

# University of Miami

The Citizen's Board

Research, Creativity, and Innovation Forum 2010

Office of Undergraduate Research and Community Outreach

and the Graduate School

## Undergraduate Abstracts

**RCIE 2010**

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## UNDERGRADUATE

### **Business**

## **Brett Abess**

School of Business Administration

Dr. Steve Ullman, Mentor

### ***Goodwill U***

Goodwill U was a project for my Management 100 class. Our group's objective was to establish a social media marketing plan to attract a younger generation of Goodwill supporters and customers. This plan developed into a concept partnership between the University of Miami and Goodwill Industries of South Florida that would provide Goodwill with a student support network. Students will act as Goodwill advocates in their campus community, providing much needed internship positions in Goodwill's marketing department, assistance with community affairs and fundraising events, and will provide Goodwill with a fresh source of knowledge and business expertise.

## UNDERGRADUATE

### Engineering

## Abraham Akinin

Biomedical Engineering, College of Engineering

Jorge Bohorquez & Fotios Andreopoulos, Mentor

### ***Electrostimulating Bioreactor for Cardiac Tissue Culture***

Coronary infarction is a common cause of severe damage to the myocardium. Attempts to culture heart tissue and cardiomyocytes have encountered that growing cells in the proper chemical and physical conditions but without an external electrical stimulation produces weak and insufficiently contractile cells. Studies involving electrical simulation have shown much improvement in this area, but are all based on very simplified models and require expertise in electrochemical systems to reproduce. There is currently no solution known to us that assists tissue engineering researchers to economically and intuitively perform more advanced studies of electrical stimulation in cardiac engineering.

We will construct an electrostimulating bioreactor that will be capable of exciting living systems in the form of cell seeded bioscaffolds or cells suspended in media with a customizable and controllable electrical stimulation pattern. The device must be able to perform reproducible studies of tissue/cell culturing through a reusable and autoclavable environment. Adjustment of the electrical stimulation parameters will be possible through a graphical user interface (GUI) in which the user will design the waveform, amplitude and principal frequency in an interactive and accessible software environment. The GUI will then export the instructions file in WAV format and it will be downloaded to the reactor's central control unit. The reactor's control unit is nothing other than a generic MP3 or WAV player fed through an amplifier to the electrochemical system. The amplified signal will be fed to the electrodes of the reactor chamber providing the desired experimental conditions.

UNDERGRADUATE

RSMAS

## Courtney Alexander

College of Arts and Sciences

M. Danielle McDonald, Mentor

### ***The effects of temperature on the sensitivity of the Gulf toadfish, *Opsanus beta*, to fluoxetine (Prozac) treatment***

In this study, we researched the effects of temperature on the sensitivity of the Gulf toadfish, *Opsanus beta* to fluoxetine (Prozac) treatment. We hypothesized that temperature would increase the sensitivity of certain physiological processes to fluoxetine. The recent interest in understanding the complex mechanism of action of fluoxetine strengthens the importance of our study in the fields of neurobiology, behavioral medicine and pharmacology. *O. beta* were acclimated to three different temperatures and then treated with oil or oil + fluoxetine via an intraperitoneal injection. In the analysis of our results, we carried out an assortment of assays (urea, serotonin, cortisol, ammonia) and measured the level of plasma osmolality. We found that at higher temperatures the fish had lower plasma levels of serotonin and cortisol, while the reverse was true in terms of plasma osmolality. Fluoxetine treatment appeared to result in higher plasma serotonin and cortisol levels, with a small reduction in plasma osmolality. We found that at higher temperatures there appeared to be a lower excretion rate of urea while fluoxetine treatment appeared to result in no real change. Based on our results, we concluded that changes in temperature do play a role in changing the sensitivity of some but not all physiological processes to fluoxetine.

**Interdisciplinary Studies**

**Jennifer Amaya**

College of Arts and Sciences

Dr. Bradford McGuinn, Mentor

***A Journey for Survival, Refugee Migration to Yemen from the Horn of Africa***

Considering the fact that the Republic of Yemen is one of the poorest countries in the Arabian Peninsula, it has played a fundamental role within the region of the Horn of Africa. Fundamental in the sense that even though the Republic of Yemen is an impoverished country, it has been able to influence a range of significant issues pertaining to North Africans situated across the Gulf of Aden. The main factor that has enabled the Republic of Yemen to engage the region of the Horn of Africa primarily pertains to the social, political, and economic affect Yemen obtains within the region in regards to migration. However, how does the issue of migration tie in both the Republic of Yemen and the Horn of Africa? At the moment, the Horn of Africa is considered a region in the midst of many current conflicts ranging from the government instability, security, and human rights. Meanwhile, as the Republic of Yemen undergoes similar political challenges, in the eyes of desperate Africans, seeking for survival, Yemen is viewed as a safe haven in comparison to other countries within the Horn of Africa.

Furthermore, the Horn of Africa consists of Djibouti, Ethiopia, Eritrea, and Somalia. However, this case study focuses on the state of Somalia because it has a unique and far more complex relationship with the Republic of Yemen than any other country in the region. One of the main reasons is due to the fact that Yemen's largest African migrations comes from the state of Somalia. Yet, the essence of this study analyzes beyond the political or geographical relation. It touches upon a greater depth of human and cultural significance. For instance, why is it that Somalis decide to migrate from one poor African country to another poor country right across the Gulf of Aden? Even though, many Somalis are aware that crossing the Gulf of Aden is extremely dangerous, that it may very well cost them their lives. This brings about the importance of why this is far greater than habitual politics. It is a means of survival and hope for a better future, even if takes to risks their lives in the process. As a result, analyzing the purpose of refugee migration from Somalia to Yemen will not only cover vital political influences regionally and internationally, but also reveal a more significant individual purpose to the issue of migration as it continues to unfold throughout time.

UNDERGRADUATE

**Interdisciplinary Studies**

## Keshet Amedia

College of Arts and Sciences

Dr. Bradford Mcguinn, Mentor

### ***Zionism, Christianity, and U.S.-Israel Bilateral Relations: The Role of Evangelical Theology in American Policy to Israel***

Keshet Lemberg

New leadership in the United States, as marked by Democratic President Obama's 2008 election, has rung in a new perspective on American policy in the Middle East that, in turn, has served to define a new relationship between United States policymakers, American Christian Zionists, and the Israeli government. Christian Zionism in the United States, which creates a unique narrative about the centrality of a sovereign Jewish State from a gentile standpoint, is anchored in religious and theological elements that have become increasingly influential over American foreign policy since the 1970s. Religious and theological considerations are an integral part of the Christian Zionist discourse in the United States, as founded on Scriptures and prophecies that affirm a central role for Israel and the Jewish people within the global context. Recently, the role of Christian Zionism in influencing the agenda of the Republican Party as well as the United States' preferential treatment of Israel has spurred an array of criticism. Regardless, the Christian Zionist narrative has achieved a fixed status in the United States as an offshoot of the hegemonic Zionist narrative from a gentile standpoint. This unique discourse in the United States serves to make a number of significant claims in favor of the supremacy of a sovereign Jewish State in relation to United States national security, as well as the virtually irreproachable behavior of the State of Israel in relation to United States foreign policy. In this paper I will examine the development of the Christian Zionist movement in the United States, tracing its historical roots, theology, and the political agenda of the movement with a focus on the International Christian Embassy—the most influential and controversial Christian Zionist organization, and will also offer a critique in which I assess the various positive and negative aspects of the movement on American foreign policy to Israel.

## UNDERGRADUATE

### Business

## Carlos Antonorsi

School of Business Administration

Oscar Mitnik, Mentor

### ***Pork Spending and Congressional Elections***

A lot of discussion in today's political environment revolves around the issue of pork barrel spending - that is, expenditures that are earmarked by Congressmen in approved bills, in order to benefit their home state and/or district. In this paper, we seek to determine 1) whether the amount of per-capita earmarked expenditures to each state has any effect on the probability of an incumbent Congressman being reelected; 2) whether pork barrel expenditures are related to how close the last elections were in a district. We use all the elections for the House of Representatives and the Senate from 1984 to 2008 for the 50 U.S. states, and a unique pork barrel expenditure dataset gathered since the early 1990s by Citizens Against Government Waste, a non-partisan organization. In addition we rely on data on discretionary spending by the federal government in each state. Very preliminary descriptive results show that while there appears to be a strong effect of incumbency, not much of it occurs through pork barrel spending. We are currently in the process of preparing regression analyses where we will account for possible confounding variables such as unemployment, politicians' characteristics, demographic structure of the districts, etc.

UNDERGRADUATE

**Engineering**

**Nestor Arita**

College of Engineering

Dr. Herman Cheung, Mentor

***Bioreactor for the Cyclic Uniaxial Tensile Strain of Stem Cells***

While cells are known to respond to mechanical stimulation, little is known about the mechanism by which the cells sense the mechanical stimulus. Static or dynamic physical stimulus can either be compression or tension. A recent report suggested that static mechanical tensile strain induced cardiovascular differentiation of stem cells. However, cardiomyocytes in the beating heart reside in a mechanically dynamic environment rather than under static strain. The aim of this design project was to design and construct a bioreactor that could be used to examine whether dynamic tensile strain will induce cardiomyogenesis in stem cells. Our custom-built bioreactor consists of a two-chamber system and a linear stepper motor that indirectly strains the cells through a silicone membrane. The chambers were constructed out of delrin and polycarbonate. Testing has shown that the strain remains constant throughout the height of the fibrin scaffold when the scaffold is twice the thickness of the membrane or less. Also, the motor is able to implement strains up to .25 (1000 samples) at frequencies up to 3Hz. Therefore, this bioreactor is fully functional and will be essential for investigating the influence of tension on the cardiac differentiation of stem cells.

## UNDERGRADUATE

### Interdisciplinary Studies

## Kristina Astone

College of Arts and Sciences

Monica Faraldo, Mentor

### ***Pathological and Health Assessment of Eight Skeletons from Isla San Lucas Penal Colony, Costa Rica***

For 120 years Isla San Lucas was considered to be the harshest penal colony in Costa Rica. This research was conducted as part of a multidisciplinary effort to investigate and reconstruct the history of Isla San Lucas through its archaeological remains. Eleven skeletons were excavated from a mass grave found on the penal colony. The skeletons were associated with artifacts, allowing for archaeological inferences and dating techniques. Eight skeletons were visually analyzed for pathologies with osteology and pathology field manuals. Population frequencies were computed for eleven pathologies. High frequencies of dental caries (75, N=6) and antimortem tooth loss (62.50, N=5) suggested that the inmates had poor diet and hygiene. High frequencies of osteoporosis on the vertebrae, patellae, and phalanges (62.50, N=5) suggested that the inmates endured mechanical and physical labor stressors, as well as age related degeneration. There were indicators of infectious and metabolic diseases on the skull (caries sicca, porotic hyperostosis), long bones (rickets, periostosis), and pelvis (osteophytes). Overall, the eight individuals displayed poor health, suggesting that Isla San Lucas was a strenuous place to be incarcerated. More skeletons must be excavated and examined in order to further support these findings. Mainland population comparisons of longevity, epidemiology, and mortality trends would aid historians and anthropologists in understanding the degree to which life in the penal colony was more arduous.

## UNDERGRADUATE

### Psychology

## Brian Becraft

College of Arts and Sciences

Dr. Alexandra L. Quittner, Mentor

### ***Differences in Facilitative Language Techniques for Deaf Children Prior to and 24 Months after Cochlear Implantation***

Dr. Kristen K. Marciel; Ivette Cruz, M.S.

Fostering language development and production in deaf children is a difficult task faced by parents. Cochlear implantation assists in this development; however, it is insufficient without parental use of facilitative language techniques. Participants (91 mother-child dyads recruited from 6 implant centers) engaged in videotaped mother-child interactions coded for 2 lower-level and 1 higher-level facilitative language techniques both before and 24 months after cochlear implantation. In partial support of our hypothesis, parent use of directives, a lower level technique, decreased from the baseline assessment ( $M = 25.57\%$ ,  $SD = 15.01$ ) to the 24 month assessment ( $M = 19.37\%$ ,  $SD = 10.61$ ;  $t(83) = 3.70$   $p < .001$ ). In contrast, parents increased their use of linguistic mapping, a lower level technique, from baseline ( $M = 0.51\%$ ,  $SD = 1.21$ ) to 24 months post-implantation ( $M = 1.50\%$ ,  $SD = 2.19$ ;  $t(83) = -3.97$   $p < .001$ ). As hypothesized, parent use of expansion, a higher level technique, increased from the baseline assessment ( $M = .03\%$ ,  $SD = .16$ ) to 24 month assessment ( $M = 2.24\%$ ,  $SD = 2.21$ ;  $t(83) = -9.28$   $p < .001$ ). Our gender hypothesis was partially supported at the 24 month assessment point for directives, as parents of males ( $M = 21.64\%$ ,  $SD = 12.19$ ) used significantly more directives than did parents of females ( $M = 16.66\%$ ,  $SD = 8.86$ ), ( $t(84.5) = 2.22$   $p < .05$ ). These data can inform early intervention strategies for parents of deaf children.

UNDERGRADUATE

**Business**

**Josh Bergman**

Dr. Abril, Mentor

***The Rise of Celebrity CEO as Related to Defamation***

Defamation lawsuits represent an important legal tool, from which victims can seek redress for false statements. CEOs who are deemed to be celebrities (and thus public figures as well) also must prove that malice was present in order to win a defamation suit. This research paper serves to examine what exactly constitutes a public figure in today's world of Twitter accounts, Facebook pages, and 24/7 media coverage.

Specifically, should CEOs be considered a celebrity in their entire persons, or only within the scope of their expertise? Other questions regarding CEO celebrity status considers how the public's desire to know factors into the criteria, and how much would a legal proceeding entitle the public access to the respondent's personal lives?

Upon careful analysis of existing case law and public trends, it has become clear that CEOs have ascertained celebrity status.

UNDERGRADUATE

**Psychology**

**Johayra Bouza**

College of Arts and Sciences

Dr. Rebecca Bulotsky- Shearer , Mentor

***The Relationship between Family Home and School Involvement and Behavior Problems***

Research has shown that preschool children of low socioeconomic status have higher rates of behavior problems. In addition, research suggests that behavior problems are associated with poor school readiness outcomes. Family involvement is considered a protective factor that can support social skills and decrease behavior problems for low-income children. Few studies compare the influence of family home and school involvement on behavior problems for low-income children. The purpose of this study was to conduct a secondary data analysis of the Family and Child Experiences Survey (FACES, 1997; U.S. DHHS, 2002) for a nationally representative sample of Head Start children and their families. We will examine the relationship between family home and school involvement and behavior problems using multiple regression analysis. The potential moderating influence of family involvement on the relations between problem behavior and multiple school readiness outcomes will be examined. Findings will inform policy and practice for early childhood educational programs.

UNDERGRADUATE

**Neuroscience**

**Timothy Boyce**

College of Arts and Sciences

Jeffrey Goldberg, M.D., Ph.D., Mentor

***Intrinsic and Extrinsic Control of Retinal Ganglion Cell Fate***

In the mammalian retina, through a coordinated expression of genes in spatiotemporal patterns, multipotent retinal progenitors differentiate into seven major cell types. The differentiation of these progenitors is driven by intrinsic and extrinsic factors, yet little is known how these factors regulate cell fate decisions. In this study, we evaluate the transcription factors and morphogens that regulate retinal ganglion cell (RGC) determination. The basic helix-loop-helix transcription factor Math5 has been shown to play a crucial role in RGC fate (Brown, Patel, Brzezinski, & Glaser, 2001). Math5 KO mice fail to produce RGCs, however the rest of retinal histogenesis is undisturbed. Using microarray data from Math5 KO mice, we created a candidate gene list of upregulated and downregulated transcription factors. Using an in vitro overexpression assay of wildtype and Math5 KO progenitors, we can observe which genes can potentiate or rescue RGC fate. In addition GDF11, a bone morphogenic protein, has been shown to decrease RGCs through modulation of Math5 in vivo (Kim et al., 2005). Understanding neural development may provide essential insight in advancing brain and spinal cord regeneration and cell replacement therapies.

