Department of Biology

TGFβ-mediated Growth Inhibition of Human Myeloid Leukemia Cells Is p53-p21 Pathway Independent.

Alessandra Angelini, Anjali Ramkissoon, Shakima St. Clair, Xiaotang Hu (Barry University, Miami Shores, FL 33161) and Lynn C. Moscinski (University of South Florida College of Medicine, and H. Lee Moffitt Cancer Center, Tampa, FL 33612)

p53 is a transcriptional factor that regulates both cell cycle progress and apoptosis. Early studies showed that cells lacking p53 were unable to control proliferation. This effect of p53 results from its action on G1 protein kinases (cdks) through the induction of p21 protein, a G1 cdk inhibitor. Transforming Growth Factor-(TGFβ) is a ligand that has been shown to be an important negative regulator of growth in a variety of cell types including hematopoietic leukemia cells. The inhibitory role of TGFβ on cell proliferation has been shown to be a result of the downregulation of cdk expression and activity, and upregulation of cdk inhibitors, including p21. Recent studies demonstrated that transcriptional activation of p21 by TGFβ requires p53 in some mammalian cells. In contrast, p53-deficient cells display an impaired response to TGFβ signals. In this study, we investigated whether the p53-p21 pathway was involved in TGFβ-mediated growth inhibition of the MV4-11 human myeloid leukemia cell line in culture. TGFβ significantly inhibited proliferation of MV4-11 cells with upregulation of p27 and downregulation of multiple cdks and cyclins, detected by cell number measurement, Western blot, and kinase assays, respectively. Unexpectedly, TGFβ dephosphorylated p53. The dephosphorylation was rapid and prolonged, first detected at 1-3 h, and lasting for 48 h after addition of TGFβ to the cells. As a control, TGFβ had no significant effect on the expression of total p53 protein. There was no significant apoptosis or cell differentiation being observed by Caspase assays and morphological examination, respectively. We were not able to detect significant expression of p21 in either proliferating or G1 MV4-11 cells, suggesting that p21 may not play an important role in TGFβ-mediated growth inhibition of the cells. Taken together, our data suggest that TGFβ-induced inhibition of MV4-11 cells is p53-p21 pathway independent. Since TGFβ suppressed the phosphorylation of p53 and growth of the cells without causing significant cell death, the possibility that TGFβ may shut down the p53-apoptotic pathway during the cell cycle inhibition is postulated.

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The Reproductive Cycle and Embryo Development of *Fundulus heteroclitus* in the Laboratory.

Jodi-Ann Browning, Alton Johnson, Blandine Victor, Myrline Sterling, Teresa Petrino PhD and Yu Wai P. Lin PhD (Barry University, Miami Shores, FL 33161)

We have a new aquarium facility (Aquatic Habitats) to house our research animals. The objective of this project was to monitor the reproductive activity of the first batch of fish (*Fundulus heteroclitus)* brought into the aquarium in January 2009. The aim is also to use these data as the baseline for future experiments on endocrine disruption. The reproductive activity of

F. heteroclitus follows a semi-lunar pattern in their natural habitat; they spawn heavily during the full moon and new moon. Under the current conditions in the laboratory (water temperature at 26 ± 2°C; salinity 28ppt-30ppt; 14hr light and 10 hr dark photoperiod; fed on average 3 to 4 times each day), 10 tanks containing a total of 79 fish *(*42 males, 37 females) were monitored and their eggs removed from the tanks after each successful spawning cycle. A screened tray was placed within each tank to collect the eggs. Once the eggs were collected each day, the development of the embryos was closely observed and the successive developmental stages were photographed. With the current set up, we were able to collect fertilized eggs, which developed to a normal hatching stage. Although more data are needed to determine the periodicity of the spawning cycle, these results indicate that our aquarium environment appears to be suitable to support the reproductive activity of this species.

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Neuronal Migration Pathways in the Zebrafish Embryo.

Jonothan Colon, Julie Cadet, Gabrielle Johnson, Lanzi Sinaise, and Stephanie Bingham PhD (Barry University, Miami Shores, FL33161)

Neurons undergo extensive migration during vertebrate nervous system development either radially from the inner core of the brain to more superficial layers, or tangentially (at right angles) to the radial plane. These cell migrations are essential to the proper establishment of synaptic contacts that will enable neurons to function efficiently. Zebrafish, *Danio rerio*, is an excellent model system for the study of these cell movements: it is a relatively simple vertebrate organism, fertilization is external making all stages of development accessible, the embryo is transparent thereby allowing for analysis at the single-cell level, development and generation times are rapid, and there are many zebrafish homologs of genes involved in human nervous system development. The hindbrain is home to many of the cranial nerves which control head and facial movements. Strikingly, two of the cranial nerve populations, the facial (nVII) and glossopharyngeal (nIX), undergo tangential migration during a period from 16 hours post fertilization (hpf) to 36 hpf. Several putative genes involved in this process have been identified but there is a decided need for a deeper understanding of the mechanisms by which these genes function to regulate neuronal migration. It is therefore our goal, through loss- and gain-of-function studies, to elucidate the role(s) played by these genes in controlling this very crucial process.

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Improving Candidate Replication of the Trait Work: Single Neucleotide Polymorphisms (SNPs) in Alzheimer's Disease.

Cindy Cuello (Barry University, Miami Shores, FL 33161), Donald McCorqoudale, and Amanda J. Myers (University of Miami, Coral Gables, FL 33124)

There are noncoding genetic differences among humans which may uphold the answer of the explicit genetic structure. Our lab seeks to unearth the relationship that exists between the known variations in the human genome and its transcriptome and observe how this relationship affects the outcome of brain diseases. We hypothesized that those relationships would be relevant to the future study of neuropathological disease. Investigation of the relationship between single nucleotide polymorphisms (SNPs) changes and transcripts expression resulted in the discovery of 2 previously known transcripts, GSTO2 and TFCP1. These transcripts may be involved in Alzheimer's disease (AD) because they interact with known AD factors. Our results substantiate that the relationship between known genetic variations and the transcript expression in the brain can be used in the future to study human brain disorders. This is interesting because we have found many novel genetic variations solely by looking genome and trascriptome wide. Additionally, by finding known targets our new approach gets truly validated.

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Confusion in Translating a DNA Sequence: How to Make Sense of Sense and Antisense.

