% concentration). Our results suggest that compounds retained in the unfiltered honey, such as enzymes and pollen, may further enhance its prebiotic effect on gut bacteria. These findings shed light into a correlation between the gut-microbiota-brain axis and using B. adolescentis as a probiotic for potential treatment or preventative measure against anxiety and other mental disorders.

Funded by Barry University New Faculty Start-Up Research Award

10. How does embryonic alcohol exposure influence feeding behaviors and appetite-regulating hormone expression?

Mario Romero, DeMarkis Dormer, Carina Jatib and Stephanie Bingham (Department of Biology, Barry University, Miami Shores, FL)

Fetal Alcohol Syndrome (FAS) is a group of disorders that leads to physical, behavioral, and learning disabilities in babies exposed to alcohol in the womb. One of the hallmarks of FAS is low birth weight and failure to thrive. This led us to question whether part of the issue may lie in misregulation of appetite-influencing hormones such as leptin. Therefore, the goal of this study is to investigate whether embryonic ethanol exposure leads to changes in feeding behaviors and whether these changes can be explained by changes in appetite-regulating genes rather than on craniofacial abnormalities solely. In this study, placed into either a control group (untreated) or experimental group (treated with alcohol) and leptin levels assayed via ELISA, an immunological test of protein production. Eventually, we hope to investigate feeding behaviors in adult zebrafish that were either untreated or treated with alcohol as embryos and correlate these feeding behaviors to leptin expression levels.

Funded by Barry University Department of Biology

11. Cardiogenesis in a zebrafish model for fetal alcohol system

Anaya Ruiz, and Stephanie Bingham (Department of Biology, Barry University, Miami Shores, FL)

Ethanol exposure during embryogenesis leads to a host of developmental and cognitive impairments including those affecting cardiac form and function. Here we investigate whether the expression profile of heart-specific genes is altered as a consequence of ethanol exposure during critical periods of cardiogenesis in the zebrafish embryo. A number of developmentally regulated transcription factors have been identified, and demonstrated to be expressed in discrete cardiac regions and for discrete time periods between 14 and 48 hours post fertilization (hpf). To address our research question, we identified the pertinent genes (including hand2, nkx2.2, gata5 and tbx20), analyzed their sequences and designed primers that would allow for the synthesis of situ probes to target these genes. This will allow us to examine the gene expression timeline for unexposed and exposed zebrafish embryos, likely identifying the genetic basis for the cardiac malformations observed.

Funded by Barry University Department of Biology

12. An investigation into the effects of embryonic ethanol exposure on learning and memory in zebrafish

Isaias Trujillo, Dustin Dawson, and Stephanie Bingham (Department of Biology, Barry University, Miami Shores, FL)

The host of cognitive, functional, and behavioral impairments under the umbrella fetal alcohol syndrome (FAS) is caused by embryonic exposure to alcohol. Due to the far-reaching neurological impairments experienced by newborns with FAS, we have decided to investigate whether ethanol exposure alters behavioral responses, both those that are learned and those that are innate using zebrafish as a model for these studies. First, the C-start/startle response will be investigated in 3-day old zebrafish embryos. This protective autonomous response is mediated by the Mauthner reticulospinal neurons and is generated by fish to escape from predators, or other threats. Using a tuning fork assay and high-speed imaging, we hope to determine 1) whether there is an impaired response 2) the extent of the impairment in terms of the angle of the tail response. Second, learning and memory will be examined using a Y-maze protocol to see whether there are differences in learning rates as determined by the number of times the 3-day old embryos go through the maze before realizing that one of the paths is impassable. These studies have the potential to shed light on the initial stages of learning and memory and how they are affected by in utero exposure to teratogens such as alcohol.

Funded by Barry University Department of Biology

13. Dimethyl sulfoxide inhibits cell growth and induces apoptosis in both human myeloid leukemia and epithelial-derived cancer cells through multiple mechanisms

Ariana Villarroel [1], Angela Duff [1], and Tang Hu [1] ([1]Department of Biology, Barry University, Miami Shores, FL)

Dimethyl sulfoxide (DMSO) is an FDA approved prescription medicine and has numerous applications in basic research. DMSO is as an efficient solvent for many chemicals and as a common cryoprotectant (5-10%). In this study, we found that DMSO significantly inhibited proliferation of several human myeloid leukemia and epithelium-derived cancer cell lines in culture, measured by cell proliferation assays and microscope examinations. The initial inhibition was observed when DMSO was added to the cell culture at a concentration of 2%. The inhibition was dose-dependent, with a maximal inhibition of the cell growth being observed in the cells treated with 5-6% of DMSO. DMSO also caused cell death identified by trypan blue exclusion assay, cytology examination and immunoblot assay. Cytology examination showed that both MV4-11 and TF-1a cells have a relatively homogeneous population with smooth cytoplasmic border and big nucleus/cytoplasm ratio. Hep-G2 and MCF7 cells displayed irregular cytoplasmic bodies with relatively small nucleus/cytoplasm ratio (approximately 1:1 in Hep-G2 cells and 1:2 in MCF7 cells). About 1-3 nucleoli were observed in majority of these epithelial cancer cells. Addition of DMSO decreased the all 4 types of cells and their nuclei in size and caused significant condensation of nuclear chromatin. In TF-1a and MV4-11 cells, DMSO at higher concentrations induced numerous nuclear fragments. The fragments were demonstrated to be a result of DNA fragmentation detected by DNA fragmentation assay. DMSO also activated Caspase 3, a key apoptotic enzyme, but not caspase 9. Moreover, DMSO downregulated the expression of CDK2 and cyclin A, two key cell cycle regulatory molecules, in TF-1a and MV4-11 cells after 24 h incubation. In summary, our study presented the first clear evidence that DMSO inhibited cell growth and induced apoptosis of the cancer cells by downregulating the expression of CDK2 and cyclin A, and by activating extrinsic apoptotic signal pathway.

Funded by Barry University Department of Biology

Barry University College of Nursing and Health Sciences
Department of Clinical Biology

14. The effects of filtered versus unfiltered honey on the proliferation of lactobacillus acidophilus from the human gut

Jovelyne Charles [1], Michelle Gonzalez [2], Emily Hernandez [2], Melissa Rigueros [2], Amanda Escalera-Torrez [2], and Poincyane Assis-Nascimento [2] ([1]Department of Clinical Biology, Barry University, Miami Shores, FL, [2]Department of Biology, Barry University, Miami Shores, FL)

The human gut is very complex and contains trillions of probiotic bacteria. One of the species that makes up the gut microbiota is Lactobacillus acidophilus. Though found in the distal human intestines in low amounts, it plays an important role in overall health. Honey is considered to be a worldwide super food with prebiotic function enhancing the proliferation of probiotic species such as L. acidophilus. Due to the high demand and increased market value of honey, producers have mislabeled or even adulterated their honey products. In this study, we aimed to analyze the effects of filtered verses unfiltered organic honey from the same market brand on the proliferation of the human gut bacteria L. acidophilus. Proliferation was assessed after treating the bacteria with 1.25% filtered and unfiltered honey compared to no honey treated controls. Cultures were incubated under anaerobic conditions at 37o C and absorption was measured at OD600 every two hours for a total of ten hours via a microtiter plate reader. Our preliminary results show a strong trend towards increased proliferation at all time points, starting at 2 hours, in samples treated with the unfiltered honey compared to controls. Additionally, unfiltered honey treated samples showed a higher rate of proliferation compared to samples treated with filtered honey at the same concentration. Our results demonstrate a positive effect of unfiltered honey on L. acidophilus and suggest that unfiltered components of honey, such as enzymes and pollen, may contribute to its prebiotic effects on bacteria that constitute the gut microbiota.

Funded by Barry University New Faculty Start-Up Research Funds

Barry University College of Arts and Sciences
Honors Program

15. Comparing the health of immigrants and U.S. native-born citizens to evaluate the health costs and advantages of migration

Arin Blake [1] ([1] Honors Program, Biology Major, Barry University, Miami Shores, FL)

Research has often suggested that migration has a negative impact on the health of immigrants and refugees regardless of the country from which they come. Statistics show that while new immigrants to the United States often have better health than native-born citizens upon arrival, the longer that they stay in the US, the further their health deteriorates. Considering the fact that a large percentage of immigrants are migrating from countries with lower standards of health, living conditions, and resources, one could assume that these new immigrants would have poorer health, upon arrival in the U.S., compared to their native born counterparts. However, this assumption has been proven to be inaccurate. Furthermore, with all of the resources, high wages, and a highly sophisticated health system, migration to the US should ideally improve the health of immigrants. Contrary to this ideal, research has shown that extended stay in the U.S. increases the rates of heart disease, diabetes, and high blood pressure among all immigrant groups. There are a variety of factors that have been identified as the root of this issue. Researchers have mainly pointed to assimilation or the adoption of American behaviors such as smoking, drinking, high calorie diets and sedentary lifestyles, although others have pointed to the stress accompanied with migration and often poor conditions that immigrants are exposed to during their stay in the U.S. Through systematic review, using recent research that compare the health trends of US immigrants and native-born populations, this paper will evaluate the positive and negative effects of migration on health and the factors that contribute to these effects.