## Joe Braun

Dr. Robert Casillo, Mentor

### ***Ars Poetica in Nature: The Natural Landscape as Poetic Emblem***

-A poet by poet look at Romantic landscape leading up to Modern sublime landscape in poetry and theory-

The initial focus of this thesis was on the manifestations of existentialism in ecopoetry, specifically aimed at linking the notions of landscape, (the) picturesque, and sublimity (the sublime) that cross between literary movements. The myriad landscapes expressed by Robert Frost in his place-based poetry seemed a fitting point of convergence from which to dialectically address his contemporaries and their environmental eyes. However, it has been found that acknowledging Robert Frost's landscape and attempting outward connections would fail to adequately recognize more than how each poet chooses to relate "nature" poetically. "Nature", in this sense, can be taken to encompass natural beauty (aesthetics), landscape, home, place, and region. In other words, if the true aim is at a comparative understanding of the modern poet's environmental psyche, this thesis requires something much more than how "nature" looks in the poetry of Frost, Snyder, Oliver, Merwin, Berry, and Jeffers. The new focus, simply put, must incorporate an investigation as to why the aforementioned poets were inclined to express "nature" as they did, and then how they did so. The "why" and "how" of poetics relates to "Ars Poetica", or the well-known attempt to derive "the art of poetry" (similarly, "the nature of poetry"). With this thesis I will make no such attempt at Ars "Ecopoetica," but rather try to identify ecopoetry as the collective effort of poets to simultaneously represent and apprehend the environment.

Every writer who has the intellectual inclination and authorial audacity to ground nature's infinite influence in poetry has a general sense of environmental profundity. The environment's dynamism is manifest in itself and in the remarkably varied perspectives within a literary genre dubbed "ecopoetry". But "ecopoetry" as a literary movement is a station worth questioning. As Samuel H. Monk illuminates in his discourse on the sublime, 'until it became possible to turn from the object to the subject and to realize that in the aesthetic act the object is "colored by the imagination," and until interest centered definitely in the analysis of the subject's experience "no steady progress in the aesthetic of sublimity was made." It follows that a study on landscape poetry "an adaptation of the imagination to the (physical) environment" as emblem(^1), the poetic epitome of the natural environment, must examine how the poet's understanding has evolved longitudinally. This thesis will treat the subject (poet), the object (landscape), and the interaction (aesthetic). In beginning with Romantic visualities, the sublime of English tradition, the picturesque, and the beauty, bounty, and boundaries of landscape, a cross-examination of modern landscape poets(^2) will emerge dialectically; that is to say their logic

will not be relegated to one of two opposing viewpoints, but rather considered in an exchange of differing views.

Footnotes:

1) Emblem as used here can be taken to mean an image, abstract and/or representational, that epitomizes a concept; thus the idea of landscape as emblem.

2) I say "landscape poets" as opposed to "ecopoets" here because ecopoetry is infused with the notion of environmental conscience, or more specifically, environmental ethics. While the poets considered will often suggest and extend outstanding theories on environmental stewardship, responsibility, and social priority that are inherent in the intimacy of their relationships with the natural world, this status would force a serious political consideration.

**Psychology**

**Heidi Bryant**

College of Arts and Sciences

Dr. Michael Alessandri, Mentor

***A Comparison of Maternal and Paternal BASC Scores for Individuals with an Autism Spectrum Disorder***

Background: Previous research has generally indicated that maternal and paternal reports of childhood behavioral functioning, as measured by the Behavior Assessment System for Children (BASC) (first and second editions) are often inconsistent. Some research suggests that fathers under-report symptoms relative to the mother report, while others suggest that mothers and fathers are each sensitive to specific types of symptoms thus making their reports dissimilar. Previous research has primarily focused on various childhood disorders and typically developing children, but there is very little research investigating differences in parental reports of behavioral functioning from parents of children with autism spectrum disorders (ASDs).

Objectives: To explore the possible differences between maternal and paternal reports on the BASC for children with an ASD. Furthermore, to determine whether there are specific differences between maternal and paternal reports on the BASC within diagnosis (Autistic Disorder, Asperger's Disorder, and PDD-NOS).

Methods: We performed a retrospective chart review of 40 files from the Autism Spectrum Assessment Clinic at the University of Miami. Reviewed charts included children and adolescents who were diagnosed with an ASD, and whose chart included BASCs completed by both mother and father. The sample includes: 10 PDD-NOS, 9 Asperger's Disorder, and 21 Autistic Disorder. Data pertinent to the study were extracted including maternal and paternal reports on either the BASC 1 or BASC 2.

Results: Paired sample t-tests indicated no significant differences between maternal and paternal reports when all children with an ASD were included in the analysis, and within the PDD-NOS group. Analysis for children in the Asperger's Disorder group revealed that mothers' ratings were significantly higher than fathers' in the Attention Problems domain, and, in the Autistic Disorder group, mothers' ratings were significantly lower in the areas of Daily Living Skills, and Adaptive Skills.

Conclusions: Analyses suggest that in general, maternal and paternal ratings of children and adolescents with ASD on the BASC are very similar. Within each diagnosis there are some differences, where, in general, mothers report more impairment. Implications of these findings suggest that clinicians should be aware of the potential similarities and differences in reporting patterns between parents, and should utilize that knowledge when making diagnostic or

behavioral conclusions and recommendations.

UNDERGRADUATE

RSMAS

Kasey Cantwell

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Jill Richardson, Mentor

***Scleractinian Reef Communities: A preliminary study in the rate of change of coral reefs by using a comparison between Dominica (West Indies) and the Florida Keys.***

In an attempt to evaluate the health of different reef communities, the two case studies of Dominica and the Florida Keys were chosen. The Commonwealth of Dominica is a third world country with little to no protection over their coral reefs, whereas the reefs of Florida are under very strict regulation by the United States. AGRRA V5 was used to collect recent data in 2009, which was compared to data collected at both locations in 2003, using AGRRA V4. From this comparison, a rate of change was able to be determined based on decline in coral cover, repopulation of *Diadema antillarum*, and increases in algal cover at the two locations. As expected, coral cover in the Florida Keys was higher; however, coral cover had slightly increased in Dominica by 1.8%, whereas in Florida it had decreased by 3.8%. In Dominica there was a strong association between the presence of *Diadema* and algae cover, even though the algae cover in Dominica was higher overall. Although there was a significant increase in *Diadema* in Florida, their populations were not enough to sustain a similar comparison. Overall, the protection offered by the Florida Keys Marine Sanctuary, maintains a higher quality of coral reef than the absence of regulation in Dominica.

## UNDERGRADUATE

### Psychology

## Tracy Carter

College of Arts and Sciences

Dr. Rebecca Shearer, Mentor

### ***Positive Play Interaction Mediates the Relationship between Early Behavior Problems and School Readiness Outcomes for Head Start Children***

The quality of interactions with peers is an important predictor of children's social and academic competencies particularly for low-income children at greatest risk for behavior problems and poor academic readiness (Buhs & Ladd, 2001; Ladd & Burgess, 2001). While research suggests the negative influence of early behavior problems on children's ability to learn in the early childhood classroom (Huffman, Mehlinger, & Kerivan, 2000), positive peer play interactions may serve as a protective factor. The current study examines whether interactive peer play mediates the relations between early classroom behavior problems and academic outcomes for a sample of low-income preschool children (N = 502). Classroom underactive and overactive behavior problems were assessed by the teacher at the beginning of the year. Interactive peer play and academic outcomes were assessed at the end of the year. Findings from multiple regression analyses support partial mediation suggesting that early behavior problems influence academic outcomes through their effects on interactive play. This was particularly the case for children with underactive behavior problems at the beginning of the year. In other words, children with behavior problems at the beginning of the year demonstrate lower academic outcomes because they did not develop interactive play behaviors across the preschool year. Findings can inform classroom-based practices in early childhood programs such as Head Start: for example, the development of interventions aimed at engaging underactive children in peer play interactions to foster positive peer relationships, mitigate future behavior problems, and promote academic success.

## UNDERGRADUATE

### Biology

## Nayma Casamayor

College of Arts and Sciences

Roy Levitt, Mentor

### **MD**

Nicotine and Alcohol Co-dependence in B6 and D2 Mice  
University of Miami, Florida.  
Nayma Casamayor

**Abstract:** The mechanisms underlying drug dependency such as with nicotine and alcohol are not precisely targeted as of now. Studies on mice have revealed a kinship among the pathways related to drug consumption that strengthen observations in simultaneous drug consumption and the behavioral changes that occur in organisms. This study used mice from two different strains (B6 and D2) which were subject to nicotine intake and later exposed to alcohol. Control groups received saline injections during the baseline stage of the experiment. Drinking preference was recorded periodically for control and treatment mice of the two different strains. The results indicated an increase in alcohol consumption for the treatment groups of the two strains when compared to the respective control groups. Additionally, it was found that D2 mice are highly sensitive to nicotine intake and consequently showed a decreased preference for alcohol. This observation can be explained by genetic predisposition that takes an essential role in the mechanisms of drug addiction.

**Keywords:** Nicotine, alcohol, drug, dependence, mice, brain pathways, receptors, behavior.

UNDERGRADUATE

**Art**

**Alicia Casillas**

College of Arts and Sciences

Tom Lopez, Mentor

***Unconscious mind***

My project is a narrative sequence of pictures telling a story. My story is going to depict the unconscious mind. Following the Freudian studies, the unconscious mind can be studied through dreams and this is exactly what the pictures are for. The pictures will represent the unconscious mind, where every element in the picture will be interpreted by Freud's studies of dreams. There will be nine digital pictures placed together in sequence.

## Ethan Chambers

Dr. Julia Dallman, Mentor

### ***Determining whether extra cholinergic neurons in the Zebrafish Glycine Transporter Mutant (GlyT1) are motor or inter-neurons***

For basic, patterned movements like walking or swimming, neuronal inputs onto motoneurons must be balanced. This balance is disrupted in GlyT1 mutant zebrafish that have a point mutation in the gene encoding the neuronal glial glycine transporter type 1 (GlyT1). This mutation disrupts glial transporter function causing elevations of synaptic glycine. Because glycine is the major inhibitory neurotransmitter in the spinal cord, this results in excess inhibition. Excessive glycinergic inhibition in GlyT1 mutant embryos fails to respond to touch stimuli, however as mutant fish mature they regain normal swimming. However, the mechanism of such recovery is still unclear.

Preliminary data indicate that during the time the mutants recover their ability to swim, there is two-fold increase in the number of islet/cholinergic neurons, which could be motoneurons or interneurons. To visualize the connections of these neurons we used backfilling techniques designed to fill neurons with a fluorescent dextran dye revealing whether these extra islet/cholinergic neurons are motoneurons or interneurons. Each backfilling method is determined by the type of neuron to be labeled. To label ventral motoneurons, muscle tissue was injected with dye. To target interneurons, cuts of the tail fin were made allowing the dye to be taken up into descending interneurons.

In the future, antibody staining will target different classes of neurons so that we can identify the fate of these extra neurons and quantify their specific subtypes, helping us to further understand the recovery mechanism of GlyT1 mutant.

UNDERGRADUATE

**Molecular and Cellular Pharmacology**

**Nauman Chaudhry**

College of Arts and Sciences

Dr. John Hackman, Mentor

***5-HT<sub>2C</sub> Receptors Enhance NMDA Induced Depolarizations of Motoneurons via Activation of a Tyrosine Kinase Receptor***

Serotonin 2C (5-hydroxytryptamine; 5-HT<sub>2C</sub>) is one of 19 known 5-HT receptors, that interact with NMDA (N-methyl- D- aspartate) to enhance motoneural activity, but the mechanisms by which 5-HT and NMDA interact are very poorly understood. Spinal cord injury and degenerative neurological disease processes, such as Huntington's disease, that target the motoneuron are major medical treatment problems most of which involve intrinsic NMDAR and 5-HT interactions. Previously, 5-HT<sub>2A</sub> and 5-HT<sub>2B</sub> receptor subtypes have been shown to selectively modulate in situ frog motoneuron NMDA receptor activation through different mechanisms. In this study, we investigated the mechanism by which 5-HT<sub>2C</sub> interacts with the NMDA receptor, which is also unique from that of the 5-HT<sub>2A</sub> and 5-HT<sub>2B</sub> receptors. We found 6-chloro-2-(1-piperaziny) pyrazine (MK212) selectively activates 5-HT<sub>2C</sub> receptors and enhances NMDA responses with and without Mg<sup>2+</sup> present. Our findings suggest that the 5-HT<sub>2C</sub> enhancement of NMDA responses is mediated by tyrosine kinases, particularly the SRC kinase.

UNDERGRADUATE

**Neuroscience**

**Phillip Chong**

College of Arts and Sciences

Antoni Barrientos, Mentor

***Generation of Yeast Models of Neurodegenerative Disorders***

Huntington's disease (HD) and Spinocerebellar ataxia (SRA) are types of polyglutamine (polyQ) diseases, which arise from the atypical expansion of CAG codon (triplet of nucleic acids) repeats in DNA that encode for abnormal proteins containing polyQ. These mutant proteins lead to neurodegeneration in particular regions of the brain and thus, to symptoms of these diseases. HD, one of the most prevalent of these presently incurable diseases, affects 1 in 10,000 people and is characterized by mental deficits, uncontrolled movements, and emotional disturbance (Vonsattel et al., 1985). There are similar changes seen during the aging process. Moreover, researchers are trying to uncover the mechanisms underlying polyQ diseases in hopes of finding better treatments or even cures. It is well-known that expressing increased glutamine residue (polyQ) chains predicts faster cell death (i.e. neurodegeneration), and one study, involving yeast polyQ models in growth phase, supported this fact (Duennwald et al., 2006). Because neurons enter stationary phase upon terminal differentiation, it is useful to have a model to mimic this state. In the present study, I helped generate yeast polyQ models in stationary phase to increase the relevance to neurons. This will ultimately aid in the study of the progression of polyQ diseases and the aging process in general.

## UNDERGRADUATE

### Business

## John Coleman

School of Business Administration

Dr. Sundaresh Ramnath, Mentor

### ***14-Week Quarters***

Working with Dr. Sundaresh Ramnath, I was given the opportunity to participate in the research and data collection process behind a collaborative project Dr. Ramnath was working on with several other professors from throughout the country. The project required that I examine over 1000 equity analyst's reports, reviewing them for specific figures, estimates, and opinions.

During a typical reporting quarter, public companies report their earnings figures for thirteen weeks. However, to cover a missed week that gradually accumulates over the course of several years, companies often add in an extra week into their quarterly reports. Analysts, whose models are built to react to thirteen-week quarters, can easily adjust their models to make note of the extra week. As my mentor Sundaresh Ramnath inferred, most analysts fail to do so. This not only results in inaccurate earnings estimates for that quarter, but also throws off estimates for the following year. Analysts reports for public companies were collected and analyzed both before and after the fourteen-week quarter. If earnings figures were adjusted and the fourteen-week quarter was noted in either the report before the quarter or report after the quarter, the analyst was categorized as having considered the occurrence of the fourteen-week quarter. Many analysts failed to recognize this anywhere in the reports related to the fourteen-week quarter, and were assumed to have missed the extra week in their models and predictions. The failure to include the extra week is considered to be a lack of recognition rather than a lack of ability.

UNDERGRADUATE

**Neuroscience**

**Daniel Cristancho**

College of Arts and Sciences

Vance Lemmon and John Bixby, Mentor

***The Regulation of Axon Formation by the JNK Pathway***

While the morphological events that are involved in axonogenesis have long been studied, the molecular pathways involved are poorly understood. What is known is that c-Jun-N-terminal kinase (JNK), a member of the mitogen-activating protein kinase family plays an active role in this process. It is not only present throughout neurons, but selectively localized in its active form in nascent and mature neurons. Pharmacological studies have further shown that when JNK is inhibited during neural growth, neurite formation continues normally while axonogenesis does not take place.

JNK has three genes that produce twelve different splice variants ??? each with a distinct and unknown function. Knockout studies suggest that there exist redundancies between these genes, but that they are necessary as their absence causes death during embryogenesis. Jnk3 has been shown to be present throughout the cell, while Jnk1 and Jnk2 are localized in the axon. By using conditional knockout mice, we intend to examine what effects the absence of the Jnk1 and Jnk2 genes will have on axons in developed mice. Mice have been selectively bred for the desired genotype Jnk1+/-/Jnk2+/-, while preparing the viral construct that would selectively knockout Jnk1 using loxP/Cre genetics. Because axons do not regenerate in the central nervous system (CNS), understanding the molecular processes involved with normal axonogenesis could prove beneficial in initiating axonal regrowth in injured neurons.

## UNDERGRADUATE

### Engineering

## Patricia Custals

College of Engineering

Dr. Zhou, Mentor

### ***Microgravity bicycle***

Jorge Ravello

Space bicycle

Patricia Custals

Abstract

With the expansion of manned space exploration to more distant celestial bodies, composed of masses different to those of earth, for seen, but unanswered challenges are brought into question. The most obvious concern, being microgravity, for both long and short term effects of prolonged exposure to the human body. Since the conception of orbital space habitats, human beings have concerned themselves with the effects of the space environment on the human body. Different designs for space habitats have been suggested, but are still under development. The problem, however, still remains unaddressed, and the physical repercussions to the astronauts may not be reversible. According to the Bioastronautics Critical Path Roadmap 24 of the 50 biomedical risks identified are due to the absence of gravity during transit and surface operations in exploration class missions. After many biomedical research programs have attempted to address this physiological problem very few practical solutions have been concluded; many of the suggested solutions would take too many years to develop and are limited both in production and funding. However, extensive research has been done on possible onboard centrifuges; it is meant to be a temporary countermeasure for the debilitating effects of microgravity. Rats centrifuged in space flight have not shown major deterioration of the bones, muscle and cardiovascular response, unlike the rats exposed to microgravity. A centrifuge for primates is yet to be considered; even though primates have many similar physical characteristics, which could adequately model human reaction.