Kiyana Edwards, Saul Jaramillo, Teresa Petrino PhD, and Peter Lin PhD (Barry University, Miami Shores, FL 33161)

When Bioinformatics is taught, teachers usually refer to tutorials, in order to help students improve the understanding of the subject. One of the tutorials used in our Bioinformatics class is the European Molecular Biology Lab – European Bioinformatics Institution (EMBL – EBI)-Transeq, a program used for translation (converts DNA sequence into corresponding amino acid sequence). However, when tutorials attempt to explain how to do a translation from a DNA sequence there is some confusion in the polarity (5’ and 3’ ends) of the sense and antisense strands of the DNA molecule. The sense strand sequence corresponds to the messenger RNA (mRNA) in terms of polarity and nucleotide sequence, except that, Thymine (T) in the sense strand DNA is replaced by Uracil (U) in the mRNA. Additionally, while the most prevalent terminology describing the DNA strands is sense and antisense , there is also confusion in the terminology used to describe the DNA strands because, they are also known as the coding and non-coding strands or the template and non-template strands. Consequently, the objective is to create a tutorial that will help us, the students, to have a better understanding of how to translate a DNA sequence.

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The cicadas of Florida (Hemiptera: Cicadidae).

Philip Gillis, Allen F. Sanborn (Barry University, Miami Shores, FL 33161), and Polly K. Phillips (Florida International University, Miami, FL 33199)

Cicadas are a loud, conspicuous part of the summer. However, they are often difficult to collect and found in relatively small populations. As a result, they are not often the subject of study and the cicada fauna for only a few states has been determined. We have produced the present work

as part of a larger project to determine the biogeography of North American cicadas. More than 100 museum collections were visited to collect biogeographical data. In combination with our own field studies and specimens sent to AFS for determination, we identified the species present in Florida and their distributions within the state. A total of 15 species and 4 subspecies representing 4 genera, 3 tribes and 2 subfamilies have been recorded for Florida. Within the Subfamily Cicadinae, the Tribe Cryptotympanini is represented by *Diceroprocta biconica* (Walker), *D. olympusa* (Walker), *D. viridifascia* (Walker), *Tibicen auletes* (Germar), *T. davisi* (Smith & Grossbeck), *T. lyricen lyricen* (De Geer), *T. lyricen virescens* Davis, *T. pruinosus* (Say), *T. resonans* (Walker), *T. robinsonianus* Davis, *T. similaris* Davis, *T. tibicen tibicen* (Linné), and *T. tibicen australis* (Davis) and the Tribe Cicadini is represented by *Neocicada hieroglyphica hieroglyphica* (Say) and *N. hieroglyphica johannis (*Walker). The Subfamily Cicadettinae is represented by *Cicadetta calliope calliope* (Walker) and *C. calliope floridensis* (Davis) of the Tribe Cicadettini. A key is provided for the species inhabiting the state. The distribution of each species is restricted to specific plant communities. Seven species (*D. bequaerti* [Davis], *D. bicosta* [Walker] *D. [Tibicen] grossa* [Fabricius], *D. vitripennis* [Say], *T. canicularis* [Harris], *T. walkeri* Metcalf, and *Magicicada septendecim* [Linné]) are removed from the Florida cicada fauna. Specimens attributed to these species are shown to be misidentified examples of other species or are significantly out of range with no voucher specimen that could be located.

We thank all the individuals who assisted with access to museum specimens. PG was supported by EPA Grant, 83164401, Barry University. AFS was supported by a Barry University Mini-Grants and a sabbatical leave.

Template Utilization in Yeast strains with Elongated Telomeres.

Gina Guillaume, Leticia Vega (Barry University, Miami Shores, FL 33161) and Katherine Friedman (Vanderbilt University, Nashville TN 37240)

Telomeres are the ends of linear eukaryotic chromosomes. Telomeres protect chromosomes from degradation and end-to-end fusions. In eukaryotes, conventional DNA replication by DNA polymerase results in an "end replication problem" whereby terminal DNA sequences are lost during each round of replication. The ribonucleoprotein enzyme, telomerase, is required to maintain telomeres. In the budding yeast, *Saccharomyces cerevisiae*, a reverse transcriptase (Est2p) and an RNA template (*TLC1*) comprise the catalytic subunit of telomerase. Together, these components maintain telomeres by adding heterogeneous repeat sequences of 5'-(TG) $_{0\text{-}6}$TGGGTGTG**(G)**-3' to chromosome ends. Most mutations that affect the telomerase pathway result in telomere shortening. However, several mutations resulting in telomere lengthening have also been described. *est2-E76K* (*E76K*), is a mutation in the catalytic subunit of telomerase that results in a substitution of a negatively charged glutamate for a positively charged lysine at position 76. Mutant yeast strains containing *E76K* exhibit over-elongation of telomeres by up to ~100 basepairs. In addition to causing long telomeres, the E76K mutation also alters the pattern of nucleotide addition to the telomere *in vivo*. Pif1p is a 5' to 3' helicase that unwinds DNA-DNA and RNA-DNA hybrids and has been shown to be a negative regulator of telomerase. In *S. cerevisiae*, deletion or inactivation of the nuclear form of Pif1p results in elongated telomeres. To gain insight into how telomere elongation occurs in mutants with

elongated telomeres, we are examining the telomere sequences in pif1 mutants by cloning the elongated telomeres via a polymerase chain reaction (PCR) based assay. Our approach will be similar to the approach used to determine the pattern of nucleotide addition in *E76K* mutants. The nucleotide sequence of the cloned telomeres from *pif1-m2* strains will be determined and will be compared to our results with *E76K*. By analyzing the telomere sequences from both *pif1* mutants and *E76K* strains, we hope to understand if all long telomere mutants show the same pattern of nucleotide incorporation and template usage *in vivo*.

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Skeletal vs. Cardiac Actin: Effects on Myosin ATPase and Thin Filament Sliding Speed.

Emily Hanna, Maxime Jean, Danamarie Moonoo, and Brenda Schoffstall (Barry University, Miami Shores, FL 33161).