16. Parallels between African syncretic theology in literature and activism in the new world

Michidael Ceard [1] ([1]Honors Program, English Major, Barry University, Miami Shores, FL)

African syncretic theology is a belief system where African traditional mythology is interwoven with Christian beliefs. These 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. This research project will examine three books as primary texts which are Krik Krak by Edwidge Danticat, I, Tituba, Black Witch of Salem by Marys Conde, and Tell My Horse by Zora Neale Hurston. Secondary sources will be used to understand the effects of practicing African syncretic beliefs on activism and liberation in the New World.

17. Degradation of the health status of immigrants as a result of assimilation to american culture

Taylor Checkley [1] ([1]Honors Program, Biology Major, Barry University, Miami Shores, FL)

In the United States, health related conditions such as obesity pose a threat to the well-being of the country's inhabitants, including immigrants. Migrants often travel to the United States with the dream of a better life for themselves and their families. Assimilation to the American culture, however, is often accompanied with negative side effects on a migrant's health. Although immigrants typically have lower socioeconomic statuses, their health is reportedly better than that of American native-born citizens, in terms of morbidity and mortality rates. This advantage, however, diminishes as their time in America increases, and factors, such as the change to a more sedentary lifestyle and the development of poor eating habits, are likely to blame. The purpose of this study is to further analyze the social and economic factors that contribute to the drastic increase in risk of obesity seen in immigrants as a result of the change in environment. This will be done through a meta-analysis of previous research as well as one-on-one interviews that will reveal the mindset behind the change. Upon further research, the sedentary lifestyle - characteristic of Americans - paired with poor diets, have shown to be major contributors of this degeneration of health. For this reason, this study will focus on eating habits and engagement in physical activity as the primary variables of interest. Its been shown that immigrants develop poor eating habits as they begin adapting to the American culture, but often lack participation in physical activity due to focus on work and school along with possible limitations of their living conditions.

18. The health disparities of migrants in the United States due to lack of physical activity with modification to current lifestyle

Lauren Hall [1] ([1]Honors Program, Exercise Physiology Major, Barry University, Miami Shores, FL)

Physical activity is important to the five health components of fitness and it is utilized to reduce cardiovascular risks. The Physical Activity Guidelines for American Adults require at least 150 minutes of moderate-intensity activity per week or at least 75 minutes of vigorous-intensity activity per week to be considered physically active. There is a difference in the physical activity levels for migrants into the United States, before and after their arrival. Specifically, among the Puerto Rican and Haitian migrant populations, studies have shown that the migrants were healthier than an average native-born American before their arrival to the U.S. However, after a period of time living and working in the U.S., the migrants' risks of cardiovascular disease increased significantly, along with levels of obesity, hypertension, and diabetes. Because these migrants often seek economic opportunities to support their families back in their native countries, two possible factors contributing to these health risks may be related to the economic status and lack of a support system among these migrants. As natives in their own countries, it is shown that these migrants were able to achieve the physical activity standards through the common daily activities like chores, lifestyle, and transportation. The typical individualistic and post-industrialized lifestyle in the U.S. often involves more time spent in a vehicle for transportation, in addition to more technology and/or factory-based occupations. This research project examines a sample of Puerto Ricans and Haitians who have been living and working in the U.S. for at least five years, highlighting factors such as the amount of time spent doing physical activity, health indicators, and economic status, before and after their arrival to the U.S. The goal of this research is to gain an understanding of this health phenomenon and help these migrant populations reduce cardiovascular disease related health risks.

19. Living conditions of migrant workers

Jennie Iudice [1] ([1]Honors Program, Social Work Major, Barry University, Miami Shores, FL)

While migrant workers are a necessary part of the farming industry, they are not treated as such. Many of these migrant workers come from Mexico and speak little English, causing many farm owners to exploit them. While there are regulations on migrants' living conditions, they are seldom enforced. Evidence shows that over a quarter of these migrant living camps violate bedroom and laundry codes. One in five of these migrants camps have signs of rodent infestation. Over half of these camps are considered food insecure, considering the lack of access to many government funded structures in place to fight food insecurity. Furthermore, these migrants are often placed in rural areas, with little transportation options. This limits the housing options outside of potential camps, allowing landlords to charge higher than normal rent. Consequently, migrants end up living in crammed and unfavorable conditions. In addition to the strenuous nature of farm work, the exposure to pesticides and toxins greatly affects the migrants' health. Adding to the poor living conditions, migrants face prejudice and harassment on the farm, affecting their mental health. Since over forty percent of the migrants are undocumented, they are reluctant to step forward, addressing and/or reporting on any of these unacceptable conditions. Because of recent news coverage in some areas, certain states have begun to try to improve the living conditions of their migrants, particularly in California. This paper examines how the State of California's Department of Housing and Community Development creates several housing centers on the farms across the state and offers affordable housing with air conditioning, healthcare, English classes, and day care for families. While California is taking steps to better the living conditions for the migrant workers, more needs to be done to ensure their safety across the country.

20. An analysis of health screening of migrants for coronavirus (covid-19) regarding ethical issues, particularly in the united states

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It is estimated that two percent of the world's population is not residing in their country of origin. Although the percentage may seem small, this equates to approximately 200 million people living abroad. Intense human mobility causes an extensive impact on the public health and health services of the host countries. The impact is mostly associated with the transmission of communicable diseases due to the possibility of migrating populations linking non-endemic regions to other regions where the disease is prevalent or even endemic. Recently, the Coronavirus (COVID-19) epidemic has been raising serious health concerns, and the health screening policies are being used as the main source of disputes between governments and avoidance of the spreading of the disease. The need for health screening policies is essential for protecting citizens as well as the health system of the host country from harmful pathogens. Furthermore, as non-medical factors play a role in health screening processes, it becomes a powerful tool for discrimination. These factors may raise serious ethical issues by compromising respect for persons, as well as infringing human rights. This research project examines how health screening of migrants, including cases in the United States, is conducted when there is a lack of standard protocol related to migration and how different definitions may limit one's attempt to move to another country. The procedure for the Coronavirus will be focused on, emphasizing the ethical issues, and propose changes to make health screening a nonpartisan process.

21. An immigration story through pictures posted on social media

Nicole Lentz [1] *([1]Honors Program, Photography Major, Barry University, Miami Shores, FL)*

Leaving family is hard. Leaving family and showing false happiness is even harder. In many cases, social media tend to portray false hope and happiness through posed photographs and fake smiles. Because of the pressure to be happy and to alleviate family concerns for their well-being in a host country, migrants may put on a play through the use of social media, especially through posting of carefully selected photographs. One can argue that if social media users who grow up in thriving countries manipulate photos to portray a great life, migrants may have even higher needs to portray a great life in a new country. Using the narrative paradigm as a theoretical framework, this paper examines the use of social media and the users' attempts to fulfill both coherence and fidelity through their posted photographs while telling intended stories. By examining selected photographs to determine degrees of coherence and fidelity, I hope to understand why some immigrants may have higher needs than others to convey a happy story about their assimilation into the American society. For this project, I will use a convenient sample of a small group of foreign exchange students, attending a small town high school in the U.S. Because these are people I know, I will have both the first-hand knowledge about them, both in person and as friends through Snapchat and/or Instagram platforms. I hope my research will reveal how immigrants and migrants tell stories, particularly to their families back home and perhaps encourage them to tell stories that achieve both criteria of coherence and fidelity.

Barry University College of Arts and Sciences
Department of Math & Computer Science

22. Vulnerability of simple transposition techniques

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We are examining the vulnerability of simple transposition techniques which includes Rail-Fence Techniques, Columnar transposition, and Vernam Cipher. A GUI (graphic user interface) is built to help illustrate the process of encryption and decryption. Brute-force methods are used to decrypt messages encrypted using the above referenced transposition techniques. The simple columnar transposition technique places characters of plain text in a sequence of rows of a rectangular structure and rearranges them in column-major sequence. Rearrangement may also take place as a binary level exclusive or (XOR) operation between plain text substrings and a given string of equal length that serves as the encryption key. The number of possible permutations of a key of length n, n factorial (denoted by n!), is the determining factor for the complexity of the decryption method. All keys of length 0 to n-1 need be examined. The process of encrypting messages involves grouping of characters in the ciphertext for varying key lengths and adjusted key permutations. For encryptions performed with the exclusive or operation, an additional computational overhead is assumed due to the increased number of key variations. A recursive algorithm is employed to produce all key permutations. The time complexity of the decryption algorithm is bounded above by $O(m * n * n!)$, where m denotes the length of plain text. Vernam ciphers require additional time due to the increased variations of the encryption key. A fundamental weakness of transposition techniques is attributed to the preserved frequency distribution of plain text characters within the resulting ciphertext. The system will also utilize a frequency analyzer as well a word validator to decrypt codes at reduced execution times.