The purpose of this project is to design a bicycle for exercise during space travel, with the ability to simulate artificial gravity when operated; in order to prevent further bone, muscle and cardiovascular deterioration. The bicycle must be designed to the standards necessary to produce the needed amount of artificial gravity for the astronauts while still occupying the least amount of space possible. The ideal design would be to have the body of the bicycle acting as the lever while a shaft running through the chassis will act as the fulcrum. The bicycle will rotate about its own axis of latitude creating a tangential and radial force along the body, which will simulate earth's gravity.

For the short radius of 1.5-3meter centrifuge, one rotation for every two seconds needs to occur in order to simulate earth's gravity. Due to these high speed rotations, it is necessary when designing, to take into account the adverse physiological effects on the human body in rotation. The most important design characteristic being orientation; the body must be placed in a position, in which artificial gravity can best affect the physical structure. For this reason the

following constraints should be considered. If the astronaut's head is not parallel to the plane of rotation, a strong cross-coupled spatial disorientation may occur, along with motion sickness, postural disturbance and non-stabilizing compensatory eye movements. The ideal position being, where both the tangential and centrifugal forces are being utilized; for this design the seat will be orientated, so that when the bicycle is in rotation, the centrifugal force will act on the entire body; while the tangential force acts to compress the spine.

UNDERGRADUATE

**Art**

**Melanie D'Andrea**

School of Communications

Mariah Hausman , Mentor

***"Turn a Blind Eye to"***

A digital art piece, "Turn a Blind Eye to" was created by the juxtaposing and altering of digital images. The concept is to open conversation to what stratifies our success and what consequences those very goals may have.

## UNDERGRADUATE

### Sociology

## Adrienne DiTommaso

College of Arts and Sciences

Jan Sokol-Katz, Mentor

### ***Disparate Impact Discrimination, Race, and Florida's Juvenile Waiver Provisions***

A substantial body of research has proven that contact with the criminal justice system severely disadvantages adjudicated individuals through the stigma of the criminal record. This stigma manifests itself in marked difficulties establishing oneself in the job and housing markets. In turn these disadvantages increase the likelihood of recidivism, which can establish a cyclical pattern of lifetime offending. Though this cycle is troubling for all races, it is even more disturbing when youth of a particular racial group experiences this milieu at a disproportionate rate, particularly as a result of criminal justice legislation. This study examines such a case, specifically examining Florida's juvenile waiver provisions for the existence of disparate impact racial discrimination. The study hypothesizes that juvenile waiver provisions of the last decade have contributed to the cycle of crime and disadvantage through racially based disparate impact discrimination. Chi square tests were run on 10 years worth of arrest data taken from Florida's Department of Juvenile Justice Profiles. Calculations analyzed the racial composition of the total number of individuals transferred for each calendar year for the statewide aggregate as well as for four circuit divisions, representing the north, south, east, and west of Florida. Results of statistical calculations failed to reject the null hypothesis, confirming that a statistically significant disparity exists between white and black youth transferred to the adult criminal court. Implications of this study indicate a legislative mechanism of race discrimination; whether this discrimination results from judicial or prosecutorial discretion could be ruled out with future analysis.

## UNDERGRADUATE

### Business

## Hayley Donaldson

School of Business Administration

Professor Knight, Mentor

### ***Analysis of a Chosen Portfolio and Relevant Benchmarks***

#### Statement of the Problem:

A portfolio of stocks, bonds, and mutual funds was chosen and tracked over a ten week holding period, while analyzing the portfolio as well as each individual stock's performance in relation to relevant benchmarks.

#### Background and Methodology:

Given the current volatility in financial markets, students were given the task of creating their own economic forecast of the next year in the financial market. This analysis included industries that are expected to outperform the market given the proposed bailout program, as well as which balance sheet configurations provide the best stability throughout a recession. From this proposed outlook, an overall portfolio strategy was chosen, and weights were given to the components of the portfolio. With these weights individual stocks, bonds, and mutual funds were chosen based on their stability, expected appreciation, and diversification benefits for the overall portfolio. Using a ten week buy and hold strategy with \$1,000,000 to invest, the performance of the portfolio as well as each individual stock's performance were compared to relevant benchmarks. The final written report was staged in the perspective of the portfolio manager, as an annual analysis of the fund given to investors.

#### Review of Findings and Conclusions:

Choosing an aggressive capital appreciation strategy, given my current age and risk aversion, an overweight of large cap stocks was chosen for the Equity portion of the portfolio. Mostly investing in corporate bonds, the Bond portion of the portfolio had little exposure to government bonds. The Mutual Fund Portion provided diversification benefits and exposure to foreign markets. After the ten week holding period, the equity and bond portions of the portfolio were outperformed by their respective benchmarks. However, the mutual fund portfolio and exposure to foreign markets provided a net weighted return of 9.42%, well above the benchmark return of 6.9%. The overall portfolio return, after all fees and collections, was -0.94%.

**Biology**

**John Dorsey**

College of Arts and Sciences

Dr. Athula Wikramanayake, Mentor

***Effect of detergents on sea urchin embryos: A molecular approach to a classic developmental biology experiment***

During embryogenesis, blastomeres in the sea urchin embryo divide with an invariant pattern along the primary egg axis, also known as the animal-vegetal axis. At the fourth cleavage division, the four cells at the vegetal pole divide unequally to produce four small cells at the vegetal pole referred to as the micromeres. These micromeres have a critical role in the early patterning of the embryo, and specifically in regulating gastrulation. Recent work has shown that these properties are regulated by the Wnt signaling pathway. A now classic developmental biology experiment by J. Runnstrom determined that if a certain concentration of a surfactant (detergent) is added at a significant point in the early development of sea urchin embryos the cells will be virtually identical in size and shape at the 4th cleavage division; these embryos lack micromeres and the embryos fail to gastrulate. This phenotype has been described as "animalization." Basically such an embryo contains cells of all the same size and forms a hollow sphere. Previous work has shown that blocking Wnt signaling in the early sea urchin embryo leads to disruption of axial polarity, germ layer segregation, and gastrulation, and produces embryos that also have the distinct "animalized" phenotype. The Dishevelled protein (Dsh, a critical component of the Wnt signaling pathway) is localized at the vegetal pole of the unfertilized egg and remains at the vegetal pole throughout development. During the 4th cleavage, the micromeres contain the Dsh protein localized to the cortical region of the cells. Previous work has shown that the Dsh protein is essential for gastrulation in the sea urchin embryo. It is hypothesized that the surfactant delocalizes the Dsh protein and results in the equal cleavage and subsequent animalization in the classic experiment.

I have replicated Runnstrom's classic experiment using the surfactant sodium dodecyl sulfate (SDS) and the sea urchin species *Strongylocentrotus purpuratus*. The ideal concentration and time for the SDS treatment has been determined. Staining for markers of the endoderm in these SDS animalized embryos have shown that cell fate is still specified, but the embryos fail to gastrulate. In an attempt to "rescue" gastrulation in these embryos, we added LiCl to SDS-animalized embryos. Lithium chloride is known to activate the Wnt pathway downstream of the receptor and bypass the activation of the Dsh protein. The rescue attempt of SDS-treated embryos partially rescued gastrulation. Protein analysis has shown that the phosphorylated form of the Dsh protein is not represented in the SDS treated embryos. This form of Dsh is known to have a role in gastrulation. We have determined that the SDS treatment affects morphogenesis, but does not affect cell fate and that a key component of gastrulation is degraded. These results indicate that SDS blocks gastrulation in the sea urchin embryo by specifically affecting Dsh signaling in the Wnt/Planar Cell Polarity Pathway, but not Dsh

signaling in the Wnt/beta-catenin pathway.

## UNDERGRADUATE

### **Business**

## Jennifer Dowd

School of Business Administration

David Caldwell, Mentor

### ***Ask Cleveland***

The following is a summary of the development and character of Ask Cleveland, a non-profit organization based in Cleveland, Ohio. Ask Cleveland was founded in February 2009 by 11 volunteers, and I became the first and only staff person in May 2009. The organization was created in response to two LGBT rights campaigns and the perceived need of a proactive, grassroots effort to gain support for said campaigns. The mission of Ask Cleveland is to ask citizens about the issues and to become engaged in creating change. The organization is guided by a board of top volunteers, and takes a proactive, volunteer-oriented approach to campaigning, as opposed to a lobbying-based approach. Ask Cleveland is operating on the funds raised over the course of one month of fund raising, and at the time of my departure, a sustainable fund raising plan was being formulated. There is currently no Ask Cleveland office, so costs include employee salary and campaign materials, such as shirts and desk supplies

The future goals of Ask Cleveland are to 1) gain additional funding and recognition from the past two victories, 2) develop a sustainable model to keep the organization growing and alive even between campaigns, 3) expand into the greater Ohio area, and 4) continue to win campaigns through the education of all sections of society. The main weakness of the organization is its lack of support from other organizations in the community because of its more aggressive approach.

UNDERGRADUATE

RSMAS

Crawford Drury

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Diego Lirman, Mentor

***Abundance and distribution of Submerged Aquatic Vegetation (SAV) in Biscayne Bay: The influence of freshwater inflow from canals***

Seagrasses are one of the world's most productive ecosystems and a critical part of shallow marine environments in areas such as Biscayne Bay, a highly managed coastal lagoon. Due to the Comprehensive Everglades Restoration Project (CERP) Biscayne Bay experiences much more concentrated freshwater inputs than its historical hydrology and the ecology of the region is changing. Studies have shown recurring trends in *Thalassia* and *Halodule* species with regards to distribution, abundance and survivorship in different salinities and other environmental conditions. In this paper, we examined these species throughout the bay and draw conclusions about their distributions with regards to freshwater inputs, salinity variability, and distance from shore. General trends emerged for each species as well as other macroalgae and how they might be affected by CERP, which is attempting to return inland and coastal waters of South Florida to their historical state.

UNDERGRADUATE

**Biology**

**Dalal Eldick**

College of Arts and Sciences

Dr. Glassberg, Mentor

***Inhibition of Matrix Metalloproteinase-2 by Doxycycline Prevents Pulmonary Lymphangioliomyomatosis (LAM) Cell Invasiveness***

The pathogenesis of pulmonary lymphangioliomyomatosis (LAM), an aggressive and destructive, eventually fatal, lung disease of women, has been only partially elucidated. Estrogens are believed to be the hormonal mediators of the disorder since the population of reported pulmonary LAM patients are only women. However, therapies using anti-hormonal therapy have been ineffective. To study the role of estrogens in LAM, we isolated and propagated spindle-shaped "LAM cells" (LAM-D-SM) from affected lungs at the time of double lung transplant. LAM-D-SMs express functional estrogen receptors (ER) which undergo rapid intracellular turnover in their un-liganded state. 17Beta-estradiol (E2) enhances the transcriptional ER activity. E2-mediated ER activation increases matrix metalloproteinase-2 (MMP-2) protein synthesis and activity. The E2/ER-mediated increase of MMP-2 activity promotes, in in-vitro assays, LAM-D-SM invasiveness, which is inhibited by specific antibodies against MMP-2 or doxycycline. Doxycycline's mechanism of inhibiting MMP-2 may involve other indirect pathways, such as dampening AKT signaling, and a change in the estrogen receptor. This has major implications for therapeutic interventions.

UNDERGRADUATE

**Business**

**Christina Farmer**

School of Business Administration

Dr. Joseph Johnson, Mentor

***International Markets that companies choose to enter and when they chose to enter them: Does this affect their success?***

Our research question is "International Markets that companies choose to enter and when they chose to enter them: Does this affect their success?" We researched 500 companies from all over the world. My task included looking up the international markets that these companies had entered in thier histories and lifetimes and the year that they entered these countries. I used electronic resources from the Business School Library including the Business and Company Resource Center and Mergent Online. Through these databases and the companies websites I learned what countries these companies had entered. I also used thier financial reports and annual reports to find out the internaitonal markets the companies have. The next step we are working on is compiling these companies into a software that will let us know if copanies are more successful that others like them due to what international markets they have entered and when they entered them.

## UNDERGRADUATE

### Business

## Stephanie Feit

School of Business Administration

Dr. Elisah B. Lewis, Mentor

### ***Quickies: Convenient On-Campus Food Service***

Jonathan Diaz, Corey Childers, Caitlyn Scherr, Gilad Ashpis, Robert Stacey

One of the basic needs of all college students is the ability to eat without taking time out of their day. Between classes, before working out, or before rushing to a lecture, the demand for quick, affordable, and healthy food options is substantial given the limited hours of Chartwells' dining halls and the absence of healthy options at existing food stands around campus. With the desire to take advantage of this unsatisfied need, Quickies intends to provide healthy food options for students in a hurry by placing food stands in key market locations on campus that will offer full meal options.

Quickies will provide students and faculty with convenient, quick, and healthy food options from 7:45 a.m. to 6 p.m. on weekdays. Unlike current dining options, Quickies will implement an online service allowing customers to text their order or submit it online, indicating which items they want and how they want them prepared. Customers will choose a convenient pickup time and Quickies will guarantee their order is available at that time and will serve healthy breakfast, lunch, dinner, and snack substitutes.

Along with providing high quality food in a timely manner to the UM community, Quickies will also be devoted to helping the UM community through charitable efforts. Quickies pledges to support UM students and organizations that share similar socially responsible ideas as Quickies.

UNDERGRADUATE

**Engineering**

**Kenneth Fernandez Prada**

College of Engineering

Dr. Baruch Lieber, Mentor

***A novel approach towards in vitro aneurysm embolization studies***

Aneurysms are possibly caused by weak points in blood vessels where pathological blood flow conditions create the aneurysm, which is an extrusion off of the blood vessel. The focus of my study dealt with trying to improve the characterization of aneurysm embolization treatment with endovascular coils. Currently, the packing density (Total volume of coils/Total aneurysm volume) is used to quantify the aneurysm treatment; however, this number provides no information about the geometric arrangement of the coils within the aneurysm. Twelve identical model aneurysms were treated with either balloon-assisted or stent-assisted endovascular coiling in order to compare these techniques. The interior and exterior of the treated aneurysms were sequentially embedded in epoxy resin to allow for fine sections of the aneurysm. The data will be used to study the detailed distribution of coils within the aneurysm in order to better characterize this treatment modality.

## UNDERGRADUATE

### Neuroscience

## Jehan Feroz

College of Arts and Sciences

Jacqueline Sagen, Mentor

### ***Gene Transfer of Analgesic Peptides for Spinal Cord Injury Neuropathic Pain***

Spinal cord injury (SCI) is a condition that often results in a chronic paralysis or loss of function requiring constant care (Hulsebosch, Hains, Crown, & Carlton, 2009). Chronic pain often occurs with spinal cord injury, and interferes with the basic activities, effective rehabilitation, and quality of life of the patient. Although researchers have been able to show numerous mechanisms underlying the maintenance of the chronic neuropathic pain state (Hulsebosch et al. 2009), pain is often unresponsive to traditional pharmacotherapy. Effective pharmacological and nonpharmacological treatment options are limited (Que, Siddall, & Cousins, 2007). Clinical and pre-clinical evidence show that intrathecal and systemic opiates may be effective in alleviating severe SCI pain (Siddall, 2009). In this study, we attempted to uncover combinations of peptide analgesics that relieve pain at sub-optimal doses without side effects by conducting gene transfer experiments by infusing drugs intrathecally into rat models. We found that a combination of peptides blocks presynaptic Ca and postsynaptic NMDA receptors to provide analgesia without motor side effects. By continuously delivering these peptides to sensory nerves by gene transfer, it is possible to selectively interrupt pain transmission or interfere with the changes in the nervous system that lead to chronic pain.

## UNDERGRADUATE

### Business

## Tom Fields

School of Business Administration

Thomas Fields, Mentor

### ***Marketing Strategies of MonaVie***

Jonathan Rozen, Kuiqing Wu, Xin Zhong

As President and Founder of MonaVie Dallin Larsen said in 2005,"My desire has ben to help create a company that's not necessarily the best company in the world, but that is the best company for the world." MonaVie has changed many people's life in a healthier way. Based on its product and its unique opportunity, Mona Vie has become in a billion dollar company in less than 5 years. In addition to help people, this company has also focus on living in a better world. Through the M.O.R.E Project (MonaVie Operation Rescue), countless rainforest in Brazil have been saved from deforestation.