We investigated the function of skeletal actin vs. cardiac actin with *in vitro* muscle solution assays using an actin-activated Mg-ATPase assay and unregulated and regulated *In Vitro* Motility assays. While α-skeletal and α-cardiac actin isoforms are well characterized with conserved (~90%) sequence homology, recent research has focused the differences between actin isoforms. Normal cardiac muscle contains ~85% α-cardiac actin isoform and a small amount of α-skeletal actin isoform. An increased α-skeletal/ α-cardiac actin ratio has been observed in diseased hearts, thus it is of interest to know if actin isoforms alter actomyosin crossbridge kinetics. Sequence variability between the two isoforms occurs in areas important for myosin binding. We performed actin-activated Mg-ATPases and both unregulated and regulated *In Vitro* Motility assays using porcine cardiac myosin, rabbit skeletal actin (historical convention), and porcine cardiac ventricular cardiac actin. We found no significant difference in actin-activated MgATPase hydrolysis rates between the two actin isoforms. Unregulated IVM, however, showed a significant difference ($p < 0.01$) in average filament sliding speeds (rabbit skeletal = 2.65 μm/s; porcine cardiac = 2.47 μm/s). With regulated IVM, we found no significant difference in maximum Ca^{2+}-activated filament sliding speed. There was a slight (but not significant) difference in the Ca^{2+} sensitivity of thin filament sliding, with pCa_{50} 5.7 for rabbit skeletal actin and 5.8 for porcine cardiac ventricular cardiac actin. Our data suggest that possible differences in myosin binding, but not regulatory protein binding between the two actin isoforms could be explored. Our results also provide baseline data and support the validity of replacement of conventionally used rabbit skeletal actin with porcine cardiac ventricular cardiac actin in regulated experimental muscle solution assays, establishing an "all cardiac protein" system for studying actomyosin interaction in cardiac muscle.

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Use of Hydroponically-reared Turtlegrass (*Thalassia testudinum*) Seedlings in Seagrass Bed Restoration.

Silvia Maciá, Robin Cascioli and Michelle Metcalf (Barry University Department of Biology, Miami Shores, FL 33161)

The purpose of our research is to hydroponically rear turtlegrass (Thalassia testudinum) seedlings from the seed stage and plant these seedlings in propeller scars to accelerate recovery of these disturbed areas. During the summers of 2004—2008 we collected seagrass fruits and seeds that washed up on the shoreline of Key Biscayne, Florida. Fruits first appeared in May and continued to appear through September. Both intact fruits and loose seeds were collected. The largest numbers of fruits were collected in July and August, and fruit diameter and weight peaked in August. Germination and laboratory leaf growth rates were similar for seeds from all collection dates. In November 2007 we planted 100 seedlings in a propeller scar in an otherwise dense turtlegrass bed. Seedlings were first placed in peat pots and the peat pots were then completely buried within the prop scar. Retention of seedlings was low; loss of seedlings from the buried peat pots suggests that waves and/or currents swept the seedlings away. Nevertheless, the large numbers of available seeds and the ease with which they can be collected and maintained suggests that this technique may provide an inexpensive, non-destructive source of turtlegrass seedlings for restoration at appropriate sites.

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The Role of Pif1p in Exacerbating Telomere End Protection in *Saccharomyces cerevisiae*.

Lina Ortega and Leticia Vega (Barry University, Miami Shores, FL 33161)

Telomerase, a specialized reverse transcriptase, preserves genome integrity by maintaining telomeres at the ends of linear eukaryotic chromosomes. In *Saccharomyces cerevisiae*, telomerase activity is highly regulated because inappropriate telomere addition can stabilize chromosomal aberrations. Pif1p, a cell cycle regulated 5′ to 3′ helicase, helps preserve genomic stability by maintaining mitochondrial DNA and negatively regulating telomerase at telomeres and at double stranded DNA breaks. Over-expression of Pif1p is lethal in *cdc13-1* and *yku*Δ strains that are compromised for telomere end protection. Conversely, deletion of *PIF1* results in suppression of the temperature sensitive growths of these strains. Cdc13p and the Ku heterodimer are multifunctional telomere binding proteins that contribute to telomere length maintenance, telomere end protection and show synthetic lethal interactions. In this study, we show that that telomere elongation in *cdc13-1* strains at permissive temperatures requires the G1 telomerase association. In addition, we found that Pif1p plays an important role in maintaining normal telomeres in *cdc13-1* strains, since *pif1Δ cdc13-1* strains exhibit telomere hyper-elongation. The telomere hyper-elongation phenotype is dependent on the G1 mediated pathway. To analyze the telomere end structure of various mutant strains, we developed conditions to detect single strand G-tails at native telomeres using non-radioactive detection methods and examined the telomere end structure of wild-type and mutant yeast strains with aberrant G-tails. Finally, we show that Pif1p is modified in response to DNA damage in wild-type cells. Higher mobility forms of Pif1p are also detected in *cdc13-1* strains grown at permissive temperatures. We determined that the mobility shift is likely due to phosphorylation. Our experiments suggest Pif1p modification in cells where DNA damage checkpoints have been activated may serve as a mechanism to limit telomerase activity. Since Pif1p like helicases are evolutionarily conserved

between yeast and humans, these studies may impact telomerase regulation and chromosome stability in higher eukaryotes.

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Determination of Ubiquitin-mediated Degradation of Pif1p in *Saccharomyces cerevisiae.*

Emir Rubi, Lina Ortega and Leticia Vega (Barry University, Miami Shores, FL 33161)

Protein degradation (proteolysis) is a fundamental mechanism for several important biological processes including: metabolic regulation, embryonic development, and cell cycle control. In eukaryotes, the ubiquitin system has been established as the principal pathway that targets proteins for selective and rapid degradation by the proteosome. Our work focuses on Pif1p, an evolutionarily conserved 5' to 3' helicase important for telomere end protection, genomic stability, and mitochondrial function in *Saccharomyces cerevisiae.* Pif1p levels are regulated throughout the cell cycle in both human and yeast cells. Recently, human Pif1p (hPif1p) has been shown to be polyubiquitinated *in vivo* and degraded by the Anaphase Promoting Complex (APC). Previous results indicate that regulation of Pif1p in yeast is also APC-dependent, but ubiquitination of Pif1p has not been shown. The purpose of our study is to determine whether Pif1p in yeast is targeted for degradation via ubiquitin-mediated proteolysis *in vivo*. We have generated cells containing a Myc-tagged form of Pif1p and plasmids encoding an HA tagged ubiquitin gene under the control of the copper-inducible promoter (*CUP1*). Experimental conditions to facilitate purification and detection of tagged ubiquitinated proteins via immunoprecipitation will be developed. Polyubiquitination will be indicated by the presence of higher molecular weight species of Pif1p after SDS-polyacrylamide gel electrophoresis (SDS-PAGE) and western blot analysis. If we determine that Pif1p is polyubiquitinated *in vivo*, our results would support an evolutionarily conserved mechanism for the regulation of Pif1p levels in both in both yeast and human cells.