23. Improve your health and wellness: an ai approach

Ernst Jean Ralph Pierre [1], and James Haralambides [1] ([1]Department of Math & Computer Science, Barry University, Miami Shores, FL)

We design a system that will help the general public improve their overall health, using an AI approach. The website built for the system is intended to display to registered users web content that closely matches their interests. From physical health to nutritional health, spiritual health to intellectual health and mental health, users will be able to navigate to webpages they choose and find relevant information that will help them to improve their health and wellness. The system will provide activities or show local events that the users might be interested in and then add them automatically to their calendar. Users will be able to subscribe with their email and receive newsletters and other updates about interesting health improvement tips. The system will adjust its display features with new topics based on content relevancy to a dynamically updated user profile. Each page will be assigned a value which is computed as a weighted average of content-related parameters. For pages internal to the system, weights are precomputed for added efficiency. Weights on external pages are computed algorithmically during page loading. User profiles are assigned similarly structured weights based on the user's navigation history. The system is designed to generate content automatically by selecting pages and hyperlinks that are highly correlated to the user profile. For users that are experiencing health problems, the system will also provide specialist access information so that they contact them via phone, electronically, or set an appointment.

24. Virtual personal trainer

Kevin Valladares[1], Alejandro Perez[1], and James Haralambides[1] ([1]Department of Math & Computer Science, Barry University, Miami Shores, FL)

We are developing an application that generates an exercise regimen curtailed to the individual user. The app will acquire the user's fitness data through smart devices and supporting software. Extrapolated data will be fed into a series of algorithms that will produce a workout and meal plan that the user may follow in order to achieve a higher level of fitness. We provide the user a starting point into a healthier lifestyle without the frustration of days of research and unscientific misinformation that can lead to an inefficient, possibly dangerous workouts and diets. The software will serve as an AI Trainer which will make fitness recommendations without the need for high fees, appointments, insufficient equipment, or micromanagement. It will adapt to the user's schedule, environment, and health concerns. It will give options to the user without overwhelming them with redundant, unrelated, or ineffective workouts and information. The user shall reap the benefits of our application by gaining awareness of the positive impact that a more health-oriented lifestyle can have on their physical and mental capacity. The application begins with data collection from a smart watch and a smart scale that includes average heart rates, body weights, and body mass indices (BMI) that translate into a generalized workout and meal plan. Workout routines and recommended meal plans are incorporated into the applications database in terms of their calorie burning values. Special consideration is given to users with health challenges such as high blood pressure and diabetes.

Barry University College of Arts and Sciences
Department of Physical Sciences

25. Synthesis of functionally selective m1/m4 long-acting muscarinic antagonists for parkinsons therapeutic applications

Grace Cambria [1], and John Boulos [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

Parkinsons disease is a progressive degenerative brain disorder effecting millions of patients around the world. The disease manifests by tremors, rigidity, bradykinesia and posture instability. It primarily occurs after gradual cell loss in the substantia nigra of the brain which is responsible for dopamine production. It is well documented that M1/M4- preferring antagonists may potentially restore neurotransmitter balance between dopamine and acetylcholine in the brain in order to alleviate some of the symptoms of Parkinsons. In light of this observation, potent long-acting M1/M4-preferring muscarinic acetylcholine antagonists were developed by former research students in Dr. Boulos laboratory. These compounds were tested on Chinese Hamster Ovary (CHO) cell lines transfected with M1-M5 muscarinic receptors, at the Czech Academy of Sciences, for binding affinity and functional activity. The current research is built on these previous results which focuses on the development of more potent analogs in order to proceed to in vivo studies. These novel analogs were synthesized via a multi-step reaction routes and characterized by Nuclear Magnetic Resonance (NMR) spectroscopy and Gas Chromatography coupled with Mass Spectroscopy (GC-MS) after purification. The first step involved the reaction of p-butylbenzoyl chloride with 3-quinuclidinol to form the corresponding ester. The product was then purified and reacted with hydrogen chloride or iodomethane to produce the corresponding hydrochloride or methyl iodide salts, respectively. These salts, recrystallized from butanol, were sent to Galbraith laboratory for elemental analysis and to the Czech Republic for bioassays. The ultimate goal of this study is to develop potent and efficacious drugs that can alleviate symptoms of Parkinsons disease and to provide a better quality of life for both patients and their immediate families.

Funded by Department of Physical Sciences

26. Comparing mechanochemical synthesis of tetraphenylporphyrin with other "greener" synthetic approaches

Lise-Berthe Laurent [1], and Tamara Hamilton [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

Three no-solvent-added approaches to synthesizing tetraphenylporphyrin (TPP), including mechanochemical, microwave, and gas phase synthesis were carried out. These were compared with each other and with the traditional solvent based approach to determine which is most green. Our work was developed into an undergraduate laboratory experiment. Previous researchers (Warner, et. al) have published the gas phase and microwave synthesis of TPP for undergraduate labs. Our work adds a mechanochemical approach and a quantitative comparison of the different synthetic methods to obtain TPP. This work will help undergraduate students to become aware of more sustainable approaches to chemical synthesis and ways to measure and compare the sustainability of various procedures. Each synthesis was carried out multiple times and isolated yields of the product were recorded. In addition, all materials used for synthesis and purification were tracked and measured. This allowed calculation and comparison of EcoScale scores and E-factor for each synthesis. Comparing results in this way enables determination of the most sustainable approach to a given synthesis. Introducing these concepts to undergraduate students will raise awareness of green chemistry and what factors to consider when comparing various approaches to synthesis of the same product.

Funded by Barry University Department of Physical Sciences

27. Introducing gc-ms analysis into undergraduate organic chemistry ii laboratory curriculum

Emily Londono [1], Michaela Reyes [1], John Boulos [1], George Fisher [1], and Zuzana Zajickova [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

In an effort to introduce gas chromatography-mass spectrometry (GC-MS) analysis into the Organic Chemistry II laboratory curriculum, undergraduate students in the upper-level Instrumental Analysis course developed two GC-MS methods to be implemented in two well-known organic chemistry experiments: the synthesis of 2-chloro-2-methylbutane via an acid-catalyzed SN1 reaction of 2-methyl-2-butanol and the nitration of methyl benzoate via electrophilic aromatic substitution reaction. The GC was equipped with an autosampler, a split injector, a HP-5MS column (30 m x 0.25 mm x 0.25 μm), and a helium mobile phase. The MS was equipped with an electron impact ionization source and a quadrupole mass analyzer. The analytes in the crude products of the synthesis of a tertiary alkyl halide and the nitration of methyl benzoate were baseline separated under isothermal conditions within 3 min and 7 min, respectively. The identity of individual analytes was confirmed via comparison of retention times and mass spectra of respective standards. The favorable speed of these separations allows either experiment to be completed in one or two three-hour lab periods, including synthesis and product identification by IR, NMR and GC-MS.

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28. Synthesis of m1-preferred long-acting muscarinic antagonists as therapeutic potential for striatal cholinergic dystonia, epileptic seizure and depress

Liliveth Mesa [1], and John Boulos [1] ([1]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 sites amongst the receptor family, the design of dualsteric ligands that are both selective and efficacious in binding to specific muscarinic receptor subtypes is essential to the successful synthesis of potential drug targets. 4-hexyloxy-(4-oxidobenzoyloxy)-3-quinuclidinyl-1-ium salts were synthesized in several steps starting with the reaction of p-hexyloxybenzoyl chloride with 3- quinuclidinol to afford the corresponding ester. The ester was reacted with either hydrogen chloride gas or methyliodide to afford the corresponding hydrochloride or methyl iodide salts, respectively. 4-hexyloxy-1-[2-(4-oxidobenzoyloxy)ethyl]-1,2,3,6-tetrahydropyridin-1-ium salts were synthesized in a similar fashion starting with p-hexyloxybenzoyl chloride and pyridine. All ompounds were recrystallized from n-butanol and characterized by 1H-NMR. In biological assays, the tetrahydropyridinyl salts compounds were found to be potent long-acting M1-preferring antagonists which non-competitively antagonize functional response to carbachol with high potency, under washing condition. The quinuclidinyl salts were found to bind to M1-M5 muscarininic receptors with much higher potency than the tetrahydropyridinyl salts. 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 striatal cholinergic dystonia, epileptic seizure and depression.

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29. Evaluation of paint air purification capacity using solid phase microextraction and gas chromatography with mass spectroscopy

Lilyveth Mesa [1], Grace Cambria [1], Jeremiah Paul [1], and Zuzana Zajickova [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

Indoor air pollution has been linked to adverse health effects such as respiratory damage, cognitive impairment, and cancer. Common indoor air pollutants include volatile organic compounds such as formaldehyde, acetone, and benzene. In order to improve indoor air quality, eco-conscious paint companies have begun to develop paints that adsorb common air pollutants onto the paint surface to minimize the quantity of pollutants in air. In this study, paint from the company Smog Armor was evaluated for its purification capabilities by measuring the amount of common air pollutants that the paint removed from the air using solid phase microextraction coupled with gas chromatography with mass spectroscopy. Thus, the results of this study provide insight into the utility of Smog Armor paints to minimize toxic emissions as well as improve general health.