Monavie has grown exponentially over the past few years by utilizing a network marketing strategy, which seems to have no limit in size. Through data given by MonaVie, their network marketing to determine its effectiveness, and to evaluate the company's business strategies as related to their Corporate Social Responsibility to help assure that they are operating effectively and ethically. This analysis is made to help MonaVie identify key strengths, weaknesses, opportunities, and threats, and to help it determine the best course of action to maximize future growth potential.

UNDERGRADUATE

**Engineering**

**Mark Freeman**

College of Engineering

Colby Leider, Mentor

***Toward Effective Music Therapy Methods for People with Parkinson's Disease***

We present the design of a study that determines the effectiveness of two similar music-therapy methods (stage 2 and stage 3 discussed below) designed to improve upper extremity movement, timing, and accuracy in people with Parkinson's Disease (PD). The study is conducted with the aid of a multi-touch table computer interface (MTT) constructed by the University of Miami's Music Engineering Group, along with custom software designed for the MTT. Participants are presented with three round targets positioned on the corners of a virtual isosceles triangle on the MTT. Study sessions with individual participants involve four stages. In Stage 1, the participants touch the targets, one after the other, in a specific pattern while the software measures the time between each touch with no auditory cueing. Stage 2 is the same as Stage 1, except an audio metronome is played from a loudspeaker at the participant's average touch rate. Stage 3 is the same as Stage 2 with the addition of auditory feedback being provided when the correct target is touched. Stage 4 is the same as Stage 1, which supplies data for comparison with the participant's initial performance. The software stores the data for later analysis by the research team.

e present the design of a study that determines the effectiveness of two similar music-therapy methods (stage 2 and stage 3 discussed below) designed to improve upper extremity movement, timing, and accuracy in people with Parkinson's Disease (PD). The study is conducted with the aid of a multi-touch table computer interface (MTT) constructed by the University of Miami's Music Engineering Group, along with custom software designed for the MTT. Participants are presented with three round targets positioned on the corners of a virtual isosceles triangle on the MTT. Study sessions with individual participants involve four stages. In Stage 1, the participants touch the targets, one after the other, in a specific pattern while the software measures the time between each touch with no auditory cueing. Stage 2 is the same as Stage 1, except an audio metronome is played from a loudspeaker at the participant's average touch rate. Stage 3 is the same as Stage 2 with the addition of auditory feedback being provided when the correct target is touched. Stage 4 is the same as Stage 1, which supplies data for comparison with the participant's initial performance. The software stores the data for later analysis by the research team.

## UNDERGRADUATE

### Music

## Mark Freeman

Phillip and Patricia Frost School of Music, College of Engineering

Colby Leider, Mentor

### ***The Instrument as the Conductor: A Wireless 5-DOF Sensor for Musical Instruments***

As part of a musical composition commissioned by Michigan-based clarinetist Arthur Campbell for solo clarinet and laptop computer, we created a novel instrument-mounted device to capture gestural performance data. This small, wireless device consists of a five-degree-of-freedom sensor that is mounted onto the bell of the clarinet, along with a small footswitch used to trigger audio samples and to "step through" the musical score. Gestural data are transmitted via a ZigBee wireless transmitter from the on-stage clarinetist to the laptop computer; these data are used to control custom audio software written in the SuperCollider language. Our device transforms the clarinet into a virtual conductor, whereby the performer participates in a perceptual feedback loop between the acoustic sound of the clarinet and the resulting laptop-processed sound. In this poster, we present a variety of technical and aesthetic issues surrounding the design of the sensor and the composition of the piece.

Psychology

Devon Gangi

College of Arts and Sciences

Daniel Messinger, Mentor

***Triadic Attention and Language Ability in Siblings of Children with Autism Spectrum Disorders***

Infant-initiated joint attention (IJA) is coordinated attention between two people around an object or event. Deficits in IJA have been demonstrated in children with Autism Spectrum Disorders (ASD) within the first year of life (Dawson et al., 2004). Greater IJA abilities in infants have been associated with better concurrent and later language development (Dawson et al., 2004; Mundy et al., 2007; Roos, McDuffie, Weismer, & Gernsbacher, 2008) and have been linked to better language skills in children with autism (Toth, Munson, Meltzoff, & Dawson, 2006). Infant-initiated behavior requesting (IBR) is requesting an object or event from a social partner and is also a deficit in children with an ASD (Toth et al., 2006). I examined the relationship between frequency of IJA and IBR at 12 months and expressive and receptive language ability at 12 and 24 months. IJA levels were observed at 12 months during both a naturalistic parent-child play task, the Triadic Play Interaction (TPI), and an examiner-child interaction, the Early Social Communication Scale (ESCS). A parent-report measure, the MacArthur Communicative Development Inventory (MCDI), was used at 12 months to measure expressive and receptive language, and the Mullen Scales of Early Learning (MSEL) measured these abilities at 24 months. 12 month IJA in the TPI positively correlated with 12 month MCDI receptive language,  $r(35)=.44$ ,  $p<.01$ , and 12 month MCDI expressive language,  $r(35)=.41$ ,  $p<.05$ . These findings indicate an important relationship between IJA and language learning. IJA was not predictive of language ability at 24 months as expected, possibly due to heterogeneity within the sample. Participants are siblings of both typically developing and ASD children which may contribute to unique early developmental trajectories and timing of acquired abilities.

UNDERGRADUATE

## Biochemistry and Molecular Biology

### Enrique Garcia

College of Arts and Sciences

Ricardo Pastori, PhD, Mentor

#### ***Intrauterine fetal cardiac delivery of antisense miR-7 impairs beta cell development***

Enrique Garcia<sup>1</sup>, Margarita Nieto-Moreno<sup>1</sup>, Pedro Hevia<sup>1</sup>, Valia Bravo-Egana, Samuel Rosero, Dagmar Klein, Silvia Alvarez, R. Damaris Molano, Nancy Vargas, Camillo Ricordi, Antonello Pileggi, Juan Diez, Juan Domínguez-Bendala and Ricardo L. Pastori. University of Miami Leonard Miller School of Medicine, Diabetes Research Institute; Miami Florida, 33136 USA.

<sup>1</sup> These authors contributed equally to the project.

MicroRNAs (miRNAs) regulate gene expression by inhibition of mRNAs translation or by induction of their degradation. Several studies reported that miRNAs regulate embryonic and organ development including pancreatic specification and islet function. Based on our previous studies showing abundance and specific localization of miR-7 in pancreatic adult and fetal endocrine cells, we hypothesized a role for miR-7 in the development of pancreatic endocrine cells. To investigate this hypothesis, we performed loss of-function studies in murine developing pancreas, by creating an in vivo miRNA knockdown model via intrauterine fetal heart delivery of morpholinos(MOs). MOs are synthetic antisense DNA mimicking oligos, which can inhibit the activity of mature miRNAs. Delivery of anti-miR-7 MO to embryonic pancreas at an early developmental stage caused a significant inhibition of insulin at both RNA and protein levels. Moreover newborn mice showed impaired glucose tolerance and their islets were smaller with lower insulin content. The irrelevant MO control had no such effect. Anti-miR-7 MO treatment of cultured pancreatic buds recapitulated the results observed in vivo. These findings suggest that miR-7 is required for normal development of murine beta-cells.

Diabetes Research Institute Foundation provided funds for this research

UNDERGRADUATE

**Psychology**

**Karin Garcia**

College of Arts and Sciences

Dr. Elizabeth Felix and Dr. Linnette Castillo, Mentor

***Association Between Change in Community Integration and Depression After Traumatic Brain Injury***

**Abstract**

Traumatic Brain Injury (TBI), defined as damage to brain tissue caused by an external mechanical force, is a major cause of death and disability in the United States. TBI often results in long-term physical, emotional, intellectual, and social changes for the survivor. While many studies have explored the cognitive and physical disabilities that accompany TBI, few have investigated how those who have sustained a TBI function socially, and how changes in their social interactions may be associated with their psychological well-being. The aim of this study is to assess the relationship between perceived changes in community integration before and after TBI and current level of depression. Inpatients at the rehabilitation unit at the University of Miami/Jackson Memorial Hospital (UM/JMH) between March and November, 2009, were recruited for possible participation in the study. Participants were interviewed six months after their TBI to evaluate their current and pre-injury home and social integration activities using the Community Integration Questionnaire (CIQ). Depression levels were also assessed using the Patient Health Questionnaire Depression Scale (PHQ-9). Preliminary results from six subjects suggest a negative correlation between perceived change in community integration and depression after TBI: larger decreases in integration were associated with higher levels of depressive symptoms.

UNDERGRADUATE

Chemistry

Chirag Gheewala

College of Arts and Sciences

Dr. James Wilson, Mentor

***Fluorogenic Reaction for the Detection of Disease Relevant to Post-Translational Modification***

We are currently investigating the role citrulline has in the autoimmune disease multiple sclerosis (MS) through chemical tools. MS is an unpredictable disease of the central nervous system, where communication between the brain and other parts of the body is disrupted. Most MS patients experience weakness in their muscles and have difficulty with coordination and balance. To this day, there is no known cure for MS [1]. Recent studies have been investigating the presence of citrulline in myelin basic protein, and how it possibly destabilizes the myelin sheath in MS patients. Arginine residues of the myelin basic protein stabilize its loop structure by ionic interactions with carboxyl and phosphoryl groups. By replacing arginine with citrulline, a destabilization of the loop structure prevails. MS patients have an increase of citrulline as well as developmentally immature myelin [2].

It is important to be able to chemically tag a molecule that seems to play a potential role in MS. We are developing a profluorescently labeled urea moiety of citrulline in an acid-catalyzed reaction of a beta-diketone with the urea moiety, obtaining a 4,6-diaryl pyrimidone. This cyclization reaction is useful in determining how the beta-diketone will react selectively with citrulline. Ultimately, we hope to provide an unambiguous, rapid assay for iminated proteins in order to further understand the prevalence and function of citrulline in MS.

1. "Multiple Sclerosis Information Page." National Institute of Neurological Disorders and Stroke (NINDS). Web. 15 Nov. 2009. <[http://www.ninds.nih.gov/disorders/multiple\\_sclerosis/multiple\\_sclerosis.htm](http://www.ninds.nih.gov/disorders/multiple_sclerosis/multiple_sclerosis.htm)>.
2. Laura R Tranquill, Ligong Cao, Nicholas C Ling, Hubert Kalbacher, Roland M Martin, and John N Whitaker. Enhanced T cell responsiveness to citrulline-containing myelin basic protein in multiple sclerosis patients. *Multiple Sclerosis*, Aug 2000; 6: 220 - 225.

**Biology**

**Michael Gonzalez**

College of Arts and Sciences

Subbarayan Pochi, Mentor

***The Affect of Arsenic Analogues on TS Expression***

The over expression of thymidylate synthase (TS) has been associated with treatment resistance in human cancer cells, most specifically when using the chemotherapy agent 5-fluorouracil (5-FU). Down-regulating TS expression could help reverse the resistance of human cancer cells to 5-FU treatment. We hypothesize that arsenic analogues have different effects on the amount of TS RNA present in the cell. Here we investigated the ability of the arsenic compounds, arsenic tri-oxide (ATO) and ZIO 101 (ZIO), to modulate the expression of the TS RNA in a human colon carcinoma cell line (HT29). We cultured HT29 with increasing concentrations of ATO and ZIO for 24, 48, and 72 hours. Our control was only culture medium. Our treatments ranged from 0.2??M to 1.0??M in 0.2??M intervals. Once the incubation period was over, cell survival was quantified by XTT assay. In order to examine the expression of TS, reverse transcription and real-time polymerase chain reactions (RT-PCR) were used. Levels of TS were compared to beta-actin (BA), a gene that is not affected by arsenic treatments. The results demonstrated that both ATO and ZIO cause reduced cell viability, but ATO decreases the expression of TS. Therefore we concluded that ATO and ZIO both contribute to reduced cell viability, but only ATO is effective in reducing the amount of TS expressed in cells as time and concentration increase. Future research will involve combining ATO and 5-FU as chemotherapeutic agents.

UNDERGRADUATE

**Business**

**Stephanie Greene**

School of Business Administration

Dr. Tsiros, Mentor

***I'll Take Your Word for It: The Effect of Gender and Self Concept Orientation on the Perception of Online Consumer Product Reviews***

The rising popularity of the internet has allowed consumers to share information with each other on a colossal scale. Much research has been done on the ways online product reviews affect consumers' purchase intentions, however attention has not been paid to the role gender (both physical and behavioral) plays. The purpose of this research is to determine the degree to which gender and self concept orientation affect consumers' perceptions of online product reviews. In this project, the literature regarding the relationships between gender, self concept orientation, internet usage, and word of mouth communication have been reviewed. A survey has been crafted which will be used to gather information to shed light on this pertinent research question.

UNDERGRADUATE

**Business**

**Andrew Grizzle**

School of Business Administration

Mark Junkunc and Santiago Mingo, Mentor

***Determinants of Success in Venture Capital in Latin America***

We are currently putting together a table of various fields of information on venture capital deals in Latin America based on information gathered from the Thompson Venturexpert online database. This includes information on venture capital firms and funds as well as portfolio companies and individual investments. We plan to plot these fields against each other and determine the relationships between them to see which of these various factors most affect the success or failure of a company, as defined in multiple terms, from current valuation to IPO status. With this information we hope to shed more light on the factors that help foster entrepreneurship and innovation in an emerging region of the world.

UNDERGRADUATE

**Psychology**

**Roberto Guerra**

College of Arts and Sciences

Matthias Siemer, Mentor

***The Relationship between Personality Traits and Emotion Regulation Strategies***

The present study examines the relationships between different emotion regulation (ER) strategies and both neuroticism and extraversion. Fifty-three university students completed an online diary study, answering questions regarding negative emotions experienced earlier that day. As hypothesized, extraversion was related to both adaptive ER strategies examined (reappraisal, distraction). Contrary to hypotheses, neuroticism was related to one maladaptive ER strategy (rumination) but not to another (suppression). Interestingly, neuroticism was negatively related to reappraisal. Results indicate that negative affectivity (in this case neuroticism) implies the use of maladaptive emotion regulation strategies and the (relative) absence of helpful emotion regulation strategies. The reverse is true of positive affectivity (extraversion). By studying how healthy people regulate their emotions in everyday life, we can apply our knowledge of ER to those who struggle with ER, such as those with psychopathology.

## UNDERGRADUATE

### Business

## Andryk Guerrero

School of Business Administration

Mrs. Mary Young, Mentor

### ***Management 100 -- Epilepsy Foundation of Florida -- Epilepsy Prevention Group***

Management 100 Epilepsy Foundation of Florida - Epilepsy Prevention Group

School of Business

Andryk Guerrero: Group Leader

Christian Perilla: Group Member

Professor: Mary Young

Research Question: How can Acquired Epilepsy Awareness best be spread amongst a collegiate demographic?

Our management group set out to both develop a safety helmet campaign and create awareness of "Acquired Epilepsy," epilepsy induced by head trauma, at the University of Miami. To sufficiently advertise the dangers of riding bicycles without a helmet, in regard to acquiring epilepsy, our team decided that the most effective medium to directly appeal to a collegiate target market was to fuse the logos of the Epilepsy Foundation of Florida and the University of Miami. To do this, we created a unique label, that would ideally be placed upon all "U" helmets purchased at the University Bookstore and that incorporated both entities logos. Moreover, our management group designed a t-shirt with a catchy phrase "be sexy wear the U helmet" and an apple iPhone cover that modeled the University of Miami's trademark uprights fostering the epilepsy flames. Lastly, we set up an advertising table at our University Center on campus, handing out brochures and statistical information about the hazards and realities of acquired epilepsy.

Although the effects of our efforts to spread awareness of Acquired Epilepsy cannot be completely quantified at this point, some positive changes can be observed. On April 18, 2010, our group, as well as other University of Miami students, will be participating in the Epilepsy Foundations Annual Walkathon to help promote and fundraise the cause. Mahatma Gandhi once said, "Be the change you want to see in the world." Taking this quote to heart, our group believes that by the small actions taken by a few, a powerful grassroots movement, promoting epilepsy awareness, can and will surface, and thus we will not cease nor desist in our attempts to do our part in spreading awareness.

UNDERGRADUATE

RSMAS

## Sam Guffey

College of Arts and Sciences, Rosenstiel School of Marine and Atmospheric Sciences

Martin Grosell, Mentor

### ***Differential proton pump expression along the teleost intestine and consequences for osmoregulation***

Marine fish regulate the osmotic pressure of their body fluids by absorbing water and ions through the intestinal epithelium, but the mechanism by which they do so is not fully understood. Recent studies have shown that different intestinal regions may differ in their capacity for water and ion absorption. Also, an apical H<sup>+</sup> ATPase (proton pump) which could theoretically enhance water and ion absorption has been found to differ along the length of the gut. Using real-time PCR to amplify pre-extracted DNA, we determined expression levels for this gene in different tissues. After acclimating a marine teleost, the Gulf Toadfish (*Opsanus beta*), to hypersaline water we found an increase in the gene expression of this proton pump, especially in the posterior intestine where the change was approximately 10-fold. This suggests that physiological adjustments in the posterior intestine may be important for osmoregulation in changing salinity. Investigations are underway to quantify the rates of base secretion (which are related to the rates of water absorption) using a pH-stat titration system. Preliminary results indicate an increase in proton pumping in the posterior intestine upon acclimation to high salinity, as expected from genetic evidence.