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Department of Information Technology

Virtual Cabling System.

Jesus Martinez (Barry University, Miami Shores, FL 33161) and Jesus Alberto Sandoval (Honduras` Air force, Tegucigalpa)

Miami Dade County Public Schools is in need of creating inexpensive ways of communication. They requested the implementation of a wireless system in the cheapest way possible, but at the same time such system needed to meet the maximum security. This Research was done in collaboration with Jesus Alberto Sandoval, an engineer of telecommunication of Honduras` Air Force. We started the research using convectional cheapest devices, normally used for home

users, but we analyzed the possibility of expand the range of transmission utilizing alternate ways, as for example a homemade powerful antenna. We used Linksys access points and converted it into telecommunication repeaters to create virtual cables. We linked five access points by their MAC address while we closed other ways of communication. The major result of our research was that we created a network in which no other devices can detect this system, except the five Linksys connected in bridge modes. This restriction applies to other access points (excluding the five on the clustering). There is no capacity to link more than four access points, and one access point acting as central repeater (located near to the server). Workstations and devices will access the network using wires and switches connected to the four access points. This is not a wireless system since no device will be able to communicate or detect the network, except another access point, but it will be virtually impossible. We have found the cheapest way of use the wireless system just to create virtual cables, while save thousands of dollars in building infrastructures. The total price of the investment was $450 Dollars. We arrived at the conclusion that conventional devices can be used to do exceptional functions if we use our imagination.

Department of Mathematics and Computer Science

The Musical Gene.

Frederic Bertino[1] and Ching-Hua Chuan PhD [2] (Department of Biology, Department of Music[1]

Department of Mathematics and Computer Science[2] Barry University, Miami Shores, FL)

Our research concerns the blending of three major academic areas, computer science; biology; and music, to encourage the education and appreciation of natural patterns and algorithms in living and natural systems. Our goal is to compose a piece of music from these naturally occurring algorithms through a technological medium. We created a computer program to generate a piece of tonal music based on the amino acid sequence of a DNA strand. The chord progression generated by the program reflects the biological sequence. This study was inspired by the complex nature and vital function of DNA, and its difficulty to be understood by non-biologists, due to its symbolic representation. In contrast, many researchers have observed that most people even without formal musical training are very sensitive to tonality and structural information in music. To test our theory of naturally occurring patterns, we took the DNA sequence of the gene *LysA* in *E.coli* bacteria and sought after recurring patterns in its amino acid sequence after codon translation. After translating the DNA sequence, a computer program was written to assign a musical triad, a chord consisting of three tones, to an amino acid based on an amino acid's frequency of occurrence in the DNA sequence. Due to the biological characteristics of amino acids, i.e., they are classified by a codon or "triad", it would be appropriate to group these amino acids to a chord triad in music. Amino acids vary based on the order and contents of the nitrogenous bases involved, similarly to musical chords (triads) and the pitches that form them. Our computer program generated a MIDI file, or music instrument digital interface file, consisting of the chord progression in the order of the amino acid sequence in the *LysA* gene. The generated chord progression led by the DNA sequence was applied to a piece of music. Musical triad were assigned based on a theoretically logical foundation within the study of music theory such that the most occurring amino acid would be assigned the tonic chord, or root chord of the

piece's intended key, followed by the dominant and sub-dominant chords being more common than chords that would not normally be found in the piece's key. The output DNA-inspired piece was evaluated by using the statistical tools and music analysis algorithms in Matlab. With this technology, we were able to analyze the piece while playing it simultaneously, as well as viewing statistical data such as the occurrence frequency of amino acids and mapped triads.

The Effect of Varying Demosaicing Algorithms on Image Quality of RAW Sensor Data Using a Bayer Filter in a Software Environment

Josiah Bradley (Barry University, Miami Shores, FL 33161)

The research explores the different effects of demosaicing algorithms. These algorithms are used in combination with RAW image data produced by sensors that use a Bayer Filter to collect color information. Only one type of Bayer Filter shall be tested to control results. Image quality will be measured using both subjective and objective methods. Subjective test will be done by the researcher and by polling volunteer participants. Objective test will be performed by creating a difference map between the original data and the processed data. All tests will be done in a software environment due to limitation of obtaining proprietary hardware systems. The software environment will include a graphical user interface (GUI) designed to switch between different algorithms and the original data. Also included will be the difference map and the ability to save both processed data and the difference map.

Artificial Intelligence in Video Games

Jonathan Fineout and Peter Wilson-Ferrer (Barry University, Miami Shores, FL 33161)

The purpose of our research is to explore the use of artificial intelligence in video games. Games are continually evolving with more realistic environments and content, becoming more attractive to a wider audience. As part of this evolution, more advanced artificial intelligence algorithms and techniques are being used to create a greater sense of realism in opponents and in elements with which the player interacts. Historically, artificial intelligence has been used in video games since the 1970's when arcade game machines became popular. These games, such as "Pong" by Atari Incorporated, used a basic form of artificial intelligence to provide a challenge to the player when not playing against another human being. While simplistic in nature, their conception marked a major milestone in the field. Following these early uses, advancements in artificial intelligence theory began to be applied in video games. Text-based video games became popular in the late 1970's and 1980's and while they did not feature much in the way of graphics, they did provide the player with a more interactive and perhaps unpredictable experience. Games such as "Zork" by Infocom reacted to commands issued by the player in an intelligent way not seen before. Since then, as well as graphical detail, the implementation of artificial intelligence has become an important part in the success of video games. For example, if the enemies in a game perform the same action every time they are challenged by a player, the game will quickly become boring and fall out of favor. Therefore to be truly successful and enjoyable, a game must respond appropriately to the actions of the player. These responses are driven by a carefully chosen and correctly implemented artificial intelligence algorithm or algorithms. Our intention is

to examine some of the various algorithms in use in today's video games and to provide an effective comparison displaying the major differences between them. We hope to discover why a certain algorithm may have been chosen and how it is appropriate for the game in question.