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30. Localization of alpha-subunits of the receptor for the neurotransmitter glycine through gel electrophoresis and immunohistochemistry

Jeremiah Paul [1], and Manuel Miranda [2] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL, [2]Department of Biology, University of Texas at El Paso, El Paso, TX)

Dysfunction of the glycine receptor (GlyR) is responsible for a variety of neurological disorders including hyperekplexia and some cases of stiff person syndrome, characterized by symptoms of complete muscular rigidity and subsequently unprotected falls leading to chronic injuries. GlyR is a specific type of receptor found in the brain that interprets the signal of the neurotransmitter glycine which initiates a change in the conformation of the receptor allowing chloride to enter a neuron, reducing its probability to elicit an action potential. GlyR is comprised of differing combinations of five subunits, known as alpha-1, alpha-2, alpha-3, alpha-4, and beta. In this study, the different alpha isoforms of the GlyR were localized in different parts of the brain quantitatively via western blot analysis and qualitatively through fluorescent confocal microscopy following immunohistochemistry. This study concluded that GlyR alpha subunits are differentially expressed in different brain regions. The alpha-1 subunit was found to be the least specific with high levels of expression in the thalamus, striatum, and cortex. The alpha-4 subunit was the most specific with high levels of expression in the brainstem but low levels of expression in the other brain regions analyzed. Given the role of the brainstem to control the flow of electrical impulses from the brain to the rest of the body, it is hypothesized that dysfunction of the alpha-4 subunit could be responsible for the symptoms observed in disorders related to GlyR. Further study of the GlyR subunits is necessary to determine the ways they affect overall GlyR functionality.

31. Synthesis of m1 and m4 selective muscarinic agonists for schizophrenia applications

Jocelyn Rivera [1], and John Boulos [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

Current medications for treating symptoms of schizophrenia exhibit partial bias for either Gq or Gi/o G-proteins coupled to M1 and M4 muscarinic receptors, respectively, resulting in adverse side effects. Several in vitro and in ex vivo studies suggest that selective M1, Gq-biased and to a lesser extent selective M4, Gi/o- biased agonists can lead to preferential activation of specific signaling pathways and inhibition of non-preferential pathways, thus avoiding undesirable side effects. This study attempts to synthesize M1 selective, Gq--biased and M4 selective Gi/o- biased agonists of muscarinic receptors. This research builds on previous work done at Barry University that led to the discovery of M2 selective, Gi/o -biased muscarinic agonists which were shown to retain their selectivity and efficacy profile in native tissues expressing muscarinic receptors. These M2 selective agonists are currently being investigated for their analgesic benefits and as alternatives to addictive opioids for pain management. The goal is to develop a new class of drugs that can activate a singular signaling pathway (Gq or G i/o) which can greatly reduce negative side effects associated with currently prescribed drugs. These agonists were synthesized via multi-step reaction routes. All target compounds and reaction intermediates were purified by either vacuum distillation or recrystallization. Compounds were characterized by infrared-spectroscopy (FT-IR), proton nuclear magnetic resonance spectroscopy (NMR), and mass spectrometry (MS). This work may result in the development of drugs for the treatment of Schizophrenia with reduced adverse effects, thus improving the quality of life of those suffering from such disorder. This research can also help shed light on the pathology and biochemical pathways of schizophrenia, furthering the potential in research surrounding the knowledge, prevention, and treatment of such disorder.

Funded by Barry University Department of Physical Sciences

32. Qualitative and quantitative analysis of caffeine and selected catechin derivatives in various green tea extracts by hplc-pda-ms

Sidney Vest [1], and Zuzana Zajickova [1] ([1]Department of Physical Sciences, Barry University, Miami Shores, FL)

In our initial study, we have determined the presence of five catechin derivatives and caffeine in Chinese green tea extracts by high performance liquid chromatography coupled with photodiode array detection and electrospray ionization mass spectrometry (HPLC-PDA-MS). In this project, we will expand to quantitative analysis of these analytes in extracts of green tea purchased in local supermarkets. Catechins are plant-based flavonoids credited with an antioxidant activity and caffeine is a natural stimulant. This project aims to determine the correlation of the amount of these analytes with the price and the manufacturer of a green tea. The separation was carried out on a silica-C18 Brownlee Choice column with an aqueous methanol gradient. 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. The quantity of catechin, (-)-epigallocatechin, (-)-epigallocatechin 3-gallate, and caffeine was determined using calibration curves of corresponding standards.

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Barry University College of Arts and Sciences
Department of Psychology

33. Association between parental acculturative stress, adolescent bicultural stress, and depression in immigrant adolescents.

Rachel Angulo [1], Christel Jeune [1], Aracely Perez [1], Joalys Baez [1], Sabrina Des Rosiers [1], and Guillermo Wated [1] ([1]Department of Psychology, Barry University, Miami Shores, FL)

Immigration research indicates that cultural challenges associated with the acculturation process increases adolescent stress levels which in turn negatively impact their mental health (Lo et al., 2016). According to Schwartz and colleagues (2010), acculturation is a psychological process that involves changes in values, identifications, and practices when an individual settle in a new culture. Research shows the acculturation process increases stress that can lead to negative outcomes including depression, suicidal ideation and attempts (e.g., Lorenzo-Blanco et al., 2016; Walker et al, 2008). Stress due to acculturation has been called acculturative stress (Rodriguez, et al., 2002) or bicultural stress (Romero et al., 2016). Acculturative stress and bicultural stress are theorized as pressures toward acculturation and pressures against acculturation (Rodriguez et al., 2002; Romero et al., 2015). Both acculturative stress and bicultural stress are detrimental to the adolescent mental health (e.g., Rania et al 2014). Furthermore, studies show that immigrant parents' own acculturative stress is linked to adolescent depressive symptoms. Nevertheless, few studies have investigated whether parental acculturative stress predicts adolescent depressive symptoms. The present study was based on Schwartz et al. (2010) conceptualization of acculturation to describe whether the parent acculturative stress and adolescent bicultural stress predicted adolescents self-reported depressive symptoms. Regression analysis revealed good model fit with an adjusted $R^2 = .20$, $F(5, 292) = 15.88$, $p < .001$ indicating that 20% of the variability in adolescents depressive symptoms was predicted by the adolescents own bicultural stress (ß = .46, t = 8.78, p <.001). Findings indicate that bicultural stress is a strong positive predictor of depressive symptoms in adolescents. Current literature reports that parents psychological functioning is related to adolescent functioning. These findings suggest when it comes to immigrant adolescent depressive symptoms, it may be recommended that practitioners direct their intervention toward reducing adolescent bicultural stress.

34. Gender and ethnic differences in sexual risk behaviors: a descriptive study of emerging adults

Amanda Araujo [1], and Sabrina Des Rosiers [1] ([1]Department of Psychology, Barry University, Miami Shores, FL)

Gender is a social construct (Martin, 1999). The conceptualization of gender is rooted in societal rules, beliefs and values (Westbrook and Schilt 2014). Consequently, social and cultural standards define gender roles. Some standards recommend that women be submissive and nurturing while men should be aggressive and dominant (Basow, 1992). Such conceptualization also determines patterns of sexual behaviors in men and women. In general, studies show both women and men engage in sexual risk behaviors (SRB) but negative outcomes associated with such behaviors vary as a function of gender and ethnicity. Men engage in more SRB but women are more likely to experience deleterious outcomes like sexually transmitted infections (STI). Similarly, data show Black males report SRB at higher rates but disproportionately higher rates of STI were identified in Black females (Brown, 2016). The present study examined gender and ethnic differences in sexual risk behaviors in a sample of emerging adults in college students who self-identify as Blacks, Hispanics and White. The sample N = 856 with a mean age = 19.95, SD = 1.97. A 2X3 factorial ANOVA revealed a statistically significant main effect of gender $F(1,849) = 7.84$, $p < .001$), and ethnicity $F(1,849) = 3.88$, $p < .001$) on sexual risk behaviors. Both main effects were observed to be small ($\eta^2 = .09\%$). Consistent with previous findings women reported lower levels of SRB. However, contrary to previous research male college students in this sample who identify as Black reported lower mean levels of sexual risk behaviors (M = 2.31, SD = 3.38) compared to their Hispanic (M = 3.72, SD = 4.35) and White counterparts (M = 3.78, SD = 6.59). These descriptive findings are meaningful for psychoeducational programs that seek to reduce sexual risk behaviors among college students.