## UNDERGRADUATE

### Biology

## Yasiel Hernandez

College of Arts and Sciences

Dr. Helena Solo-Gabriele, Mentor

### ***Vertical Distribution of Enterococci in the Sand at Hobie Beach***

Rafael J. Hernandez

Vertical Distribution of Enterococci in Sand at Hobie Beach

Yasiel Hernandez<sup>1, 2</sup>, Rafael J. Hernandez<sup>1, 2</sup>, Dr. Helena Solo-Gabriele<sup>2, 3</sup>

Department of Biology, University of Miami, Miami FL Department of Civil Engineering, University of Miami,

Miami FL Department of Oceans and Human Health, RSMAS, University of Miami, Miami FL

Purpose: To measure the vertical distribution of Enterococci in the sand of Hobie Beach along a designated transect.

The Environmental Protection Agency tests the quality of recreational waters by quantifying the levels of Enterococci present in the water. Having such information might give an insight to the possible contamination by human fecal matter. Though, it has been widely studied, it is not clear why this bacterium can inhabit the waters and sand particles of non-point source beaches. In order to understand the distribution of Enterococci in the sand and its' possible transport to the water a small square in the sand about 25 cm by 25 cm will be enclosed; sand will be collected by inserting a sterile 16cm core into the sand. The core will be collected in the upper supra-tidal zone. Only the top 13cm of the sand will be collected by layers every .5cm. Later, the enterococci will be extracted through vigorous shaking for 30 seconds, with PBS as the diluents and a membrane filtration procedure will be used to analyze the number of bacterium in the sand sediments.

## Lisette Hichez

School of Business Administration

Dr. Martin E. Segal, Mentor

### ***The Glass Ceiling***

#### The Glass Ceiling

Lisette Hichez and Professor Dr. Martin E. Segal

We are looking at the issues of gender discrimination against women (glass ceiling that exist today whereby women do not receive equal compensation for equal work) in the domestic and international workforce.

Background of Literature: Analysis of United States (U.S.) and international laws on gender discrimination, to determine whether or not the "glass ceiling" still remains a pertinent issue for women in the work place. There are U.S. legislations that have been enacted with the intention to shatter the glass ceiling such as the Lily Ledbetter Fair Pay Act of 2009 (based on the majority opinion of the Supreme Court case Ledbetter v. Goodyear Tire, 2007), Title VII of the Civil Rights of 1964 (Price Waterhouse v. Hopkins, U.S. 1989, where Hopkins sued Price Waterhouse successfully for sex discrimination as it was in violation of the Title VII Act), and the Equal Pay Act of 1963. However, there is little change in how women in the business world are treated. There is an international law in Norway called the Gender Equality Act of 2005, whereby corporate board of directors are legally required to be at least 40% women. This law is unique as no other country has such law. Norway also has a statute that demands all public institutions to "promote gender equality, and these efforts are to be documented each year". Neighboring country Sweden Corporations, on the other hand, choosing to form in either country choose Sweden and avoid Norway as they perceive this law to be counterproductive in certain industries. Thus, this often debatable area of business law made for a very interesting research.

Methodology: I utilized Lexus-Nexis, Find Law, periodicals, the law library and public records.

Conclusion: We found a study by the World Economic Forum on "Women Leaders and Gender Parity", 2009. That the Global Gender Gap Index conveys that Nordic Countries such as Iceland (#1), Finland (# 2), and Norway (#3), Sweden (#4), are all aggressively fighting for the rights of women in the workforce and to maintain gender parity. On the contrary, the United States falls behind at number 31 out of 134 countries. Thus, our nation needs to improve on closing the gap to obtain gender parity. It is important to note that although no country in the world has achieved full gender equality, the top four countries mentioned above have taken an

active role in eliminating gender discrimination (glass ceiling).

**Psychology**

**Heather Hollembeak**

College of Arts and Sciences

Marc Gellman, Ph.D., Mentor

***Differences in Obesity among Hispanic Subgroups***

Obesity is a precursor to cardiovascular health problems and has been targeted as a risk factor for metabolic syndrome, diabetes, and heart disease (American Heart association, 1998). Hispanics have higher rates of obesity compared to non-Hispanic whites (American Heart association, 2008). A link has been found between acculturation and the prevalence and development of obesity, but findings are inconsistent, perhaps because Hispanics have generally been treated as an aggregate population lacking any analyses according to country of origin (Goel, McCarthy, Philips, & Wee, 2004; Kandula, et al., 2008). The present study examines how central obesity differs between Hispanic subgroups and between genders within those subgroups. Central obesity was categorized according to National Cholesterol Education Program Adult Treatment Panel III criteria. The data are a small subset of data, collected from a much larger scale epidemiological study examining the cardiovascular health of Hispanics living in Miami-Dade County. During their visit, participants undergo a comprehensive series of diagnostic medical exams as well as questionnaires administered in interview format in their preferred language. These assessments are geared to provide researchers with information about lifestyle practices and psychosocial factors unique to Hispanics. Of special interest to this investigation is the role work-related and recreational physical activity may play in mediating central obesity.

UNDERGRADUATE

**Biology**

**Katherine Hurley**

College of Arts and Sciences

Alex C. C. Wilson, Ph.D., Mentor

***Regulation of nitrate reductase in Arabidopsis thaliana in response to aphid (Myzus persicae) parasitism***

In predator-prey relationships, the stable isotope ratio of  $^{15}\text{N}/^{14}\text{N}$  increases by approximately 3 parts per thousand with each trophic level; however, host-parasite systems do not follow this typical pattern. Stable isotope analysis of the interaction between the aphid *Myzus persicae* and two of its hosts in the family Brassicaceae demonstrates that aphids are consistently depleted in  $^{15}\text{N}$  relative to their host, and that aphids increase the  $\delta^{15}\text{N}$  of their hosts under crowded conditions. Further investigation demonstrated that host plants with heavy loads of aphids have significantly elevated nitrate reductase (NR) activity. Previous work has shown that nitrate substrate limitation, resulting from an increase in NR, leads to lower plant discrimination against  $^{15}\text{N}$  during nitrate uptake. The present study investigates the mechanistic basis of the elevation in NR activity in aphid-infested *Arabidopsis thaliana* testing the hypothesis that elevated NR activity results from post-transcriptional regulatory processes rather than regulation at the level of transcript production.

UNDERGRADUATE

Neuroscience

## Julian Bryan Iorgulescu

College of Arts and Sciences

, Mentor

### ***Developmental Plasticity Responses of the Zebrafish Spinal Cord to Blockade of Inhibitory Neurons***

Olivia Severdija, Nina Hirsch

The central nervous system has an unparalleled capacity for plasticity. During development this plasticity manifests as a constant tug-of-war between inhibitory and excitatory neuronal mechanisms. If one of these forces is altered from its normal state, the other will compensate accordingly in order to maintain a homeostatic equilibrium and ensure normal development. This holds true for blockades of inhibitory neurons during zebrafish spinal cord development, resulting in a compensatory reduction of excitatory neuronal populations and an elevation in the number of inhibitory neurons. The zebrafish were dually transfected with vGlut-RFP and GlyT2-GFP to visualize excitatory and inhibitory neuronal populations, respectively. Strychnine, a potent inhibitor of glycine receptors, was administered to zebrafish 24 hours post fertilization for 48 hours. The experimental group that was exposed to 48 hours of strychnine displayed a 28% increase in GlyT2-GFP fluorescence, along with a 25% decrease in vGlut-RFP fluorescence, as compared to vector-only controls. Blocking inhibitory neuronal populations in the developing zebrafish spinal cord seems to elicit a compensatory response that enlarges inhibitory neuronal populations and reduces excitatory neuronal populations. These findings further evidence the ability for the developing nervous system to rectify any abnormal shift and restore a proper, homeostatic developmental state.

## UNDERGRADUATE

### Neuroscience

## Christopher Jimenez

College of Arts and Sciences

Helen M. Bramlett, Ph.D., Mentor

### ***The efficacy of necrostatin TL14077 after traumatic brain injury on histopathology and behavior***

Traumatic brain injury (TBI) produces massive cell death in the directly impacted areas that may lead to motor, speech, and sensory dysfunction. Some brain injuries initiate a cell death cascade distal to the injury site, resulting in further damage. Necroptosis is a newly identified programmed cell death pathway that leads to necrosis via RIPK1 kinase signaling. TL14077 is a highly selective inhibitor of this RIPK1 kinase. Previous researchers used the controlled cortical impact model (CCI) to analyze the effects of this necrostatin on brain injury. In the present study, we used the fluid percussion injury model (FPI) to examine the effects of TL14077 treatment on TBI injury outcomes. FPI provides a better model than CCI for diffuse contusion injuries such as occur in car accidents. Male Sprague Dawley rats (N=32) were randomized to 72 hrs post-TBI chronic jugular infusion of either vehicle (n=10), 10mg/Kg TL14077 (n=12), or 25mg/Kg TL14077 (n=10). Sensorimotor function was assessed by cylinder task before initial TBI then again after treatment (3 days post-TBI). Animals were sacrificed after behavioral testing (3 days post-TBI) for histological analysis of contusion volumes. Sensorimotor behavioral testing showed no difference between control and drug-treated animals. However, we observed significant reduction of contusion volumes in the 10mg/Kg animals compared to both the vehicle-treated and 25mg/Kg animals. The histological findings suggest possible therapeutic applications of TL14077. However, it may be beneficial to examine the treatment in animals at a chronic time point to determine the impact on sensorimotor function.

UNDERGRADUATE

**RSMAS**

**Sara Johnson**

Rosenstiel School of Marine and Atmospheric Sciences

Dr. James Klaus, Mentor

***MICROBIAL BIOFILMS ASSOCIATED WITH BEACH SEDIMENTS***

Fecal indicator bacteria (FIB) are used to assess human health risks on recreational beaches because their presence is associated with waste contaminants and waterborne disease-causing organisms. Recent studies have found concentrations of FIB to be higher in beach sediments than within the water column. The mechanism by which FIB persist in beach sediments is unknown. This study investigates the potential for FIB integration into sediment biofilms and how biofilms may affect the distribution and mobilization of FIB into the water column at recreational beaches. Biofilms are matrix-enclosed bacterial communities that attach to surfaces via extra cellular polymeric secretions. To study the relationship between FIB and biofilms, sediments from the subtidal, intertidal, and supratidal zones were collected from a known nonpoint source polluted beach in Miami, Florida. EPS was extracted from the samples and quantified using a phenol-sulfuric acid assay. FIB abundances were determined using quantitative PCR (QPCR). Confocal scanning laser microscopy (CSLM) and environmental scanning electron microscopy (ESM) was used to visualize sediment grain biofilms and attached bacteria. Additionally, composition of sand grains was analyzed and percent carbonate, silicate, and organic material was determined. CSLM identified and visualized EPS and microbes in sediment grain crevices and was supported by ESM. Results indicate that biofilm concentration varies with sediment location on the beach. Higher numbers of enterococci positively correlated with high biofilm concentrations found in the supratidal area. Additional studies will include further assessment of biofilm bacterial communities associated with beach sediments.

UNDERGRADUATE

**Business**

**Marco Jovovich**

School of Business Administration

Dr. Royce Burnett, Mentor

***Accounting for Municipal Solid Waste Landfill Closure and Postclosure Care Costs***

Chris Papa and Robert Till

In 1993, The Government Accounting Standards Board (GASB) enacted Statement No. 18, "Accounting for Municipal Solid Waste Landfill Closure and Postclosure Care Costs," which requires that municipal solid waste landfills (MSWLF) recognize closure and postclosure costs as expenses and liabilities during the period that the landfill is in operation. All closure and postclosure costs should be recognized by the time the landfill is closed. However, evidence indicates that there is a disparity in the way the Statement is addressed in that disclosure of landfill costs varies from no disclosure, to footnote disclosure to liability recognition. The objective of this research is to assess why some municipalities (counties) adopt better disclosures than others. A key component of this study will be to assess the role that specific social, economic, demographic, and political attributes play in the disclosure decision. As such, the study will speak to both economic and social sustainability, two issues that are of key interest to local and community stakeholders.

## UNDERGRADUATE

### Neuroscience

## Emily Jun

College of Arts and Sciences

Sari Izenwasser, Ph.D., Mentor

### ***Environmental and Social Factors Differentially Alter the Effect of Nicotine on Cocaine-Stimulated Locomotor Activity in Periadolescent Male Rats***

Environmental and Social Factors Differentially Alter the Effect of Nicotine on Cocaine-Stimulated Locomotor Activity in Periadolescent Male Rats

Emily Jun, Magalie Lenoir, Jennifer Ledon, and Sari Izenwasser

The use of tobacco among adolescents is prevalent and particularly problematic. Previous studies have suggested that nicotine use during adolescence carries a greater risk than during adulthood and that smoking during adolescence can lead to a greater probability of illicit drug use. In laboratory studies, it has been shown that male adolescent rats exhibit increased sensitivity to the locomotor-activating effects of cocaine and amphetamines after exposure to nicotine. In addition, social and environmental factors have been shown to alter systems that mediate drugs of abuse and a significant interaction between social and environmental factors on cocaine-induced locomotor activity has been observed in adolescent rats. The present study explores whether social and environmental factors alter the effects of nicotine on cocaine-stimulated locomotor activity and on the neurochemistry of the brain in periadolescent male rats. Upon arrival of the rats on postnatal day 23 (PND 23), the rats were randomly assigned to one of four housing conditions. Socially isolated/ environmentally impoverished rats (II) were housed 1 rat/cage with no toys available. Isolated/ environmentally enriched rats (IE) were housed 1 rat/cage with toys. Socially enriched/ environmentally impoverished rats (SI3) were housed 3 rats/cage with no toys, and socially enriched/ environmentally enriched rats (SE3) were housed 3 rats/cage with toys. Beginning on PND 34, 11 days after housing conditions were applied, rats were injected once daily with either 0.4 mg/kg nicotine or saline for 7 days. On the eighth day (PND 41), one group of rats was killed and their brains were removed for neurochemical analysis through autoradiography assays. Another group of rats began locomotor activity testing, beginning with baseline testing on PND 41. On the 3 subsequent days (PND 42-44), cocaine (5 mg/kg)-stimulated locomotor activity was measured. Pretreatment with nicotine increased cocaine-stimulated locomotor activity and dopamine transporter densities in II and in SE3 rats, while no difference was found in the IE or the SI3 rats. In the socially isolated rats, nicotine increased locomotor activity, but this effect was blocked by the addition of environmental enrichment (toys). However, in the socially enriched rats, the addition of environmental enrichment increased the effect of nicotine on cocaine-stimulated locomotor activity and dopamine transporter densities. These results show that environmental conditions differentially alter the effects of nicotine on cocaine depending on

social conditions. The data further suggest that changing social and environmental conditions may alter the potential role that nicotine plays as a gateway drug.

## UNDERGRADUATE

### Neuroscience

## Jennifer Kaplan

College of Arts and Sciences

Dr. Michael Antoni, Mentor

### ***The Correlation between Salivary Cortisol Levels, Perceived Stress, and Emotional Well-Being in Women Treated for Breast Cancer***

Jen

Women recently diagnosed with breast cancer and who have undergone surgical treatment often experience chronic stress which can affect their emotional well-being (McGregor et al., 2004). Negative psychological states may reduce the ability these women to resist disease progression and metastatic spread (Andersen et al., 1998). Many researchers have focused on examining the relationship between psychosocial factors and survival rates or disease progression (Goodwin et al., 2001; Antoni & Lutgendorf, 2007). However, there are few researchers who have examined the correlation between perceived stress, emotional well-being and the biological response of stress, cortisol levels. The present study examined these relationships at baseline using salivary cortisol levels measured throughout the day, the Affect Balance Scale (ABS), the Functional Assessment of Cancer Therapy-Breast (FACT-B) instrument, and the Positive States of Mind (PSOM) scale while accounting for multiple factors such as the stage of cancer, age, social support system, etc.