Voice over IP: Future and Current Use

Danny Levons (Barry University, Miami Shores, FL 33161)

Voice over Internet Protocol better known as VoIP is a grand technology that is taking the world by storm. Why? It's saving millions of businesses and families tons of money while keeping them even more connected than they previously were with traditional phone companies. VoIP is an innovative method that takes our analog audio signals and transforms them into digital data that can be transmitted via the internet. VoIP technology is a derivative of the traditional phone system which can completely revamp the aged communication system that we've been using a form of since the times of Germany's Phillip Meis and America's Alexander Graham Bell. This research explores the various forms of VoIP technologies, the vast potential behind it, and the great services that customers are receiving throughout the entire world. Various methods and services that incorporate VoIP will be presented such as Skype and MagicJack phone communication services. We will also analyze the benefits and limitations of VoIP and compare it to the classical phone system.

Improving the Efficiency of the Reconstruction Algorithm used in Soft X-Ray Diffraction Microscopy.

Nicholas Tsoi-A-Sue (Barry University, Miami Shores, FL 33161), Ethan Townsend, Margaret Murnane, and Henry Kapteyn (University of Colorado, Boulder, CO 80309)

In 1999, a new type of microscopy was demonstrated where a sample is illuminated by coherent beam, and the detailed scatter pattern is collected. Instead of using a lens to produce an image, a computerized iterative phase-retrieval algorithm replaces the imaging optics, thus making it possible to reconstruct an image of the sample. This type of lensless imaging (also called x-ray diffractive microscopy) is attractive because it can be used to produce images of non-crystalline specimens. However, there existed huge inefficiencies and limitations in the way that images from the X-ray diffraction microscopy process were reconstructed. Two changes that significantly affected the reconstruction time included a simple parallelization of the code and the application of a holography technique. The parallelization process allows the C++ code to run a major "for" loop in parallel allowing the runtime of the reconstruction algorithm to be cut by a factor of the number of processors available. The holography technique takes advantage of the useful constructive interference that the Auto-correlation of images with reference holes contain to build a tight support and obtain useful information about the phase constraints of the image. This tight support and phase constraint information significantly improve the run time of the code. Images of similar resolution using this method, compared to the previous method, have been obtained. However, the time taken to reconstruct images using the improved algorithm is significantly faster than the time taken using the old algorithm. We were able to reduce the time taken for the reconstruction of the j409 experimental data from a few days to as little as an hour.

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Department of Physical Sciences

An in Depth Analysis of Special Relativity and the Double-Slit Experiment.

Chris Akel and John Goehl PhD (Barry University, Miami Shores, FL 33161)

This study was conducted in an attempt to either further validate the ideas/findings portrayed in Special Relativity and the Double-Slit Experiment, or to provide for a different explanation of the observed phenomenon/theoretical models. The most common accepted idea among physicists is that nothing can travel faster than the speed of light, and this study was meant to challenge that very belief. It also attempted to explain the diffraction patterns observed in the Double-Slit Experiment through a different means other than the duality of light. In regards to Special Relativity, just as its founder Albert Einstein did, we used thought experiments to analyze how and why something either could, would, or should travel faster than the speed of light. MathCad was used to model different aspects of the Double-Slit Experiment. The results thus far obtained from this study are inconclusive. The computer models so far indicate the possibility of obtaining two symmetrical peaks in the diffraction patterns of the Double-Slit Experiment, but the remaining infinite number of smaller peaks has not yet and perhaps will not be accounted for.

Evolution of the Global Energy Crisis – Causes, Effects and Strategies for Improving the Impact on the Environment

Kiyana M. Edwards (Barry University, Miami Shores, FL 33161) and Paul F. Mutolo, PhD (Cornell Center for Material Research, Cornell University, Ithaca New York, 14850)

Energy is the capacity to do work; it is found in countless forms, from heating to commuting to industrial processes. Currently, the majority of the world's energy is made available through the burning of fossil fuels such as coal, oil and natural gas; all non-renewable resources. One of the most intricate global challenges confronting our world today is the energy crisis. At the forefront of this crisis is the increasing rates of energy utilization and the ultimate impact of this usage on the environment, which includes the depletion of natural resources and global climate change. Nevertheless, the solution to this problem is no more than sustainable environmental methods including developing technologies for new renewable energy that will prevent, or, at least significantly decrease the impacts on the environment. However, the crises, and the previously established moderation policies are inadequately understood. Consequently, a definite and structured approach is essential to improve the global understanding of the current and potential consequences of this quandary.

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Creatine and Beta-alanine Stability and Kinetics Analyzed Using NMR and HPLC.

Kiyana Edwards and Tony Wallner PhD (Barry University, Miami Shores, FL 33161)

Interest in creatine exists due to its popularity as a nutritional supplement for increasing muscle size, endurance, and performance based on numerous studies. Recent reports have also shown a synergistic effect with combinations of creatine and beta-alanine. NMR (Nuclear Magnetic Resonance) was used to determine the degradation of creatine monohydrate into creatinine both in the presence and absence of beta-alanine. Initial studies on the kinetics of the degradation of these mixtures in the absence and presence of the enzyme creatine kinase were also investigated. The effect of solvent properties such as acidity and glycemic index on the degradation was also examined. Previous analyses have used reverse phase HPLC (High Performance Liquid Chromatography) to study this degradation. Therefore, the NMR results were compared to reverse phase HPLC method. Results from the NMR spectra were consistent with the HPLC data, but were obtained with shorter time.

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D-Aspartate Has Been Found in the Frog Nervous System and Activates Excitatory Amino Acid Receptors.