35. Acculturation in emerging adults of haitian, jamaican and cuban heritage

Ceferina Dominguez [1], Zariya Miller [1], Devaedne Mond [1], Beatrice Verrani [1], Sabrina Des Rosiers [1], and Guillermo Wated [1] ([1]Department of Psychology, Barry University, Miami Shores, FL)

Recent reports indicate above 4 million immigrants in the US identify as being of Caribbean heritage (Zong &Batalova, 2019). The 2017 report from the Migration Policy Institute indicates Caribbean immigrants are primarily from Cuba (30%), Dominican Republic (26%), Jamaica (17%) and Haiti (15%). Despite the fact, many emerging adults identify as Jamaican and Haitian heritage, these populations continue to be underrepresented in research. Studies show that acculturation, the process of psychological change that occurs in multiple domains including identifications, values, and behaviors when an individual settles into a new cultural context (Schwartz et al., 2010), is related to variation in mental and physical health depending on national origin (e.g. Kartal et al., 2018). Immigrants who experienced socio-economic disadvantage in their country of origin are at higher risk for maladaptation during their settlement in the US (e.g. LeMaster et al., 2017). The examination of acculturation on the basis of national origin is a meaningful endeavor in particular in immigrants whose country of origin are afflicted by social and economic instability. Based on Schwartz and colleagues (2010) theory, this study assessed differences in acculturation among emerging adults who self-identify as Cuban, Jamaican, and Haitian. The sample included N = 183 participants with a mean age = 20.39 (SD = 4.44). Participants were mostly women, n = 145 (76%). ANOVA test revealed a statistically significant effect of national origin on acculturation toward American culture $F(2, 180) = 3.39$, $p < .05$). Emerging adults who self-identify as Jamaican reported higher mean levels of orientation toward American culture M = 63.23, (SD = 6.85) compared to those who identify as Haitian M = 61.29, SD = 6.85 or Cuban M = 58.86, (SD = 6.85). These findings support previous research that national origin is associated with variation in acculturation patterns.

36. Discrimination, context of reception, and depression in hispanic adults

Haley Faulkner [1], Samuel Elie [1], Chiara Fusari [1], Aaron Simon [1], and Sabrina Des Rosiers [1] ([1]Department of Psychology, Barry University, Miami Shores, FL)

According to Schwartz et al., 2010, acculturation is a psychological process that leads to cultural changes in behaviors, values and identifications when an individual settle in a new culture. Immigrant experiences vary and these variations predict acculturation orientations and health outcomes (Birman et al., 2005). Research shows discriminatory experiences that many immigrants face including Hispanics increase likelihood of mental and physical health issues (e.g., Salas-Wright et al. 2014) including depressive symptoms. In fact, Becerra et al. 2014 found Hispanics who experienced discrimination were more likely to engage in health risk behaviors and report higher levels of depressive symptoms. Similarly, the context of reception in which immigrants settle predicted variation in acculturation and likelihood of maladaptation. Using Schwartz conceptualization of acculturation, the present study sought to identify whether perceived discrimination and context of reception predicted depression in a sample of Hispanic adults. The sample (N = 297) consisted of mostly women (n = 216; 71%). Results from regression analysis indicate good model fit with an adjusted $R^2 = .06$, $F(3, 290) = 84.38$, $p < .001$ indicating that 6% of the variability in depression was predicted by negative context of reception (ß = .15, t = 2.23, p <.05) and perceived discrimination (ß = .14, t = 2.13, p <.05). The present findings are consistent with previous research and informative for practitioners who serve Hispanic adults.

37. Acculturation orientations, self-esteem and perception of body image in Hispanic college students.

Angelica Rodriguez [1], Daniela Caceres [1], Lillian Rodriguez [1], Esperancia Anacce [1], Sabrina Des Rosiers [1], and Guillermo Wated [1] ([1]Department of Psychology, Barry University, Miami Shores, FL)

Reports from the Population Reference Bureau (2019) indicate that the Hispanic population will experience the largest numeric gain and will include the largest portion of emerging adults aged 18 to 29 years (Brechan & Kvalem, 2015). Recent reports indicate increased risk of eating disorders among Latina youth whose acculturation orientation is toward American culture.(Ebrahim et al., 2019). Acculturation, the process of psychological change in multiple domains (Schwartz et al., 2010) that occurs when individuals immigrate into a new cultural context may be associated with ones perception of body image (e.g., Kroon et al., 2014; Cordero & Gutierrez, 2016). Also associated with body image is self-esteem, ones evaluations about the self. Some studies have suggested that immigrants vary in their acculturation orientation such that some retain their heritage culture and others acquire the host culture (e.g., Burton & Yang, 2019) and variation in acculturation and self-esteem is linked to body image perception(e.g., Cordero & Gutierrez, 2016). However, few studies have examined these associations in Hispanic college students. Grounded in acculturation theory (Schwartz et al., 2010), the present study described the predictive relationship of acculturation orientations and self-esteem on perception of body image. The sample (N = 1497) consisted of Hispanic college students. Most (n = 1120) were women (75%) and 77% reported to be US native-born. Results from regression analysis indicate good model fit with an adjusted R^2 = .18, F(3, 1192) = 84.38, p < .001 indicating that 18% of the variability in body image perception was predicted by Hispanic culture retention (ß = .06, t = 2.04, p <.05) and self-esteem (ß = .41, t = 15.22, p <.001). Present findings are informative for college counseling centers that serve Hispanic students.

Barry University College of Nursing and Health Sciences
Department of Sport & Exercise Sciences

38. The effect of sleep quality and being physically active on developing mental toughness

Kendrick Morris [1], Alexander Anderson [2], Quinn Astrachan[2], Courtnie Moodie [2], Andreas Stamatis[3] and Zacharias Papadakis[1] ([1]Department of Sport & Exercise Sciences, Barry University, Miami Shores, FL [2]Department of Biomedical Sciences, Barry University, Miami Shores, FL, [3]Sport and Wellness, SUNY Plattsburgh, Plattsburgh, NY)

Mental toughness (MT) has been increasingly associated with successful performance in several stressful and competitive environments (e.g. the military, business, academics, medicine, sports). Being physically active (PA) may compromise sleep quality (SQ). Research has reported conflicting associations regarding PA and MT. Regarding SQ and MT, a bidirectional association has been reported. However, research has not yet focused on the combined effects of PA and SQ on MT. PURPOSE: To characterize the association and the effects of PA and SQ on MT. The authors hypothesized that: (a) PA and SQ are negatively associated; (b) PA and MT are positively associated; (c) SQ and MT are negatively associated; and (d) the interaction effect of PA and SQ on MT will be buffering. METHODS: Sixty-two participants (age 25.4 $\pm$ 6.0 SD) completed inventories related to SQ (Pittsburgh Sleep Quality Index) and MT (Mental Toughness Index). PA data were collected according to American College of Sports Medicine guidelines. Main and interaction effects of the responses were analyzed using factorial ANOVA. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: PA was positively correlated with SQ ($r = .009$, $p = .473$) and with MT ($r = .246$, $p = .027$). SQ was negatively correlated with MT ($r = -.470$, $p = .000$). PA ($F_{1,58} = 10.939$, $p = .002$, $\eta^2 = .159$) and QS ($F_{1,58} = 23.051$, $p = .000$, $\eta^2 = .284$) had a main effect on MT. The interaction of PA and QS had a buffering moderating effect on MT ($F_{1,58} = 12.394$, $p = .001$, $\eta^2 = .176$). CONCLUSION: Evidence was found for all but the first hypothesis. PA-participants tending to be mentally tougher than the non-PA ones. Poor sleepers, on average, were mentally tougher than the good sleepers. The buffering effect indicates that the non-PA individuals with poor quality of sleep are the mentally toughest ones, followed by PA individuals with poor quality of sleep. Non-PA individuals with good quality of sleep present the lowest MT levels. In regards to developing mental toughness the authors suggest that: a) PA should be prescribed to good quality of sleepers and b) in poor quality sleepers focus should be placed on sleep before PA. Such findings may be useful to exercise and health-related practitioners when prescribing PA in a wide variety of individuals that report sleep quality issues in relation to MT capacities.

39. The effects of adhering to ACSM physical activity guidelines on female university employees

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Despite the well-established benefits of regular physical activity (PA), 50.9% of Americans do not meet the American College of Sports Medicine (ACSM) guidelines for cardiorespiratory, resistance, and flexibility exercise. Physical inactivity, low cardiovascular fitness (CVF), obesity and body fat percentage (BF%) are risk factors for increased cardiometabolic morbidity and mortality. Universities, despite the increased educational awareness, create sedentary environments that do not promote PA, thus jeopardizing their employees' health. PURPOSE: To educate university employees about the health-related benefits of PA and the time frame is needed to start seeing changes by meeting the minimum of the ACSM PA guidelines. METHODS: Female physical inactive university employees were targeted (Age 40 ± 11 yrs, Body weight 76.9 ± 4.4 kg). Participants underwent basic anthropometric (body weight, waist circumference, waist hip ratio), mean arterial pressure, body composition (using bioelectric impedance analysis) measurements, and a submaximum oxygen consumption test (using a Bruce protocol) as baseline measurements. Participants were given the ACSM guidelines and instructed to follow these for 12 weeks. No other control was made on participants' lifestyle factors between the pre- and post-measurements, other than the day before to replicate their diet, PA and sleep patterns. They were given a Fitbit© tracker to record and monitor their PA activity levels so they meet the weekly PA guidelines. This is an ongoing funded project from the

Advancement of Interprofessional Collaboration and Education (ADVICE) project and the reported results reflect pre- and post-values from end of week 1 to end of week 4 (N=4). Thus, all measurements were repeated after 4 weeks of the intervention. One-way factorial ANOVA by time was used to detect changes between Week 1 and Week 4. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: BF% was significantly reduced by 38.8% ($F_{1,5} = 9.943$, $p = .025$, $\eta^2 = .665$). All the remaining examined variables were improved by week-4 presenting practical, but were not statistically significant ($p > .005$). Lean mass was increased by 15.6%, mean arterial pressure was reduced by 9.6%, waist circumference was reduced by 5.7%, waist hip ratio was reduced by 20.7%, minutes of being physically active were increased by 13.7%, and predicted maximum oxygen consumption was increased by 4%. CONCLUSION: Following the ACSM PA guidelines for just 4 weeks and increasing the minutes of being physically by 13.7% it was enough to improve BF% and other associated cardiometabolic disease risk factors. Even though these results represent preliminary data from small sample size the practical significance of this study is that university employees can improve their risks factors for cardiometabolic morbidity and mortality by adhering to the ACSM PA guidelines for even 4 weeks.