## UNDERGRADUATE

### Business

## Elena Kasparis

School of Business Administration

Dr. Elisah Lewis, Mentor

### ***"Munchies": A Late-Night, On-Campus Dining Venue***

Ophelia Bernardino, Deanna Kalil, Rob Konferowicz

The study involves the formation of a business plan for a late-night, on-campus dining venue. The name of the business will be "Munchies" and the business' purpose is to provide conveniently-located hot meals on campus during late hours. Services will include delivery to dorms and products include wraps, salads, fat sandwiches, soda, and water. Hours of operation for "Munchies" will be 12am - 4am; the key phrase that describes the business is "Fast food 'till four am". The unique benefit of the dining facility is that it is the only late night dining option on campus. "Munchies" will provide pick up, and delivery for a nominal charge, making food quick and convenient to access. The reason for being in business is to satisfy a general need of hot meals for college students who are awake late at night.

The target customers for the business include the students of the University of Miami who frequently go out late at night and return to campus in the early morning. There is a large, unfulfilled need from these students for hot meals on campus during these late hours. Dining venues competing against "Munchies" consist of the local area late-night food services. These include Denny's, McDonald's, the C-Store, Sbarro's, Domino's (and other pizza delivery restaurants), and CVS. The dining service differs in that it is located directly on campus near the freshman dorms (Hecht and Stanford Residential Colleges). It is a much shorter walk and is open much later with a better variety of food.

UNDERGRADUATE

**Psychology**

**Sophie Khokhawalla**

College of Arts and Sciences

Sari Izenwasser, Mentor

***Nicotine Reward Differs in Adolescent vs. Adult Male and Female Rats***

Adolescents develop symptoms of dependence after minimal tobacco exposure. Individuals who initiate smoking at early adolescence are more likely to show a greater difficulty in quitting than those who start as older adolescents or adults. Nicotine dependence rates are higher among females than males and adolescents experience higher rates of dependence than adults. Research has shown female rats are more sensitive to the locomotor stimulant effects of nicotine than male rats and adolescent rats were more sensitive than adult rats; however, it is not known whether the same is true for nicotine reward. This study was done to measure nicotine reward in adolescent and adult male and female rats. Nicotine reward was determined in Sprague-Dawley rats using a conditioned place preference (CPP) procedure. In this procedure, the test chamber has a striped side and a white side and 0.4 mg/kg nicotine is paired with one side and saline with the other. After 3 days of pairing (conditioning), preference for the two sides is determined. If a rat finds nicotine rewarding, it should spend more time on the nicotine-paired side than the saline-paired side after conditioning. Nicotine CPP occurred in adolescent females (PAF) and adult females (ADF) but not in adolescent males (PAM) and adult males (ADM) and the magnitude of CPP was greater in PAF than ADF. Thus, nicotine produces greater reward in females than in males and it appears that the magnitude of the reward is greater in adolescents than in adults.

## UNDERGRADUATE

### **Business**

## Sara Kim

School of Business Administration

Dr. Lewis, Mentor

### ***U LoUnge***

Leah Galinsky, Hadley Manfredi, Jenna Gulla, Daniel Polen, Lauren Pannone

ULounge was created so that students on campus can have a place to socialize at all times during the day or night. This facility will also serve as the only restaurant open after eleven o'clock p.m. on campus and will host events and concerts throughout the school year. Many students that live on campus do not have cars, especially freshmen. As freshmen students, our team came up with the idea of having an on-campus facility where many of the student's needs are met.

ULounge will also engage in the eco-friendly initiatives where every product we use will be made from recycled and/or organic material. There would be a designated team specifically in charge of this aspect of the operation.

Our financial plan begins with a "do it yourself" approach where our finances will come directly from the group. After generating revenue, we will begin to finance with outside sources.

Psychology

Sara Klaben

College of Arts and Sciences

Jill Ehrenreich May, Mentor

***Parent-Child Concordance in Reports of Anxiety and Depression Amongst a Normative Sample Participating in a Universal Prevention Program***

Emily A. Laird

Research examining clinical populations has often found discordance between parent and child severity ratings of child psychopathology (Jensen et al., 1999; Yeh & Weisz, 2001). Such findings suggest that parents of children receiving mental health services rate their children as experiencing more severe internalizing psychopathology than children indicate themselves (Grills & Ollendick, 2003; Jensen et al., 1999). In contrast, non-referred children seen in a primary care setting may report higher anxiety scores than their parents (Wren, Bridge & Birmaher, 2004). Although these findings have been repeatedly shown in clinical samples, they lack substantial replication across non-clinical samples. Therefore, the purpose of the current study is to investigate parent-child concordance regarding reports of internalizing symptoms amongst a non-clinical sample participating in a universal prevention program targeting these symptoms. Participants were 75 children (mean age = 8.39 years; 29% female) whose parents had registered them for a community summer camp and agreed to have their children participate in a universal prevention program for anxiety and depression offered in conjunction with the camp. Using the Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997, 1999) and The Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977), parent and child ratings of children's anxiety and depressive symptoms were collected prior to the onset of the prevention program and at a post-prevention interval. Preliminary analysis examining pre-prevention findings demonstrated a negative, non-significant set of correlations between child and parent scores of anxiety ( $r = -.126$ , NS) and depression, ( $r = -.122$ , NS). Average parent and child ratings of the child's anxiety (Child  $M = 24.75$ ,  $SD = 13.57$ , Parent  $M = 10.94$   $SD = 8.01$ ) and depression (Child  $M = 13.10$ ,  $SD = 7.40$ , Parent  $M = 9.90$ ,  $SD = 5.50$ ) indicated that children rated themselves more severely on anxiety and depression scales than they were rated by their parents. At the time of presentation, concordance ratings at post-prevention will also be reported. These results will also be used to discuss potential sources of the varying patterns of discordance between parent and child reports of internalizing symptoms observed in clinical and non-clinical samples, respectively.

## UNDERGRADUATE

### Psychology

## Janice Leon

College of Arts and Sciences

Youngmee Kim, Ph.D., Mentor

### ***Correlates of Fruit and Vegetable Consumption among the Poor and Uninsured***

Sierra Winings; Youngmee Kim, Ph.D.

Consuming at least 5 servings of fruits and vegetables a day for greater than 5 days a week has been recommended based on the evidence showing the link to lower risks for numerous chronic diseases including cancers, cardiovascular disease, diabetes, and hypertension. Studies have shown, however, that this minimum recommendation is not being met by most people: only 62% consume the recommended amount of vegetables, and only 77% consume the recommended amount of fruits. Furthermore, low-income households report among the lowest levels of fruit and vegetable consumption (FVC). Low-income individuals therefore, a population already vulnerable by socio-economic standards, suffer disproportionately from chronic diseases due to poor diets. In this study, we explored the demographic correlates of FVC in a low-income, at risk population. Sixty-one participants were recruited at a free Health Fair held in Liberty City, Florida, where the population is mostly uninsured, low-income, and largely comprised of ethnic minorities. Participant's income, age, sex, and level of education were recorded and analyzed as potential predictors of FVC. Results showed that income and sex proved to be accurate predictors of FVC. Women with yearly incomes between \$10,000 and \$20,000 reported the least FVC ( $p < .05$  and  $p < .02$ ). This study identifies a subgroup of an already vulnerable population that shows the poorest healthy lifestyle behaviors among the poor and uninsured. Clinicians must be aware of the poor diets of this subset of the underserved population and work to promote fruit and vegetable consumption with this group of low-income women in mind. New initiatives should be developed that increase awareness of the benefits and disease prevention related to high levels of FVC.

## UNDERGRADUATE

### Business

## Seth Levy

School of Business Administration

Susan Amat, Mentor

### ***Filling in the missing piece for municipal skateboard park construction***

In the past 15 years, the number of public skateboard parks in the United States has grown over 6000% and the number of skateboarders has grown at more than double that rate, leaving many skaters without a place to practice their passion. Why are public skateboard parks growing at less than half the rate than skateboarders? Considering the current skateboarder to skateboard park ratio is 25,000 and the average skateboard park can only serve 45 people at a time, there is a huge need to be filled. In order to research this, I had to perform mostly primary research by surveying municipalities of all sizes to find out their biggest hurdles for building a skateboard park.

After quantifying and analyzing the data from these surveys, I came to the conclusion that there are three major hurdles for municipalities in building a skateboard park: cost, public opinion, and not knowing how to go about doing it. Of these three, the third one is the least adequately addressed and the second part of my research explores the reasons behind this and what opportunities exist in the space. Finding a suitable solution for this problem could begin to close the gap between the skateboarder to skateboard park ratio and bring parks to regions that have none, especially in isolated and rural areas of the country.

**Biology**

**Sonia Majid**

College of Arts and Sciences

Dr. Claudia Rodrigues, Mentor

***Role of Proto-oncogene c-Myc in Endothelial Cell Activation***

**Background and Logical Context**

Blood vessel formation, angiogenesis, is used for organ growth, healing, and reproduction. During adulthood, most blood vessels remain quiescent and angiogenesis occurs only in the cycling ovary and in the placenta during pregnancy [i]. If needed, endothelial cells (ECs) still have the ability to divide rapidly in response to factors such as wound healing. However, this stimulus can become disturbed: abnormal blood vessel growth, either excessive or insufficient, is now recognized as a "common denominator" underlying many deadly and debilitating conditions, including cancer, skin diseases, age-related blindness, diabetic ulcers, cardiovascular disease, stroke, and many others [ii].

The proto-oncogene, c-Myc, is a major regulator of important cellular functions such as cell proliferation and differentiation. The expression of c-Myc is tightly regulated. It is important to keep c-Myc expression under control because constitutive activation of c-Myc expression has been linked to the development of many types of cancers. In addition to its roles in cell proliferation, cell growth and embryonic development, C-Myc has also been shown to regulate processes such as apoptosis and more recently, angiogenesis[iii]. Knockout studies of the c-Myc proto-oncogene in embryos show defects of blood island formation and endothelial cells lining the yolk sac [iv], demonstrating that c-Myc is required for vascular development. Upregulation of c-Myc has been associated with increased angiogenesis in a number of systems, including myocardial hypertrophy and tumor angiogenesis [v]. In these systems, the expression of proangiogenic genes is activated, supporting new blood vessel growth by paracrine action on endothelial cells and vascular progenitors. Thus, there is strong evidence that this proto-oncogene plays a critical role in angiogenesis, but the mechanisms involved still need clarification.

**Significance**

The growth of blood vessels, angiogenesis, is essential for organ growth and repair. However, abnormal activity within this process can lead to a variety of malignant, infectious and immune disorders. Better understanding of the mechanisms involved in blood vessel formation can lead to the development of new therapeutic strategies such as anti-angiogenic therapy which can help fight diseases such as cancer. For instance, as a tumor grows its demands more oxygen and nutrients, usually exceeding what existing blood vessels can provide. Thus a new vascular network is established via angiogenesis in order to meet the tumor's increasing needs. By

showing that c-Myc is essential for promoting angiogenesis, anti-angiogenic therapy may be able to focus on a way to stop the tumors growth by cutting off its blood supply [vi]. In this proposal, we will test the hypothesis that c-Myc is required for endothelium activation, leading endothelial cells from a quiescent/dormant stage to an activated/cycling/migratory stage. Unlike tumor cells, endothelial cells are genomically stable and are therefore considered to be ideal therapeutic targets that will not become resistant to anti-angiogenic therapy [vii].

#### Specific Objectives

Aim 1. Determine if c-Myc is mobilized during endothelial cell activation.

The mobilization of c-Myc upon endothelial cell activation will be determined by stimulating endothelial cells with growth stimulus such as fresh culture media supplemented with growth factors ( SDF-1/CXCL12).

Aim 2. Determine the requirement of c-Myc for endothelial cell activation.

The requirement of c-Myc for endothelial cell activation will be determined using loss of function approaches and functional studies of cell proliferation, cell cycle analysis and cell migration.

#### Methods

##### 1. Mobilization of c-Myc

After treating Human umbilical vein endothelial cells (HUVECs) with fresh culture media, we will determine if there is a change in c-Myc expression at the protein level by Western Blot and RNA level by real-time PCR.

##### 2. Knockdown of c-Myc

HUVECs will be transduced with lentivirus vectors expressing small interfering RNA (siRNA) against c-Myc as well as GFP (Green Fluorescent Protein). Transduction efficiency will be determined by counting the number of GFP-positive cells. Knockdown efficiency will be determined by western blot analysis and qPCR.

##### 3. Functional Assays

Control and knockdown cells will be tested using the functional assays described below.

a. Proliferation will be determined after growth stimulation with fresh culture media supplemented with SDF-1/CXCL12 using the Click-It EdU cell Proliferation Assay.

b. Cell cycle experiments will be performed by fixing cells at different time points ( to be determined) after growth factor stimulation, staining with propidium iodide and cell cycle analysis using fluorescence activated cell sorting.

c. Cell migration will be determined using matrigel and wound healing in vitro assays.

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## Adam Margol

College of Arts and Sciences

Dr. Jennifer Durocher, Mentor

### ***Comparing Preference and Reinforcement Assessment Methods for Children with ASD***

Dr. Jennifer Durocher, Dr. Anibal Gutierrez, Dr. Melissa Hale, Dr. Michael Alessandri

Children with Autism Spectrum Disorders (ASD) show impairments in social communication skills. Consequently, the reinforcing value of social consequences varies according to each individual child; social consequences may not function as reinforcers. Therefore, determining preferences for social consequences may be important in developing interventions for children with ASD. This study compares two described methods for assessing social motivation to assess preference and reinforcement effects of social consequences: Revised Dube et al. 2004 (preference assessment) and a modified Smaby et al. 2007 (single operant reinforcer assessment). Preliminarily, the two social motivation assessments have been correlated to test their strength within a small sample. The revised Dube et al. procedure exposes children to a forced-choice procedure whereby they must choose between spending time on an interactive side of the room or a not interactive side. The amount of time during a five-minute session is quantified and defined by the child either engaging the examiner or not based on an all-encompassing definition of engagement. The modified Smaby et al. 2007 procedure involves the pressing of a micro-switch. The procedure is conducted for 5 previously selected social consequences and quantifies reinforcing value by measuring the frequency of micro-switch presses during a one-minute session for each consequence. Results from the preference assessment showed variability across participants, although a majority of the participants favored the non-engagement condition. Results from the reinforcer assessment also varied across participants, and showed that the assessment identified relative preferences among types of social reinforcers. A preliminary one-tailed Pearson correlation between the Revised Dube et al. procedure and the modified Smaby et al. procedure was not statistically significant, although results were in the expected direction ( $r=.519$ ,  $p=.062$ ). The relationship between the scores of the revised Dube et al. procedure and the modified Smaby et al. procedure suggests the revised Dube et al. procedure may properly measure preference for social consequences. Therefore, engagement may be an important aspect of assessing social motivation and may predict a child's ability to positively benefit from intervention.

## UNDERGRADUATE

### RSMAS

## Hannah Marshburn

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Donald Olson, Mentor

### ***High Arctic Climate Change: Glaciomarine Oceanographic and Suspended Sediment Dynamics, Kongsbreen system, Svalbard***

This study characterizes oceanographic conditions and suspended sediment loads resulting from glacial meltwater in proximal distance to the glacier terminus of the Kronebreen-Kongsvegen system, Kongsfjorden, Svalbard, located at 79°N and 12.5°E as a component of the Svalbard REU project. The Svalbard REU project, funded by the National Science Foundation, is a research project that aims to characterize glacial sedimentary and oceanographic systems by immersing undergraduates in an extensive field research program in the arctic environment. The study was conducted during July and early August of 2009, coinciding with maximum melt water volumes induced by elevated summer temperatures, and approaching the spring tidal maximum. Major fjord, oceanic, and glacial-induced brackish meltwater plumes were identified and evaluated for suspended particulate load through CTD scans, optical back scatter (OBS) readings, and water samples taken in perpendicular transects roughly 200-1000 m from the glacial termini. Sub-glacial upwelling systems on opposing sides of the glacial face were targeted for analysis and comparison. The control of tidal fluxes on sediment and interflow mixing was examined. The fjord is an example of a system with active marine glaciers transitioning to terrestrial systems, vulnerable to circulation changes.

The surface mixed layer contained the highest suspended particulate matter. Data during ebb tide phases indicate reduced water column stratification. Fjord waters and currents are strongly driven by thermohaline convection cycles due to their partial enclosure and protection from open ocean winds and waves. Research characterizing density driven mixing properties of inner fjord basin water columns is limited. Data generated in this study can be used to investigate the effects of glacial outwash, comprised of freshwater and sediment, on fjord circulation. Understanding how glacial meltwater is exported from fjords and interacts with ocean-climate systems is critical to hypothesizing future climate behavior. The effects of climate change are amplified in polar regions such as the high arctic archipelago of Svalbard.