Nathan Gonzalez, Maria T. Perez, George Fisher PhD (Barry University, Miami Shores, FL 33161), Alice Holohean, and John Hackman PhD (Spinal Cord Pharmacology Laboratory, Miami VA Healthcare System, and Departments of Molecular and Cellular Pharmacology and Neurology, Miller School of Medicine, University of Miami, Miami, FL 33101)

The D-enantiomer of the amino acid aspartic acid (D-Asp) is an endogenous amino acid found in the nervous and endocrine systems of many marine and terrestrial animals where it has physicological importance in neurotransmission and hormone regulation. We report here the first finding of D-Asp in the nervous system of *Rana pipiens* frogs. Various nervous and non-vervous tissues were dissected from frogs. The tissues were homogenized in 10% trichloroacetic acid, centrifuged, and neutralized with aq NaOH. The supernatant was then passed through an AG1-X8 anion exchange column using 1.0 M acetic acid to elute the acidic amino acids (Asp and Glu). The rsulting samples were analyzed by HPLC for the presence of D-Asp. Higher concentrations of D-Asp were found in the nervous tissues (brain, spinal cord, sciatic nerves) than in non-nervous tissues (heart, lung, muscle). We also studied the action of D-Asp on motoneurons of *Rana pipiens* using non-invasive sucrose gap recordings from the ventral root of hemisected spinal cords perfused with Ringer's solution containing TTX to exclude indirect effects of interneuronal and afferent activation. Ten second applications of D-Asp were normalized to 10 sec applications of 100 μM N-methyl-D-Aspartate (NMDA). D-aspartate responses for 0.1, 0.3 and 1 mM were 15, 61 and 130% of NMDA control responses, respectively. The excitatory amino antagonists AP5 and CNQX decreased the depolarizations evoked by D-aspartate. These results demonstrate that D-aspartate is present in the frog nervous system and is capable of eliciting a depolarization of motoneurons.

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Modification of Silica-based Monoliths with Nanolayer of Fluorinated Methacrylate via Photografting for Applications in Microscale Liquid Chromatography.

Joao Luna, Zuzana Zajickova PhD (Barry University, Miami Shores, FL 33161) and Frantisek Svec PhD (The Molecular Foundry – Lawrence Berkeley National Laboratory, Berkeley, CA)

Silica-based monoliths have been prepared inside of UV transparent fused silica capillary by hydrolysis and polycondensation of a sol-gel mixture containing tetramethyl orthosilicate, polyethylene glycol, urea, and acetic acid. Surface modification of the silica monoliths with pentafluoropropyl methacrylate was performed in the presence of benzophenone via free radical grafting polymerization photoinitiated with UV light. Scanning electron microscopy was utilized for the evaluation of the skeleton structure of the prepared monoliths. The monoliths were then used as a separation medium for liquid chromatography. Chromatographic separation of a mixture of thiourea, ethylbenzene, and hexylbenzene was achieved in less than 4 min under isocratic conditions using aqueous acetonitrile as the mobile phase.

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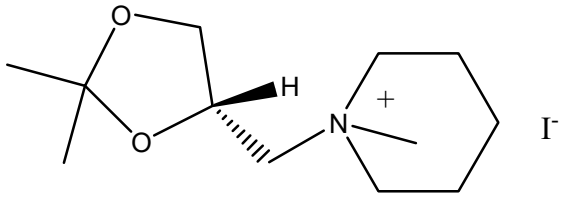
Synthesis of Heterocyclic Salts as Muscarinic Agents for Alzheimer's Disease Application.

Cristina Marrero and John Boulos PhD (Barry University, Miami Shores, FL 33161)

A series of piperidinium salts were synthesized and tested for muscarinic activity. Several salts were found to inhibit the specific binding of [^{3}H] Quinuclidinyl benzilate in radioligand muscarinic binding assays. These compounds are intended as M_1 muscarinic agonists for Alzheimer's application. M_1 muscarinic agonists have been shown to be of therapeutic value for the symptomatic treatment of Alzheimer's disease. The piperidinyl- 1, 3-dioxolane salt was synthesized by protecting D-mannitol with acetone to form diacetone D-mannitol which then underwent oxidative cleavage to form 4(R)-formyldioxolane. Treatment of formyldioxolane with sodium borohydride gave the corresponding alcohol which was converted to the halide and then coupled with piperidine to yield piperidinyl- 1,3-dioxolane base. The base was then methylated to produce the N-methyl iodide salt **1**. Other salts were synthesized in similar fashions



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Solvent-Free Synthesis of Porphyrins.

Andrea Orvieto and Tamara D. Hamilton PhD (Barry University, Miami Shores, FL 33161)

Traditional synthesis of porphyrins requires high-dilution conditions, and as a result large amounts of organic solvent are usually required. We have been investigating a solvent-free approach to the synthesis of porphyrins that entails grinding of reactants or heating in slurry mixtures. We also investigated whether the presence of a templating metal has an effect. Presence of a porphyrin in the product mixture is indicated by the appearance of the Soret band in the UV-Vis spectrum, around 400 nm. It is hoped that these more environmentally-friendly methods of porphyrin synthesis will lead to elimination of the use of large amounts of harmful organic solvents in both research and industrial settings. Here we report yields of solvent-free syntheses of porphyrins, and characterization/purification of the products.

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A Circular Dicrhoism study of KL_4 in Various Lipid Vesicles.

Andrea Orvieto (Barry University,Miami Shores, FL 33161), Joanna Long and Omjoy Ganesh (University of Florida, Gainesville, FL 32611)

Lung surfactant is a mixture made up of 90% lipids and 10% proteins, and is formed in type II alveolar cells. Lung surfactant's main function is to minimize surface tension at the alveolar air-fluid interface. One of these proteins, Surfactant Protein-B (SP-B) is required for proper biophysical function of the lung. The synthetic surfactant peptide, KL_4, efficiently mimics some functional properties of SP-B and has also been proven to successfully lower surface tension in the alveoli. Proteins and lipids that constitute lung surfactant contain both a hydrophilic and hydrophobic region which influences how they interact. In this study we measured the secondary structure of KL_4 in several lipid mixtures and at several different concentrations using Circular Dichroism (CD) spectroscopy. CD is an easy, qualitative technique for examining peptide secondary structure. It is a form of spectroscopy based on the differential absorption of left and right handed circularly polarized light and is ideal for looking at peptides and proteins since they are made up of chiral (L-form) amino acids. We added KL_4 to three lipids found in lung surfactant (DPPC, POPC and POPG) at different peptide to lipid ratios (P/L = 1:33, 1:50, and 1:100) and lipid mixtures (DPPC, POPC, POPG, POPC:POPG, DPPC:POPG, DPPC:POPC:POPG). CD measurements confirmed the helical character of KL_4 when bound to these lipids. When KL_4 was added to single lipids, CD of the 1:33 P/L ratio yielded curves which were slightly higher than the 1:50 and 1:100 P/L ratios. However, this raised curve in the 1:33 P/L samples appeared more similar to the other P/L ratios in a mixture of two lipids. When KL_4 was added to the samples containing, the CD curves of the 1:33 P/L aligned with 1:50 and 1:100. A possible reason for these results may be due to the difference in the lipids. DPPC and POPC have zwitterionic choline head groups whereas POPG has an anionic glycerol head group. Additionally, DPPC contains saturated fatty acid chains while POPC and POPG are monounsaturated. Further studies may provide more insight into these differences.