Funded by the ADVICE Project

40. Heart rate variability responses to exercise in mid-spectrum chronic kidney disease

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BACKGROUND: Heart rate variability (HRV) is a measure of autonomic nervous system (ANS) activity, and decreased HRV is associated with many cardiovascular conditions. Chronic kidney disease (CKD) is characterized by a decrease in renal function and may be associated with ANS imbalances in the renal vasculature. Low HRV is associated with CKD incidence. Exercise is able to alter HRV by modulating the ANS. The effect of exercise on HRV in mid-spectrum CKD patients remains understudied. PURPOSE: To determine the effect of steady-state exercise (SSE) and high-intensity interval exercise (HIIE) on post-exercise HRV in patients with stage 3 or 4 CKD. METHODS: Twenty participants with stage 3 or 4 CKD (n = 6 men; n = 14 women; age 62.0 ± 9.9 yr; weight 80.9 ± 16.2 kg; body fat 37.3 ± 8.5% of weight; VO_2max 19.4 ± 4.7 ml/kg/min, eGFR 51.5 ± 6.82). On separate days, each participant completed 30 minutes of aerobic exercise on the treadmill with exercise intensities set at 65% VO_2reserve for SSE and 90% and 20% of VO_2reserve in 3:2 min ratio for HIIE in a randomized crossover design. Both exercise conditions averaged ~ 65% VO_2reserve. HRV was measured at baseline, immediately post-exercise (IPE), 1-hr post-exercise, and 24-hr post-exercise. HRV was measured for 5 mins in the supine position using an elastic belt and Bluetooth monitor (Polar H7). CardioMood software was used to process HRV variables high frequency (HF), low frequency (LF), and standard deviation of all NN intervals (SDNN). Data were analyzed using 2 (condition) by 4 (time) repeated-measures ANOVAs. Data violated normality and were natural log (ln) transformed prior to analysis. Significant main effects were followed up using pairwise comparisons using a Bonferroni adjustment for multiple comparisons. All analyses were performed using SPSS© (v.26). RESULTS: For ln LF/HF there were no significant main effects for exercise condition, time, or their interaction ($p > 0.05$). For ln HF, ln LF, and ln SDNN there was a significant main effect for time ($p < 0.05$). Post-hoc comparisons revealed that HF, LF, and SDNN were significantly lower IPE than for all other time points. CONCLUSION: Thirty minutes of aerobic exercise transiently decreases HRV in mid-spectrum CKD patients. This response was not modified by exercise condition.

41. Longitudinal-retrospective 8-weeks non-periodized, non-individualized training program effectiveness of Hialeah fire department

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Firefighting requires high fitness. Fire academies assess cadets' fitness. Hialeah Fire Department (HFD) academy utilizes a non-periodized, non-individualized training program to assess its recruits' fitness. PURPOSE: Evaluate HFD's program effectiveness across 4 years. We hypothesized a) each class-years' fitness will be improved; b) there will be no difference in gain across years, after accounting for intra- and inter- individual differences. METHODS: HFD cadets (age 26 ± 5 SD) from class-years 2016 (N=6), 2017 (N=7), 2018 (N=16), and 2019 (N=15) included in the study. All class-years participated in the same 8-week program. Cadets assessed at week-1 and week-8 on 1.5-mile run time, maximum pull-ups, push-ups, and sit-ups. Delta gain percentage (ΔG%) calculated as [((post-pre)/pre)*100]. Analysis of covariance (ANCOVA) by class-year and controlled for the pre-test scores was performed for each dependent variable. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: Significant effect of ΔG% on class-year 1.5-mile ($F_{3,39}$ = 20.693, p = .000, η^2 = .614); no significant effect of ΔG% on class-year pull-ups ($F_{3,38}$ = 2.722, p = .058, η^2 = .177); significant effect of ΔG% on class-year push-ups ($F_{3,39}$ = 3.338, p = .029, η^2 = .204); no significant effect of ΔG% on class-year sit-ups ($F_{3,39}$ = 1.828, p = .158, η^2 = .123). CONCLUSION: HFD's program improved cadets' fitness levels across 4 year-classes but failed to account for intra- and inter-individual differences. This program may under- or over-estimate cadets' fitness training capabilities. This program is not appropriate to account for between class-years and within cadets' differences and maximize the reported benefits as dictated by the training principles. Specific individualized fitness programs that meet the needs of a broad range of individuals within the Fire Service are needed. Such tailored programs may serve better the firefighters' job-related fitness.

42. 10-yr follow-up for adolescent with low back pain & symptomatic lumbo sacral transitional vertebra/Bertolottis syndrome: a case study

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CASE HISTORY: A 16-yr old female presented a lower back pain (LBP) with significant axial pain extending bilaterally to buttocks and anterolateral thighs. Past health history revealed laminectomy for removal of a benign tumor on L4/L5 at 8-yr old and structural scoliosis (e.g., C-curve). Computed tomographic (CT) scans of the lumbosacral spine conducted 10 years prior revealed: an abnormal articulation between the L5 transverse processes and the sacrum ala bilaterally with 5 regular lumbar vertebrae and a transitional vertebra (L6); there was no evidence of disc degeneration or spinal nor foraminal stenosis. Initial diagnosis revealed lumbosacral transitional vertebra (LSTV), however classification wasn't proposed due to patient of adolescent age. LBP was stated to be potentially due to a complicated case of Bertolotti's syndrome (BS). Conservative therapy was recommended and a follow-up post-pubertal changes to see if articulating surfaces fused with time and determine if disc above the LSTV incurred degeneration. PHYSICAL EXAM: Recent physical exam revealed no lack of strength bilaterally in lower extremities. The LBP intensity on a numeric rating scale was 7/10 and Oswestry score of 33 (moderate disability). LBP affected by prolonged sitting or standing and presenting tenderness. Provocative factors included forward flexion-based movement and restricted mobility in back extension-based movement. DIFFERENTIAL DIAGNOSES: Disc degeneration or herniation; facet joint arthrosis; spinal canal or foraminal stenosis. TESTS & RESULTS: CT scan for comparison with initial diagnosis were ordered; complete lumbarization/sacralization with complete fusion with the neighboring sacral basis with no disc herniation or degeneration. FINAL DIAGNOSIS: CT scan revealed LSTV classification type III. DISCUSSION: LSTV are congenital spinal anomalies with variation of L5 in which enlarged/elongated transverse processes form a joint or fusion with sacrum or ilium. BS is stated to be the association of LSTV with LBP with change in biomechanical properties of the lumbar spine, however, the etiology of pain is unclear. The contact between bones at the pseudo-articulation has been debated as a source of pain which can be manifested as sacroiliac, hip, groin or imitating an L5 radicular pain. Infiltration with local steroids and anesthetics, along with

positive imaging are useful diagnostic tool to study BS and pain generator—more specifically which patients have pain generator exclusively at the pseudo-articulation (complete relief of pain after the injection) and which patients have pain due to the irritation of L4 or L5 nerve root. In rare cases, patients with negative response to injections are candidates to more complex procedures such as resection of L5 transverse process and decompression with varied results. OUTCOME OF THE CASE: Patient received an interlaminar and a transforaminal epidural steroid injection with negative response. RETURN TO ACTIVITY AND FURTHER FOLLOW-UP: Despite the steroid injections, muscle relaxants and an aggressive physical therapy rehab regimen (core strengthening, stretching/flexibility, hydrotherapy, massage therapy) has been unsuccessful in pain mitigation. Resection of the abnormality has been proposed. Further research is warranted, given the pathophysiology of BS remains obscure and there being no consensus about the most appropriate therapy/management of disorder in each patient especially for younger populations.

43. The prevalence of musculoskeletal injuries and burn out in undergraduate nursing students at barry university

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Musculoskeletal disorders (MSDs) affect the muscles, nerves, blood vessels, ligaments and tendons. Work related MSDs are among the most frequently reported causes of lost or restricted work time. Moreover, MSDs caused 33% of all workers injury and illness cases. In addition, burnout is another consequence of the high stress and increased incidence of MSDs. Burnout is a term that describe the reactions of workers to a chronic stress in occupations that have direct interactions with people. Typically, it is conceptualized as a syndrome characterized by emotional exhaustion (EE), depersonalization (DP), and reduced personal accomplishment (PA). The purpose of this study was to measure the risk factors of MSD and the level of burnout in Barry University nursing students during their clinical rotation. Sixteen college students participated in the study, 13 females and 3 males (29.5±4.4 years, 165.6±6.8 cm, 68.7±11.8 kg). All students have completed seven clinical rotations by the time of the data collection. The students were required to complete two questionnaires to assess the prevalence of MSD and burnout. The results of the Survey for Work-Related Musculoskeletal Disorders (WMSD) found that the students experienced pain/discomfort at the neck (50%), shoulder (44%), upper back (31%), and lower back (44%) in the last year, which lasted two days or more. In addition, 38% of the students experiencing neck and lower back pain/discomfort stated that the pain/discomfort increased during their shifts. The results of the Maslach Burnout Inventory questionnaire suggested that 75% of participants experienced moderate to high levels of EE, 38% showed moderate to high levels of DP, and 63% experienced low levels of PA. These findings suggested that Barry University nursing students are susceptible to MSDs and burnout. Future studies need to investigate the influence of physical activity and relaxation techniques interventions on MSDs and burnout among nursing students.