**Psychology**

**Saily Martinez**

College of Arts and Sciences

Amy Weisman de Mamani, Radha Carlson, Mentor

***Ethnic and language differences in communication deviance of relatives of patients with schizophrenia***

Schizophrenia is a severe psychiatric disorder. Communication Deviance (CD), or a lack of clarity in communication within family members, is one predictor of symptoms. Only two studies have investigated cultural differences in CD. Doane et al. (1989) found no differences in CD between English-speaking Anglos and Spanish-speaking Latinos. This study was limited to parents and did not examine English-speaking Latinos. Comparing ethnicities, Kymalainen et al. (2006) found relatives of Anglo patients with schizophrenia had higher CD than relatives of Hispanic patients. In the Kymalainen et al. study, however, English and Spanish speakers were combined. One explanation for their ethnic finding may be explained by the minimizing bias (Lopez, 1989). In other words, when speaking English, Hispanic CD may erroneously be minimized or discounted because it is instead attributed to poor language ability. The current study will elucidate this hypothesis. Specifically, using a sample of 80 relatives of patients with schizophrenia, the present study will compare CD levels among three groups 1) Anglos interviewed in English, 2) Hispanics interviewed in English and 3) Hispanics interviewed in Spanish (Hispanic participants are interviewed in their preferred language). Following Kymalainen et al., CD will be measured using the Five Minute Speech Sample. Support for the minimizing hypothesis would be obtained if group 2 demonstrates lower levels of CD than groups 1 and 3. A three-way ANOVA will be used to test the primary study hypothesis. If differences are found, post hoc analyses will be conducted to clarify ethnic patterns.

UNDERGRADUATE

Neuroscience

Jose Martinez

College of Arts and Sciences

Richard L. Rotundo, Ph.D., Mentor

***The Translational Repressor Pumilio-2 Regulates Its Own Expression Through a Novel Negative Feedback Mechanism***

The PUF family of RNA-binding proteins regulate expression of specific gene products at the translational level by binding to specific sequences known as nanos response elements (NREs) in the 3'untranslated region (3'UTR) of target mRNAs. One member of this family is Pumilio-2 (PUM2), a translational repressor protein that plays a key role in the nervous system and during development. For example, it has been shown that PUM2 mRNA is expressed during neuronal development and that it is involved in the formation of dendritically localized ribonucleoprotein particles and stress granules. Even though the expression of PUM2 seems to be critically important in the development and modulation of neurons, nothing is known about the mechanism regulating PUM2 expression. We found NREs in the PUM2 3'UTR and show that PUM2 binds to the 3'UTR of its own mRNA. Furthermore, we show that overexpression of PUM2 in cells transfected with a green fluorescent protein coding region linked to PUM2 3'UTR construct (GFP-PUM2-3'UTR) dampens GFP production, suggesting that PUM2 downregulates its own expression by binding to its own 3'UTR. These observations suggest a novel model for the localized regulation of protein translation through a negative feedback loop responsive to extracellular signals.

UNDERGRADUATE

**Chemistry**

**Lauren Marussich**

College of Engineering

Roger Leblanc, Mentor

***pH effect on quantum dot formation***

Quantum dots are semi-conducting, phospholuminescent nanoparticles 0.1-10 nanometers in length. Quantum dots can be synthesized as protein conjugates, which produce a different emission spectrum than that of the protein itself. In that way, the presence of quantum dots can be detected, and then used as probes. Serum albumin is the most abundant protein in the blood plasma in mammals, and this study focuses on bovine serum albumin (BSA). Under normal circumstances, BSA is filtered from urea by the kidneys; thus the BSA-CdS quantum dot conjugate can be used to probe for kidney malfunction. Because the pH of the protein is linked to its quaternary structure, we decided to test for the pH effect on quantum dot formation. We hypothesize that the optimal pH will be 8.5. We used buffer solutions of pH values of from 4.5 to 10.0 at increments of 0.5 on the pH scale. Using a spectrofluorimeter, the quantum dot solutions were tested for luminosity of the emission spectrum found at wavelengths of 370-700 nm, with a peak occurring for each trial at 520 nm. We found that the peak luminosity of the quantum dots produced was the highest at pH 8.5, but still observable up to a pH of 10.0, at which the protein denatured, and down to (value not yet known 7/1/09), at which the reaction formed a precipitate and no quantum dots were able to be formed. Overall, the peak intensity values formed a bell curve, with 8.7 as the optimal pH value for quantum dot formation.

## UNDERGRADUATE

### Music

## Alison Mattek

Phillip and Patricia Frost School of Music

Colby Leider, Mentor

### ***A Multi-Touch Implementation of John Cage's I Ching Compositional Process***

Mark Freeman, Eric Humphrey  
The American experimental music tradition often emphasizes a process-oriented

The American experimental music tradition often emphasizes a process-oriented rather than a goal-oriented composition style. According to this tradition, the compositional process is considered an experiment through which a musical solution unfolds. John Cage (1912-1992), a noted composer, believed that the artist's role in the experimental composition should be one of coexistence, as opposed to the traditional view of controlling the process. Consequently, Cage invented methods of composing that upheld this philosophy by utilizing charts and the Chinese Book of Changes, also known as the I Ching. This project investigates these methods and models them via a multi-touch table computer interface (MTT) and custom software. When a user touches a displayed hand print on the MTT, a pair of three digit binary numbers are produced based on the location of the touch. These binary numbers are essentially random and are used to reference and short samples from a prepared library. Once a sample is loaded, it can be effected by touching an effects color wheel on the MTT and stored as one element in the growing composition.

## UNDERGRADUATE

### RSMAS

## Lisa McManus

Rosenstiel School of Marine and Atmospheric Sciences

Dan DiResta, Mentor

### ***Succession and Diversity of Cryptic Marine Invertebrates using Autonomous Reef Monitoring Structures (ARMS) in Broward County, Florida***

Autonomous Reef Monitoring Structures (ARMS) are long-term collecting devices designed to mimic the structural complexity of a coral reef. They have been developed through a collaborative effort between the National Oceanic and Atmospheric Administration (NOAA) and the Census of Marine Life (CoML) as a means of assessing cryptic marine invertebrate diversity. An ARMS unit is constructed out of PVC plastic and consists of four open and four semi-closed layers stacked in an alternating fashion. In June 2009, nine ARMS units were deployed in the waters off Hollywood Beach in Broward County, Florida in an inshore reef area. Three units were harvested during September 2009 and another set of three was retrieved in January 2010. The final three units will be processed in April 2010. The objective of this research is to conduct a fine-scale quantitative study of the recruitment patterns of a benthic community on a coral reef system in South Florida. The sessile organisms will be identified and measured for percent cover on each layer of the ARMS unit. Differences in settlement will be compared between the open and semi-closed layers as well as between ARMS units which have spent differing amounts of time in the water. Motile organisms will be identified and assessed for body mass. Across the three time periods, the succession of early to late recruits can be inferred. The species composition within the recruitment plates can be compared with the species composition of the adjacent reef area as well as with that of previous ARMS studies.

UNDERGRADUATE

**Business**

**Sara Michalski**

School of Business Administration

Barbara Kahn, Mentor

***Product Image Location: A Perceptual Cue for Portion Size?***

We explore how the location of the product image on the package can affect perceptions of how filling a food will be, and ultimately affect perceptions of appropriate portion size and consumption amounts. A pilot study shows that consumers associate product image location with the perceived heaviness of the food, which in turn is associated with the perceived fullness of the food. Three experiments demonstrate the moderating effects of snack type, availability of cognitive resources, eating traits and package size on the link between product image location and perceptions of fullness, portion size expectation, and/or actual consumption behavior. These results can help mitigate the previously identified boomerang effects, where it has been shown that restrained eaters paradoxically sometimes eat more from small, portion-restricted packages than they do from larger packages.

UNDERGRADUATE

**Biochemistry and Molecular Biology**

**Heather Miller**

College of Arts and Sciences

Rakesh Singal MD, Mentor

***TMS1 as a Potential Therapeutic Target of Pancreatic Cancer***

Background: Pancreatic cancer is the fourth leading cause of cancer related deaths in the United States, with an estimated 42,470 new cases and 35,240 deaths in 2009. Gemcitabine is the current treatment for patients with advanced pancreatic cancer, however, only a 5.4% partial response rate with a five year survival rate of 5% is observed. The high fatality of this disease may be attributed to epigenetic silencing of pro-apoptotic genes contributing to chemoresistance. Target of Methylation induced Silencing 1 (TMS1) is a pro-apoptotic gene frequently silenced by methylation in other cancers. In this study we examined whether epigenetic silencing of TMS1 contributes to resistance to chemotherapy in pancreatic cancer. Methods: Methylation status of the TMS1 promoter region in MiaPaCa-2 pancreatic cancer cells was examined by methylation-specific PCR (MS-PCR). Gene expression was analyzed by quantitative reverse transcriptase PCR (RT-PCR). Cell viability after drug treatment was measured with Cell Titer Blue. MiaPaCa-2 cells were transfected with pCMV6-XL5/TMS1 plasmid and effect of gene expression on sensitivity to gemcitabine was determined by cell viability assays. Results: The promoter region of TMS1 was found to be completely methylated in MiaPaCa-2 pancreatic cancer cells, which correlated inversely with gene expression levels in these cell lines. Treatment of MiaPaca-2 cells with a DNA methyl transferase (DNMT) inhibitor, 5-azacytidine, resulted in demethylation of TMS1 promoter and gene re-expression. Pre-treatment with 5-azacytidine and recombinant expression of TMS1 in MiaPaca-2 cells resulted in increased sensitivity to gemcitabine chemotherapy. Conclusions: TMS1 is inactivated through promoter methylation in MiaPaCa-2 cells and up-regulation of TMS1 in these cells enhanced sensitivity to gemcitabine chemotherapy.

## UNDERGRADUATE

### Neuroscience

## Gregory Mlacker

College of Arts and Sciences

Isaac Skromne, Mentor

### ***Does Cdx Assign Posterior Identity to Neuronal Progenitors***

Michael

During development, many different neuron types fundamental for survival arise from a single layer of cells on the surface of the developing embryo. Mature cells such as neurons and glia possess identical genes and originate from the same progenitor, yet they perform vastly different functions for their host organism. Understanding the mechanisms that give rise to these differences is fundamental for a thorough understanding of developmental neurobiology. In vertebrates, anterior-posterior identities (i.e. forebrain, midbrain, hindbrain, and spinal cord) are assigned to cells during early development stages. Work done in our lab has shown that Caudal (Cdx) assigns posterior identity to cells along the anterior-posterior axis. Embryos lacking this gene show a posterior shift in the position of neuronal populations in the spinal cord; thus, neurons normally located in the position of neuronal forelimbs are now present in the waist area of the body, evidence of an overall expansion of those regions with anterior identity (Skromne, Thorsen, Hale, Prince, & Ho, 2007; Liu, 2006). No one to date has investigated the effects of Cdx on cell identity in the context of chicken development. My research aims to understand the role of Cdx in assigning positional identity to cells along the anterior-posterior length of the embryo during development.

**Psychology**

**Andrew Moskowitz**

College of Arts and Sciences

Dr. Matthias Siemer, Mentor

***Individual Differences in Emotion Regulation Between Collegiate Athletes and Non-Athletes***

Understanding the effect of specific emotions and how to maximize their benefits through effective regulation can be important to increase goal-attainment (Tamir, 2005). Generally, people prefer to feel more positive emotion, and thus emotion regulation research has previously focused on a hedonistic model, maximizing positive emotions and minimizing negative emotions. However, recent research has shown that when presented with a challenging task, embracing a negative emotion may lead to better performance. Anger, a traditionally negative emotion, may be a useful mental tool to aid concentration and motivation in confrontational situations (Raglin, 2001; Tamir, Mitchell, & Gross 2008; Tamir, 2009; Carver & Harmon-Jones 2009). It has been associated with approach tendencies and serves as a motivator to remove a barrier to one's goal (Carver, 2004; Carver & Harmon-Jones 2009). Collegiate athletes are of particular interest because they are constantly confronted with frustrating situations during which they must perform at optimal levels. In the present study, I explore and compare the instrumental use of anger between collegiate athletes and non-athletes, focusing on individual differences as a predictor of mood choice in frustrating situations. Initial results indicate that athletes are more resilient than non-athletes ( $p < .05$ ). Further analysis may show a relationship between resilient personalities and tolerance for negative emotions in frustrating situations.

UNDERGRADUATE

**RSMAS**

## Matthew Niznik

College of Arts and Sciences, Rosenstiel School of Marine and Atmospheric Sciences

Brian Mapes, Mentor

### ***The Predictability of Record Rainfall: Hurricane Ike's Predecessor Rainfall Event***

Hurricane Ike is perhaps best remembered for its landfall on September 13, 2008 in the vicinity of Galveston and Houston, but record rainfalls across the Midwest U.S. were concurrent with the landfall and are of interest to forecasters in that region. This inland rainfall is an example of a Predecessor Rainfall Event (PRE), which is defined as a widespread area of precipitation 1000 km or more from the center of a landfalling tropical cyclone. The predictability of PREs in global forecasting models is relatively unexplored. This study aims to cast some light on how well the forecasts of these models predict the PRE associated with Hurricane Ike. More specifically, we will evaluate the predictive skill of individual ensemble members of the models. Additionally, we will examine differences in initial conditions between well-performing and poor-performing ensemble members. This will allow for a discussion of what mechanisms increase the potency of a PRE as well as how to improve the forecasts of PREs in global forecasting models. Early results indicate that a PRE is predicted in certain ensemble members with a lead time as long as 72 hours with moderate skill, though the magnitude of the precipitation associated with the PRE is often too small when compared to rainfall measurements during the event.

## UNDERGRADUATE

### Psychology

## Stephanie Novotny

College of Arts and Sciences

Dr. Michael Alessandri, Mentor

### ***Changes in Developmental Rate of Students with Autism Spectrum Disorders: A Comparison of LEAP, TEACCH and Eclectic Preschool Educational Models***

Autism spectrum disorders are pervasive developmental disorders affecting 1 in 150 children according to recent estimates. In order for children with autism spectrum disorders to close the gap in their developmental delays, it is imperative that evidence-based early intervention practices are available and effective in increasing rate of development across core symptom domains (e.g., language, cognition, social). The purpose of this study was to evaluate change in developmental rate on standardized measures of language/communication, cognition, and motor performance for preschool students with autism across commonly available comprehensive treatment models (i.e., LEAP and TEACCH) and an eclectic "Business as Usual" (BAU) comparison model. Preliminary results show a significant increase in developmental rate on all Preschool Language Scale domains within TEACCH and BAU models and consistent increasing trends within the LEAP model. However, no significant changes in developmental rate on subscales of the Mullen Scales of Early Learning were found, although increasing trends were noted across most subscales. Results are discussed in the context of our need to conduct future research to determine if rate differences are attributable to programmatic or child characteristics. Study limitations, such as limited sample sizes within groups, are also discussed.

UNDERGRADUATE

**Interdisciplinary Studies**

**Kelsey Nowakowski**

College of Arts and Sciences

Dr. Mazen Labban, Mentor

***A Geographical Analysis of Inmate Labor: the circulation of toxic materials through Atwater Federal Prison***

The use of inmate labor by private, for-profit corporations has long been a controversial issue in the United States. Economic policies of the Reagan administration, combined with the enactment of the Prison Industry Enhancement Certification Program in 1979, which allowed joint ventures between private companies and state-run prisons for the use of inmate labor, drew increasing attention to this debate as the push to privatize prisons to enhance economic efficiency led to more inmates working behind bars. The debate on prison labor assumes the spatial isolation of inmate labor from society. Contrary to popular belief, however, prison laborers are not isolated workers disconnected from the rest of society; they are embedded in a larger space of material flows that in effect connects them with a greater economic sphere. My paper employs concepts of spatial flows and circulation, together with recent research on landscapes of defense, to (a) show how the labor prisoners perform is simultaneously divided from society and integrated in the economy; and to (b) explore the role inmate laborers play in the division of labor. I examine Atwater Federal Prison's computer recycling program as a case study to demonstrate how within the division of labor inmates perform the most health hazardous tasks due to their social exclusion, which allows for their abuse outside the realm of regulated labor and provides the means by which inmates are unjustly integrated into society.

Key words: prisons, inmate labor, circulation, waste, landscapes of defense

UNDERGRADUATE

RSMAS

## Aidan O'Dowd-Ryan

College of Arts and Sciences, Rosenstiel School of Marine and Atmospheric Sciences

Dr. Dan DiResta, Mentor

### ***Great white shark hunting strategies around a seal colony in Mossel Bay, South Africa***

Perhaps one of the most misunderstood organisms in the ocean, the great white shark has a reputation as a mindless monster. Recent research, however, appears to paint the picture of a precise and calculated hunter. This study attempted to determine whether great whites are capable of altering their patrol patterns in response to the movements of one of their prey items, Cape fur seals. Three sharks were tracked using manual acoustic telemetry. Of these three sharks, one, a 4.5 meter female, appeared to adjust her patrol patterns when the largest number of seals was returning to the island. This suggests that this shark was capable of detecting the differences in seal movement patterns throughout the night, and adjusted her patrol to increase her chance of successfully capturing a seal. This result illustrates that these predators are not the random killing machines portrayed in movies, but rather are very specialized to catch difficult prey.