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In situ Synthesis of Monolithic Alumina Columns for Applications in Microscale Liquid Chromatography.

Emir Rubi, Vanessa Narciso, Zuzana Zajickova PhD (Barry University, Miami Shores, FL 33161) and Frantisek Svec PhD (The Molecular Foundry – Lawrence Berkeley National Laboratory, Berkeley, CA)

The *in situ* synthesis of the alumina - based monoliths within 100 µm ID fused silica capillaries via the sol-gel method has been studied. It was possible to prepare porous alumina monolith from a mixture of aluminum salt, solvent, porogenic reagent, and epoxide. Evaluation of structural characteristics was performed by means of optical microscopy, scanning electron microscopy and nitrogen adsorption analysis. Monoliths were synthesized with porous skeleton, surface area of 29 m^2/g and a predominant average pore size of 170 nm. The chromatographic performance of the alumina-based monoliths was investigated under isocratic conditions using a micro-scale liquid chromatography. Separation of a mixture of imidazole and pyrazole was achieved in less than 2 min and a binary mixture of hexylbenzene and thiourea was separated in less than 40 s.

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Department of Psychology

Parental Attitudes Toward Immunization of Children with Autism.

Melissa Balgobin and Linda Bachelor, PhD (Barry University, Miami Shores, FL 33161)

This is a literature review looking at parents' attitudes towards vaccination and autism. Autism rates have significantly increased over the past two decades in the United States. According to Tribune Information Services (2008), 20,000 children were diagnosed with autism spectrum disorder in 1980 and the numbers have alarmingly risen to125, 000 in 2003. The exact cause for autism is unknown. However, in 1998 Dr. Andrew Wakefield suggested that the MMR vaccine may be linked to autism in children (Evans, Stoddart, Condon et al, 2007). It is speculated that thimerosal, a mercury-based preservative used in the measles-mumps-rubella (MMR) vaccine and other vaccinations may be a factor in the cause of autism in children. Although mercury is no longer found in childhood vaccines in the United States, some parents still have concerns about vaccinations (National Institute of Mental Health, 2007). The proposed study aims to examine the parental attitudes toward immunization of children with and without autism and the possible reasons for not vaccinating their children. Also,we aim to find out whether parents' perception of immunization and its possible link to autism in children varies with regards to ethnicity, parental education, socioeconomic status and availability of health care. The proposed study will also look at whether parents' have higher or lower confidence levels in their health professionals and government organizations and the reasons why they feel this way. A web-based survey will

be constructed and administered to both parents whose children have been diagnosed with autism and parents who have children who have not been diagnosed with autism. Parents' responses to immunization and autism may provide valuable information as to whether they believe that vaccines cause autism and whether there is need for education in order to reduce the fears that parents may have had.

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Evaluation of the Teaching Tools for Young Children (TTYC) with Challenging Behavior.

Melissa Balgobin (Barry University, Miami Shores, FL, 33161) and Bobbie J. Vaughn Ph.D (University of South Florida, Tampa, FL, 33620)

There is a call to intervene early with young children who exhibit challenging behavior. Some children are exhibiting challenging behavior at earlier ages due to multiple risk factors such as poverty (Qi & Kaiser, 2003). When children with multiple challenges enter preschool, early educators often feel ill equipped to cope with their complex issues and often opt for the expulsion of these young children from preschool programs (Gilliam, 2005). Supporting children with challenging behavior and multiple risks suggests the need for comprehensive interventions that can be individualized based on the unique needs of the child, setting, and educator. One such approach is positive behavior support (PBS). PBS uses three primary processes: a) collecting information; b) creating a behavior support plan and c) implementing and evaluating a support plan (Hemmeter & Fox, in press). The ultimate goal of PBS is to determine the function of problem behavior and then through strategies based on that function render the behavior inefficient, ineffective, and irrelevant. The strategies based on PBS can take many forms depending on critical factors such as setting, expertise of implementers, and the needs of the child. Taking into account these critical factors, an intervention package was developed that blends the essential elements of PBS with evidence based intervention strategies for use with young children. The Teaching Tools for Young Children with Challenging Behavior (TTYC; Lentini, Vaughn, & Fox, 2005) provides teachers with an intervention guide and instructions for developing numerous intervention strategies that support language, communication, and cognitive processing. This presentation centers on feedback on the intervention given by educators who have experience implementing TTYC (e.g., early childhood conference attendees and early educators from various listservs). Participants reported that (N= 50) TTYC helped them to improve structured teacher interaction with children (M = 3.31, SD = .62), expand support strategies (M = 3.27, SD = .72), teaching new skills (M = 3.24, SD = .60), increased effective response to challenging behavior (M = 3.23, SD = .65), feel better about their teaching (M = 3.19, SD = .69), prevent challenging behavior (M = 3.19, SD = .63) and feel more in control in the classroom (M = 3.04, SD = .66). Respondents reported that TTYC helped at least one child with problem behavior in the classroom but 52% stated that TTYC helped 5 or more children (See Figure 1). TTYC improved communication (M = 3.23, SD = .59), improved social interactions (M = 3.16, SD = .62) and decreased or eliminated problem behavior (M = 3.15, SD = .73) with children with challenging behavior (See Figure 2). These findings suggest the importance of measuring practitioners' perceptions of evidence based intervention packages.

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Identity and Aggression in College Students.

Sarah A. Garcia and Laura Ferrer-Wreder PhD (Barry University, Miami Shores, FL 33161)

The purpose of this cross sectional study was to explore potential relations between identity development and aggression in a multi-ethnic college student sample. This poster is a description of preliminary analyses of an ongoing study (N=21). Participants were asked to anonymously complete self report surveys on different aspects of identity development (e.g., identity distress, ethnic identity) and aggression (e.g., physical, relational, verbal aggression and normative beliefs about aggression). Results indicated a statistically significant positive correlation between aggressive behavior (direct) and normative beliefs favorable to physical aggression (r=.67, p=.01) as well as correlated ethnic identity subscales (r=.86, p=.001). The relation between these aspects of human development is understudied and the findings from this study have the potential to inform efforts to promote positive adult development.