Funded by CNHS Project and Professional Development Scholarship, Project ADVICE

44. Do race, physical activity, body mass index, and sleep quality affect mental toughness?

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BACKGROUND: Physical activity (PA) has been linked to health and quality of life benefits. Differences in race and body mass index (BMI) may contribute to health-related disparities. Sleep quality (SQ) has been associated with both PA and health, influencing each other in a two-way interaction. Variations in PA are linked to differences in mental toughness (MT). MT is linked to lower SQ and increased PA, but the influence of race and BMI on MT is still under investigation. The purpose of this study was to characterize the association and the effects of PA, race, BMI, and SQ on MT. METHODS: Sixty-two participants (age 25.4 $\pm$ 6.0 SD) completed surveys related to PA, race, BMI, SQ, and MT. Main and interaction effects of the responses analyzed using factorial ANOVA. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: PA was

positive correlated (r = .246, p = .027) and SQ was negatively associated with MT (r = -.470, p = .000). Race was negatively associated with MT (r = -.234, p = .033). SQ had a main effect on MT ($F_{1,30}$ = 18.568, p = .000, η^2 = .382). PA and BMI interaction had an effect on MT ($F_{2,30}$ = 5.572, p = .009, η^2 = .271). The interaction of race and BMI had an effect on MT ($F_{4,30}$ = 2.805, p = .043, η^2 = .272). CONCLUSION: As previously reported, poor quality sleepers are mentally tougher compared to good quality sleepers. When PA and BMI are combined, PA and overweight individuals are mentally tougher, followed by the non-PA and underweight ones. When race and BMI are combined, White-overweight and other-normal BMI individuals are the mentally toughest. Followed by Hispanic-overweight, and Asian underweight and obese I, II, III, with African Americans underweight and overweight having similar values. Health care professionals may find this information valuable when they are trying to address health-related issues that pertain to race, PA, BMI, SQ, and MT.

45. Exercise prescription for and outcomes of a cardiovascular and cerebral misfunction case

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HISTORY: A Caucasian 62 -year-old male was admitted in the emergency room with complaints of chest discomfort. Patient was experiencing weakness on the left side of his body and was considered medically paralyzed. Patient was experiencing seizures that occurred 1 month ago due to heart conditions and in the last two weeks he experienced another stroke. History consisted of cardiovascular disease, cancer and coronary artery disease and smoking for 25 years. In 2011, patient had a defibrillator and pacemaker put in. August of 2016, patient had gone through ventricular fibrillation and resulted in a stent placement. In 2017, patient experienced a stroke that affected his left side. In 2018, patient had a left ventricular assist device (LVAD) placed, which is currently still present. PHYSICAL EXAMINATION: Patient weights 65.1 kg, is 170 cm tall, blood pressure is 230/112. DIFFERENTIAL DIAGNOSES LIST: Patient has diagnosed of coronary artery disease, heart failure, and non-Hodgkin lymphoma. DATA: Patient had a 24% ejection fraction. FINAL WORKING DIAGNOSIS & TREATMENT: Coronary artery disease and stroke with a left side deficit. Patient enrolled in Resolution Cardiovascular Rehabilitation for seven months and he is following the cardiac rehab program three times a week. Patient's goals were to improve balance, walk longer distances and increase strength. Program's main rehabilitation was to improve patient's balance and bilateral strength in addition to strengthen his heart in order to perform a heart transplant. Cardiac rehab team is focused to strengthen the muscles of the right (unaffected) side of his body in order to compensate for the left (affected) side. The exercise prescription focuses on cardiovascular and weight bearing exercises. He has been working on 6-minute walks, Nu-step for 20 minutes, lower and upper body exercises. During weight bearing exercises patient performs with heavier weight on his right side. During exercises like the leg extension machine, patient exerts and controls weight with right leg but uses left leg to the best of his ability. In order to assess improvements between the left and right side strengths, unilateral exercises are performed. Cardiovascular exercises are done to increase patient's endurance and promote improvement in posture. Patient's LVAD placement elicits pain due to involved muscle tissue in the abdomen and due to unstable posture while walking. Patient is to be walking and attempting to be independent at home for a continuation of what is learned in rehab. OUTCOME: Patient has increased weight bearing abilities for left and right side. Patient is able to walk 90ft continuously, is experiencing less pain from LVAD and maintains better posture. Continuation of improvements are predicted if patient continues to attend and put effort in exercising that will promote strengthening of his heart for future heart transplantation.

46. Sex impacts regression models predicting upper-body muscular endurance

Christina MacDonell [1], Takashi Fukushima [2], Frances Huldin [2], Grant Morgan [3], Andreas Stamatis [2], and Zacharias Papadakis [1] ([1]Department of Sport & Exercise Sciences, Barry University, Miami Shores, FL, [2]Sport and Wellness, SUNY Plattsburgh, Plattsburgh, NY, [3]Educational Psychology, Baylor University, Waco, TX)

According to Centers for Disease Control and Prevention (CDC) data and the well-established overall benefits of physical activity (PA), only one out of three adults meet the American College of Sports Medicine (ACSM) muscle strengthening guidelines in the US. PA and obesity levels, cardiovascular endurance, psychological factors, and sex disparities have been suggested as possible predictors of

this statistic. Minimum levels of muscular endurance are required to perform activities of daily living (ADL), maintain functional independence during aging, and to participate in leisure and PA without undue fatigue or risk of injury. Upper-body muscular endurance is commonly measured directly using the push-up test. Males are more likely than females to meet the muscle-strengthening physical activity guidelines. Regression analysis is often used in exercise prescription in an effort to provide answers to a phenomenon and make predictions of future behavior. PURPOSE: To examine whether a prediction model for upper-body muscular endurance using predicted oxygen consumption (VO_2max), physical activity (PA) level, age, body mass index (BMI) and mental toughness index (MTI) scores during a push-up endurance test is subjected to sex. METHODS: In total, 162 participants agreed to participate (M_{age}= 23, SD=5.7). A calibrated Monark 828E cycle ergometer, an electronic HR monitor with a chest strap were used for the VO2max test prediction based on the heart rate termination. A standardized push-up test was chosen to measure muscular endurance. BMI was calculated based on height and body weight. PA and all of the aforementioned assessments were collected and calculated according to ACSM 10th ed. guidelines. The statistical analysis involved a multiple regression of the variables described above using R and p level was set at 0.05. RESULTS: The regression model for females was: y=.7+.04*x; $F_{5,47}$=5.6, p=.00, R^2=.373 and for males was: y=.73+.02*x; $F_{5,78}$=1.9, p=.11, R^2=.108. Comparing the regression models factored for sex revealed significant difference between males and females: $x^2(15)$= 38.67, p=.00072. CONCLUSION: Muscular endurance is associated with improvements in cardiovascular and respiratory function, reduction in cardiovascular risk factors, decreased morbidity and mortality, and other benefits, such as decreased anxiety and enhanced performance. Our prediction model for upper-body muscular endurance was significantly different based on sex. Health care professionals may need to consider sex when using models for prescribing exercise to increase North Americans' upper-body muscular endurance. Future studies on muscular endurance should focus on creating models examining the contribution of other factors in order to investigate the unexplained variance of our modeling. However, the authors believe that sex needs to be investigated further in any future regression modeling. Limitations may include self-reported data of physical activity and mental toughness scores.