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Learning ESL Vocabulary with Context and Definitions: Order Effects and Self-generation.

Sarah Garcia (Barry University, Miami Shores, FL 33161), Kady Speeks (University of Florida, Gainesville, FL 32611), Michal Balass (University of Pittsburgh, Pittsburgh, PA 15213), and Charles A. Perfetti, PhD (University of Pittsburgh, Pittsburgh, PA 15213)

There is a need to help people improve their vocabulary learning. Balass et al. (2006) reported that it is beneficial for native English speakers to read a word in context before reading a word definition. This experiment was designed to examine whether self-generated definitions and context related to the meaning of words resulted in better vocabulary learning. It also aimed to replicate the order effect, in which it was found that reading a word in context before reading its definition was more effective for learning and retention of vocabulary than reading the definition followed by reading a word in context. For this study it is expected that reading a word in a context, first, followed by actively generating a definition, and then reading the dictionary definition will yield the best learning path. For this study, a 2 (order) x 2 (self-generation) within-subjects experimental design was incorporated into the Reading-Specific Practice (REAP) software that is used to assist in vocabulary learning. First, participants were asked to complete a pre-test on familiarity with the vocabulary words. They were then asked to complete a series of homework assignments (5 words per homework) on REAP in order to learn words selected from the Academic Word List (also used in the ELI curriculum). To help assess learning gains, participants took an immediate post-test after each assignment. Two weeks after each assignment, participants took a delayed post-test in order to assess retention. This study is ongoing. Preliminary results indicated that the study stimuli were incorporated into the REAP interface successfully. Preparation of materials for this study also suggested the usefulness of

Latent Semantic Analysis (LSA), a theory and method for extracting and representing the contextual-usage meaning of words by statistical computations, in the process of preparing experimental stimuli and for use in the classroom. While results on the study hypotheses are pending, a pilot study demonstrated faster response times on conditions in which the definition was presented first, as well as more accurate responses on conditions requiring high involvement with generation tasks. Results for this study promise to shed light on optimal learning paths that result in better vocabulary learning.

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Religious Belief and Psychological Well-being.

Javier Gonzalez and Frank Muscarella PhD (Barry University, Miami Shores, FL, 33161)

There is much controversy about the relationship between religious belief and psychological well-being. This comes as a result of a wide variety of contradictory research that has been done in the area. Research has found a positive relationship, no relationship and a negative relationship between religious belief and psychological well-being. The current study focused on college students in an effort to extend the limited research done on this segment of the population. Another objective of the study is to identify specific elements of religious belief that may be related to psychological well-being in this population. Participants were 50 men and 50 women (N = 100) recruited via flyer from the participant pool in the Department of Psychology at Barry University and through an online study posting at www.surveymonkey.com. In analysis 1, a correlation matrix was created for all individual items on the Gonzalez Religious Attitude Scale (GRAS) and the four subscales of the Psychological Distress Inventory (PDI). In analysis 2, a regression analysis was used to explain the relationship between religious belief, measured by the GRAS, and psychological well-being measured by the four subscales of the PDI: Depression, Anxiety, Somatic Discomfort, and Stress.

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Did They Learn Anything Important?: Evaluating the Psychology Methods Course at the University of Arizona.

Danielle Jackman, (Barry University, Miami Shores, FL 33161) and W. Jake Jacobs PhD (University of Arizona, Tuscon, AZ 85721)

The purpose of this study was to evaluate a Research Methodology course (which includes a class and lab component) taught at the University of Arizona, and to formulate a mission statement. To date, the course has never been formally assessed in its thirty year history. The attitudes of the faculty (which included those in the Department of Psychology and authors of Research Methodology textbooks) were measured to determine what they felt a student should learn from such a course. Their responses were compared to the attitudes of students with regards to what they felt they learned from the course. Survey questions were sent to the

faculty, and students via email. There were a total of 68 (31.19%) faculty and 26 (12.62%) students who responded. The results of the survey showed that both the faculty and the students felt that the most important areas to cover for the class were: learning the scientific method, statistics and science versus pseudoscience. For the lab, the important areas were: conducting an experiment, literature research, and psychology communication. The results were skewed due to low student participation. A course mission statement was also formulated based on the responses of the faculty. This will serve as a standard to guide future evaluations of the course and determine whether certain aspects of the course should be modified or removed from the core curriculum. The information presented is the foundation for other studies to determine the course's overall impact on its students.

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The Examination of Oppression Through the Eyes of Haitian American and African American Male College Students.

Danielle M. Jackman, Pamela D. Hall PhD (Barry University, Miami Shores, FL, 3316), and Gladys E. Ibanez PhD (University of Delaware, Coral Gables, FL, 33134).

Oppression is an issue still facing ethnic minority groups in the United States (Watts, 2001). The present study analyzes the meaning of oppression in Miami as seen by Haitian American and African American male college students (n = 20). Males were chosen for this study because research has shown them to be more sensitive to their environment (Watts, 2002). There has been limited research on Haitian Americans and they, along with African Americans are susceptible to being oppressed and further discriminated against. The photo voice methodology was used in this pilot study. The participants took pictures that addressed three research questions: "How do you view oppression in your community?", "In what ways can you reduce oppression in your community?", and, "In what ways can the community leaders and the community reduce oppression?" After the pictures were taken, the researchers held audio-taped meetings with the participants. The participants explained how the pictures corresponded to the questions they answered. The data from the audiotapes was qualitatively analyzed by two raters and categories were developed. Once the categories were developed, the results were compared to determine if the two groups viewed oppression similarly or differently. Eight categories were formulated from the first question: Filth, Things that hold you down, Devalued, Economics, Police Domination, Hidden Treatment, Black on Black crime and Lack of a role model. Six categories were formed from the second question: Education, Voting, Unity, Community Development, Pay it forward, and Revolutionary thinking. For question three, seven categories were formed: Education, Community Action, More jobs, Youth Programs, Political action, Program development, and Community revitalization. A chi square test was conducted to determine whether there was any correlation between ethnicity and the types of pictures they took, i.e. whether it was abstract or concrete. The results were not significant because they violated the assumption of the chi square test.

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