47. Open reduction and internal fixation of three displaced malleoli

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CASE HISTORY: A 20-year-old, white/Hispanic, female visited Emergency Room with severe inflammation, lateral ecchymosis, tenderness, and displacement of the left ankle due to a fall. Patient was unable to move foot, remained non-weight bearing, and had 10/10 pain levels with palpation to ankle and foot. PHYSICAL EXAM: Upon orthopedics' physical examination, pain on palpation was noted on the left hallux. Her pedal pulses were readily palpable. There was moderate nonpitting edema to the left lower extremity. DIFFERENTIAL DIAGNOSES: Grade 3 lateral ankle sprain. TESTS & RESULTS: General radiology (GR) on ankle, tibia, fibula, and a computerized tomography (CT) on left ankle were ordered. GR found acute displaced angulated trimalleolar fracture with soft tissue swelling and ankle joint malalignment. CT indicated displacement of distal medial malleolar fragment, minimal posterior displacement of both the distal lateral and posterior malleolar fragment. No damage was found to the tendons and ligaments. FINAL DIAGNOSIS: Three displaced malleoli. DISCUSSION: Open reduction and internal fixation of lateral malleolus with 1/3 tubular internal fixation systems (IFS) plate and six locking and nonlocking screws across the plate. Medial malleolar displacement was reduced with a 1.25 K-wire then internally fixated with one 4.0 partially threaded cancellous IFS screw measuring 45mm in length. Fluoroscopy was used to confirm medial and lateral malleolar alignment and proper screw length. Reduction of the lateral and medial malleoli caused accidental reduction to posterior malleolar displacement and no internal fixation was needed. Patient was placed in a controlled ankle movement (CAM) walker and transferred from operating room to post-anesthesia care unit. Vital signs were stable and neurovascular status was intact in left lower extremity. She was readmitted to the floor for postoperative management and discharged two days postop. Patient was instructed to be strict non-weight bearing to her left lower extremity. She was instructed to keep the CAM walker on with ankle at 90º dorsiflexion and she ambulated with crutches. X-rays were taken during follow up with podiatrist to rule out hallux fracture, in which case there was no fracture. Patient was to be non-weight bearing with left lower extremity elevated for 3 months postop. Physical therapists were asked to evaluate and gait train the patient. OUTCOME OF THE CASE: Patient received 1-3 hour physical therapy sessions, tri-weekly, for three months in an outpatient facility. Therapist provided scar massages to remove scar tissue and help gain range of motion (ROM). Patient was weaned into applying full body weight to left lower extremity with CAM walker. Once patient was

full weight-bearing she was permitted to cease need for CAM walker. RETURN TO ACTIVITY AND FURTHER FOLLOW-UP: Patient's goal was to gain the strength to run and the flexibility to wear heels again. Therapist focused on building muscle, gaining balance and stability, increasing ROM, and decreasing pain. After three months, patient was able to run and wear heels without issues. Patient fully recovered from injury and now lives comfortably with the IFS plate and screws.

48. A single short sleep-wake cycle effect on heart rate variability among good quality sleepers

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BACKGROUND: Morning awaking hours are associated with increased risk of adverse cardiovascular events. Nocturnal sleep physiology is important to health and functioning. Short sleep (SS) impairs autonomic nervous system (ANS) activity. Low ANS function is reflected by decreased heart rate variability (HRV). High stress index (SI), parameter of HRV, is identified as a physiologic mechanism which sleep disturbances may potentially influence cardiovascular events, due to the imposed higher level of strain of ANS. This study aimed to examine the effect of one night of SS on SI among good sleepers. METHODS: Fifteen males (age 31 ± 5 SD), with good sleep quality as determined by the Pittsburgh Sleep Quality Index (PSQI) participated in this study. After being in a supine position for 10 minutes in a quiet and temperature-controlled environment heart rate was recorded for 5 minutes with an elastic electrode belt (Polar Wearlink®). SI was recorded the night before and the morning of the next day during reference sleep (9-9.5 hrs) (RS) and SS (3-3.5 hrs) conditions. Sleep was performed at their own residence. SI data were processed using CardioMood® application. SI was analyzed using a 2 (condition) by 2 (time) repeated measures ANOVA. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: There was a significant main effect of time on SI ($F_{1,14} = 4.7$, $p = .049$, $\eta^2 = .250$). Participants' mean SI was higher the night before (m=82.1) than the morning of the next day (m=59.9). CONCLUSIONS: SI is not modified by a single episode of SS among good sleepers. In good sleepers, results contribute to the observed increase in cardiovascular vulnerability after awakening in the morning irrespectively whether they obtain their regular sleep or not.

49. Race and gender differences in overweight-obese population on mental toughness

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BACKGROUND: Race, gender, and being overweight-obese are linked to health disparities. Adherence to weight management strategies may require certain levels of mental toughness (MT). Cultural and gender differences may have different impact on people battling with weight management when MT is under questioning. This study aimed to characterize the association and the effects of race and gender in overweight and obese population on MT. It was hypothesized that: (a) Race and gender are positively associated with MT; (b) Race and gender will have an effect on MT. METHODS: Thirty-two participants (age 25.0 ± 3.0 SD) completed surveys related to demographics and MT. Main and interaction effects were analyzed using factorial ANOVA. Significance was set at $p < 0.05$. All analyses were performed using SPSS©. RESULTS: Race was negatively correlated with MT ($r = -.437$, $p = .006$). Gender was negatively correlated with MT ($r = -.357$, $p = .022$). Race had a main effect on MT ($F_{2,26} = 4.119$, $p = .028$, $\eta^2 = .241$). Gender had a main effect on MT ($F_{1,26} = 5.268$, $p = .030$, $\eta^2 = .168$). No interaction of race and gender on MT was observed ($F_{2,26} = .506$, $p = .609$, $\eta^2 = .037$). CONCLUSIONS: Hispanics are mentally tougher than African Americans, followed by Asians. Hispanics are not different than African Americans, but they do differ from Asians on MT, while African Americans do not differ from Asians. Males compared to females had higher levels of MT. Even though there was not an interaction effect between race and gender, Hispanic males have the highest MT levels, followed closely by African American males. The lowest MT levels were observed between Asian female individuals. Health care professionals working with overweight and obese minorities may need to be more cautious on their approaches and strategies applied to manage weight using stressful strategies that may require high levels of mental toughness.

50. Using regression analysis to prescribe exercise for increasing cardiorespiratory fitness levels

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Increases in cardiorespiratory fitness (CRF) are linked to reduction in all-cause mortality. VO_2max is considered the criterion measure of CRF. Models for predicting VO_2max are essential for practitioners when prescribing exercise. PURPOSE: To develop a prediction model for VO_2max using termination heart rate (HR) and rate of perceived exertion (RPE), sex, physical activity (PA) level, and body mass index (BMI) during a submaximal CRF test. METHODS: In total, 162 participants agreed to participate (M_{age}= 23, SD=5.7). The sample was predominantly males. A calibrated Monark 828E cycle ergometer, an electronic HR monitor with a chest strap, and the 6-20 Borg Scale were used for the test. The appropriate protocol was chosen based on participants' body weight and physical activity level. In the last 10 seconds of the last stage of each protocol, RPE and HR were obtained. That termination HR was used to estimate VO_2max. PA was assessed according to American College of Sports Medicine (ACSM) guidelines. BMI was calculated based on height and body weight. The statistical analysis involved a multiple regression of the variables described above using R. RESULTS: The set of predictors explained 67% of the variability of VO_2max (R^2 = 0.67). HR (b = -.45, p < .001), sex (b = -7.71, p < .001), and PA (b = 4.92, p < .001) were all significant predictors of VO_2max. RPE (b = .45, p = .06) and BMI (b = -.23, p = .10) were also related to VO2max, but not at the 5% significance level. CONCLUSION: The results indicate that practitioners in fields such as healthcare analytics, exercise physiology, and sport coaching should focus on the modifiable predictors of VO_2max (i.e., PA, RPE, and BMI), when prescribing exercise (especially, as means to increase CRF and reduce all-cause mortality). Future studies should include additional exercise (e.g., metabolic gases) and non-exercise (e.g. Perceived Functional Ability) variables and use other submaximal or maximal protocols. Limitations may include small number of variables and self-reported RPE data.

Author Index

Raven	Kpassou	7
Anastasia	Kotsanis	4
Lise-Berthe	Laurent	26
Delia	Leal	43
Nicole	Lentz	21
Yu-Wai Peter	Lin	7
Emily	Londono	27
Christina	MacDonell	46,47,50
Victoria	Martinez	4
Christianida	Mazard	3
Liliveth	Mesa	28,29
Dina	Mijacevic	50
Zariya	Miller	35
Manuel	Miranda	30
Devaedne	Mond	35
Zachary	Money	4
Courtnie	Moodie	38,39,44,49
Grant	Morgan	46,50
Kendrick	Morris	38
Carmen	Nieves	4
Osahon	Obayagbona	22
Zacharias	Papadakis	38,39,40,41,42,44,46,47,48,49,50
Jeremiah	Paul	29,30
Alejandro	Perez	24
Carley	Painter	47
Aracely	Perez	33
Matthew	Peterson	40
Ernst Jean Ralph	Pierre	23
Erika	Pierre	2,8
Devin	Plaskett	42
Michaela	Reyes	27
Mario	Romero	10
Isabella	Ruiz	1
Anaya	Ruiz	11
Melissa	Rigueros	5,6,9,14
Jocelyn	Rivera	31
Angelica	Rodriguez	37
Lillian	Rodriguez	37
Lee	Sanchez	49
Ashley	Schneider	42
Brenda	Schoffstall	2
Aaron	Simon	36
Kira	Spearman	7
Andreas	Stamatis	38,44,46,49,50
Marvin	Sublett	42
Marisa	Sutton	45
Paige	Symonette	3
Isaias	Trujillo	12
Kevin	Valladares	24
Beatrice	Verrani	35
Sidney	Vest	32
Morgan	Vyas	43
Ariana	Villarroel	13
Guillermo	Wated	33,35,37
Meghan	Williams	39
Zuzana	Zajickova	27,29,32

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Cover Design by: Nicole Beltran