UNDERGRADUATE

**Engineering**

**Patrick O'Keefe**

College of Engineering

Colby Leider, Mentor

***Audio Effect Control via Head-Position Estimation***

We present a method for combining computer vision techniques with audio effect parameter control. In particular, we focus on tracking a user's head position relative to the camera and using this as a control signal for real-time audio effects processing and editing on digital audio workstations. The computer vision techniques used are robust and use readily available, inexpensive tools, allowing our implementation to be used as an editing tool for audio engineers and composers, a component of larger interactive multimedia installations, and other applications. A test case is presented that utilizes OpenCV and Mac OS X Audio Units to control a resonant lowpass filter in real time.

UNDERGRADUATE

**Engineering**

**Patrick O'Keefe**

Phillip and Patricia Frost School of Music, College of Engineering

Colby Leider, Mentor

***A Cost-Effective Multi-Touch Table for Interactive Musical Applications***

We present a system that leverages commercial, off-the-shelf technologies to make a robust multi-touch table interface and software development environment. For our inexpensive implementation, we used a technique called Laser Light Plane Illumination (LLP). A laser plane approximately one millimeter thick is created over a clear surface by surrounding the table with infrared lasers diffused by line generators. The infrared nature of the lasers ensures that this plane is not within the human visible spectrum, making it "invisible." Fortunately, computer cameras do not have this limitation. When a finger breaks the plane over the clear surface, the infrared light is deflected down into a camera. This camera is fitted with a bandpass filter that renders the visible spectrum in such a way that is sensitive exclusively to the wavelength of the infrared light. This deflected laser light is then interpreted by computer vision software as a touch. This has yielded a platform for which we can write applications for a number of audio research tasks, as well as applications for other disciplines and research problems. Current applications of the platform include interactive/generative music synthesis, a multi-touch pong game, gesture driven music composition, an audio mixing suite, and a musical-tactile rehabilitation program for subjects with Parkinson's disease.

## Valerie Otero

College of Arts and Sciences

Nanette Bishopric, Mentor

### ***Clonal variations in morphology and expression of CXCL-12 reveal a broad spectrum of vasculogenic potential in c-kit+ cardiac stem cells.***

Multipotent cardiac stem/progenitor cells (CSCs) have been identified in adult myocardium, but their biological properties and differentiation potential remain incompletely defined. We isolated c-kit+, sca-1+ CSCs from adult mouse left ventricles and obtained > 40 clones by serial dilution, of which 8-10 were characterized in detail. The clones exhibited distinct and stable morphologies, but globally similar gene expression profiles by microarray. All clones were pluripotent and expressed stem cell-associated genes, including Oct-4 and Myc, and low to undetectable levels of Flk-1. However, clones differed noticeably in the tendency to adopt myogenic vs. vasculogenic fates. Under identical differentiation conditions, some clones exclusively adopted a smooth muscle ?vasculogenic? phenotype, while others produced high levels of GATA4, suggesting a cardiomyogenic fate. And still other clones exhibited an intermediate phenotype. Vasculogenic clones were distinguished by a stellate morphology and rapid tube formation (<5h) in Matrigel, comparable to HUVECs. Interestingly, vasculogenic potential did not correlate with expression of Flk1, VEGFA or other angiogenic genes, but with levels of CXCL12 (SDF-1), a small chemokine that during embryogenesis directs formation of large blood vessels and in adulthood has shown to recruit endothelial progenitor cells from bone marrow thus revealing angiogenic properties. Our results show a correlation between endogenous CXCL12 levels and number of tubes formed. Likewise we observed that when the CXCL12 receptor CXCR4 is inhibited with AMD, there is a significant decrease in the number of tubes formed in Matrigel. Our results suggest that c-kit+, sca-1+, flk-1 -CSCs in adult hearts inherently possess a broad spectrum of myogenic and vasculogenic potentials that can be predicted in part by expression of CXCL12.

## UNDERGRADUATE

### Chemistry

## Ravi Patel

College of Arts and Sciences

Dr. Roger Leblanc, Mentor

### ***Hemoglobin stabilized CdS quantum dots***

Anup Dadlani

Serum Albumin (Bovine SA) is the most abundant protein in blood plasma. It is capable of carrying fatty acids, water insoluble components, and delivering various drugs throughout the body. It should be no surprise that BSA-Cadmium Sulfide quantum dots (or BSA-Gold nanoparticles) have endless applications in tagging molecules. BSA contains the amino acids tryptophan, tyrosine and phenylalanine, which are all optically active. Since quantum dots and nanoparticles also fluoresce, molecules that bind to BSA will effect the fluorescence of that particular system. BSA is able to stabilize the quantum dot or nanoparticle complex due to its quaternary protein structure. The protein forms a "pocket"-like cavity. In this cavity the CdS or Au can be concentrated and held together. We are interested in seeing whether Cadmium Sulfide or Gold will bind to hemoglobin to form quantum dots or nanoparticles, respectively. Hemoglobin is a tetramer consisting of four heme group subunits with a single iron atom at the center of each subunit. This structure creates a cavity to form in the center of the four subunits, potentially allowing quantum dots or nanoparticles to be stabilized. Additionally, the molecular weight and amino acid composition of both proteins are very similar. Hemoglobin like BSA is also prevalent in the blood and therefore we hypothesize that a similar mechanism of biomineralization will take place due to presence of conformation cavity for both proteins.

## Jennifer Pernas

Louise Carlson and PI: Dr. Kelvin Lee, Mentor

### ***Therapeutically Rewiring Kinase Pathways in BCR-ABL+***

The leukemogenic lesion in chronic myeloid leukemia (CML) is the BCR-ABL fusion gene. The tyrosine kinase inhibitor (TKI) imatinib inhibits tyrosine kinase activity of BCR-ABL selectively suppressing growth by inducing apoptosis in CML blasts. It is the paradigm for inhibiting oncogenic signal transduction. However, imatinib and other TKIs are less effective in accelerated phase/blast crisis CML and BCR-ABL+ ALL. Thus, novel strategies for targeting the oncogenic kinase are needed. We have used BCR-ABL's oncogenic kinase activity to activate a prodrug that acts as a "suicide" agent causing leukemic cell differentiation and death. Through genetic re-engineering of the PKC  $\beta$ 1 molecule, we have introduced the ABL kinase target motif into the PKC regulating sub-domain, such that the BCR-ABL phosphorylation of the motif activates PKC in the BCR-ABL+ CML cells causing their growth arrest/death. These clones are called A25Y PKC $\beta$ 1-GFP. A major challenge to this approach is delivering the large re-engineered PKC $\beta$ 1 protein into the cytoplasm of leukemic cells. The project goals were to create reliable methods to produce functional proteins in measurable and effective quantities to place on cells and translocate to the cell membrane.

The TAT transducer is an arginine rich peptide motif from HIV that allows large proteins to be readily transduced across cell membranes both in vitro and in vivo. The parental A25Y-PKC $\beta$ 1-GFP gene was subcloned into a plasmid vector containing the TAT transducer motif at the 5' end. This modification allows the HIV pTAT motif to be used to deliver whole proteins into mammalian cells. Thus, the A25Y PKC  $\beta$ 1-GFP protein should be able to transduce into the cell cytoplasm to assess whether the addition of the TAT motif interfered with the function of the A25Y PKC  $\beta$ 1-GFP molecules. cDNA plasmid constructs were transfected into mammalian cells using an Amaxa to express the TAT A25Y PKC $\beta$ 1-GFP molecules inside the cell. Through fluorescent microscopy, the expression of the TAT A25Y PKC  $\beta$ 1-GFP protein was visible as fluorescence and was expressed in high levels. Phorbol myristate acetate (PMA) was added to activate the translocation of the A25Y PKC  $\beta$ 1-GFP protein to the cell membrane. These studies demonstrated that the presence of the TAT motif did not interfere with the function of the A25Y PKC  $\beta$ 1-GFP protein in the cell cytoplasm.

To produce functional recombinant TAT A25Y PKC  $\beta$ 1-GFP proteins, BL21 bacteria were transformed with cDNA constructs containing plasmids encoding the TAT-A25Y-PKC- $\beta$ 1-GFP cDNA's. The protein expression was induced by isopropylthiogalactoside (IPTG). The proteins were extracted and isolated from the BL21 bacteria with Ni-NTA superflow agarose column to collect the proteins at high and pure concentrations. The collected proteins were placed on K562 cells to see if the recombinant TAT-A25Y-PKC- $\beta$ 1-GFP proteins transduce across cell membranes in vitro. The proteins were transduced in very low levels in comparison

to transfection, and were not visible by fluorescent microscopy. Future directions of this project will include modifying the procedure to increase levels of protein expressions in cell, using more sensitive detection methods (confocal microscopy and flow cytometry).

This approach may be a novel way to "rewire" the prosurvival BCR-ABL signaling pathway into the "prodeath" PKC pathway. The therapeutic approach of using oncogenic signaling pathways to activate prodrug effector molecules specifically within cancer cells, or particularly in malignancies that may be less dependent on the oncogenic signal for survival where the signaling pathway is "on" but blocking it has little effect.

## UNDERGRADUATE

### Molecular and Cellular Pharmacology

## Michael Philippe-Auguste

College of Arts and Sciences

Michael Philippe-Auguste, Mentor

### ***The Role of Rop in Dendrite Growth in Drosophila melanogaster***

James Doherty, Dr. Michael Kim

There are many characterized neurological diseases. A number of them, including Rett's disease, Amyotrophic Lateral Sclerosis (Lou Gehrig's disease), Down Syndrome, and Fragile X are characterized by irregular dendrite morphology. *Drosophila melanogaster* is the perfect organism to study the pathophysiology of such diseases. In *Drosophila*, all neurons have been identified, their morphology is highly stereotyped, dendrites can be examined in vivo, and neurons can be seen with single cell resolution through microscopy. A preliminary screen in the Kim lab has shown that dendrite morphology of flies deficient in *rop* (human homolog: *munc18*) is extremely different from the wildtype fly. The dendrites of *rop* mutants exhibit extreme reduced branching. So far, it is known that *rop* is involved with exocytosis, synaptic transmission, neurotransmitter transport, cell-cell signaling, and vesicle mediated transport. We are interested in *rop* because nothing is known about the role of the exocytotic machinery in dendrite growth in vivo. In several mouse studies, it has been shown that the removal of Golgi outposts reduces dendrite branching. We hypothesize that *rop* co-localizes with Golgi outposts to control dendrite growth. To determine whether *rop* co-localizes with Golgi outposts, we created a fly line where fluorescent markers for the protein and the organelle are co-expressed. We are still imaging neurons from the larvae, however we suspect that *rop* is associated with Golgi outposts.

UNDERGRADUATE

RSMAS

## Matthew Phillips

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Helena Solo-Gabriele, Mentor

### ***Vertical Microbial Transport via Ground Water flow through Beach Sediments***

Enterococci are used by the Environmental Protection Agency to test recreational waters for contamination by human fecal matter. It has been shown that these bacteria can also inhabit beach sediments and contaminate water at beaches without a point source of sewage contamination. The process by which microbes are transported from the sediment into the water column has not been widely studied. Quantifying the release of these microbes under varying physical conditions would be useful for implementing predictive measures to ensure public safety in recreational waters. In order to test and quantify the release of microbes from beach sediments, two microcosms were built to control and monitor environmental parameters such as pressure differentials and flow rate. The first microcosm simulated the upward flow and the second microcosm simulated the downward flow of water through beach sand. Hobie Beach was chosen as a sampling site because of its well documented high enterococci concentration in beach sediments and because it is not exposed to a known point source of sewage. Sand cores were taken from the beach at various tidal stages and locations. Sand cores were then placed directly into the microcosms for experimentation. Microbe free marine water was then forced through the sand core, driven by pressure differentials, and sampled after it had passed through the core. The water exiting the core was then tested for enterococci. The total enterococci concentration of the sand was also measured before and after the experiment. Results show an initial peak in enterococci released from the sand core within one pore water volume. After this initial peak, the number of microbes released quickly decreases below detectable limits with seemingly no bacteria being released after one and a half pore water volumes. The total amount of microbes released accounts for only 10% on average of the total enterococci contained within the sand core. The results indicate that microbes are located within the pore water and interstitial space and that other factors control the release of microbes from the sand, as only a small fraction of the total bacteria were removed from the columns through vertical flow.

## UNDERGRADUATE

### Microbiology and Immunology

## Christopher Pinto

College of Arts and Sciences

Stephen Gutierrez, Mentor

### ***The Lost Haitian Identity: A forced or chosen path?***

Leah Pinto

The American culture superimposes itself upon the customs of its immigrants. Haitians specifically lose their identity to the lower sect of American society. The largest population of Haitian-Americans exists in Miami, in the neighborhood known as "Little Haiti". A misnomer indeed as first generation Haitian-Americans are quick to uncloak themselves from an stereotype awarded by their heritage. 85 percent of American-born Haitian adolescents (aged 15-24) declared themselves "black" or African-American. Only 10 percent of Haitian-born immigrants however called themselves African-Americans and indeed most were offended by the term. In an interview with local store owner and Haitian immigrant Camille Duverce, she stated that "Black people steal from me. They no good." and that "I no black. That is bad". A quite obvious sentiment of her own nationalistic pride. Indeed 40 percent of the Haitian community said they did not support Obama in the 2008 election, were as less than 10 percent of the American Black community said they did. The Haitian identity loss clashes brusquely with other nationalities and indeed is at a much higher rate of disparity through one generation than most others.

UNDERGRADUATE

RSMAS

Eric Pruitt

College of Arts and Sciences

Wade Cooper, Mentor

***Assessing spatially-dependent mortality in the brooding coral, *Porites astreoides****

Early coral recruitment and survival shapes population dynamics and population size of local reef systems. Such a decisive role in future coral populations makes a better understanding of early coral life paramount for reef conservation, restoration and management. Even still, the inherent difficulty in studying small and widely dispersed coral larvae has greatly limited our knowledge of the dynamics of these organisms. Through the use of novel research techniques and technology we were able to look at the intraspecific interactions of settled *Porites astreoides* larvae. In order to determine if there was a relationship between proximity to nearest deceased larvae and individual larval survival, we settled *P. astreoides* larvae onto treated plates in a laboratory setting and then transplanted them into the field. Using this method, we were able to consistently locate individual larvae while also ensuring the larvae were experiencing accurate environmental settings. Bi-monthly analysis of the larvae over a period of three months indicated a clear relationship between distance from nearest dead neighbor and survivorship. While this may be due to disease, microbial interactions or other microhabitat effects, close proximity to other larvae still appears to be detrimental to coral larvae health. Research such as this, which gives us a better understanding of early coral life, holds great importance when used to generate new and more effective management and restoration techniques.

UNDERGRADUATE

**Sociology**

**Lauren Quattromani**

College of Arts and Sciences

Linda Belgrave, Mentor

***The Meaning of Food among College-aged Women***

This project addresses the question: What is the meaning of food for college-aged women between the ages of 18 and 24? Findings are based on in-depth interviews with 18 women of college-age. Participants will answer open-ended questions about the meaning of food to see if any patterns arise throughout interviews. For instance, current research investigates how many food decisions for young women are based on a cultural emphasis of thinness. Other themes frequently arise in sociological research of food and its meaning for people involving social or environmental influences, cultural meanings, and identity. The interviews will show if these themes are prevalent among college-aged women as well. The research will discover whether these meanings are common among college-aged women or whether they vary by individual. If young women frequently associate food with unhealthy meanings, research of this nature could result in the implementation of programs focusing on changing the meaning of food for young women.

UNDERGRADUATE

RSMAS

## Christine Quigley

Rosenstiel School of Marine and Atmospheric Sciences

Don Olson, Mentor

### ***Spatial Isotopic Variability of Grey Snapper in the Dry Tortugas and the Yucatan***

Gray snapper (*Lutjanus griseus*) are an ecologically and commercially important reef fish found in the coastal areas of the Western Atlantic. Like many species of reef fish, gray snapper have a pelagic larval stage before they settle into coastal mangrove, sea grass, or reef habitats. Because it is difficult to tag fish during their early life stages, much still remains unknown about natal origins and ontogenetic pathways as they settle into their adult populations. This study aims to assess the connectivity of age-0 juvenile gray snapper in the Yucatan Peninsula, Mexico and compare it to that of the Dry Tortugas. The snapper from these areas in particular may show connectivity due to the ocean currents that traverse the two sites. The Loop Current, which originates in the Yucatan Strait, travels from the Yucatan Peninsula into the Gulf of Mexico, and exits through the Florida Straits, may aid in the transport of larvae. The research will compare carbon and oxygen stable isotopes in otoliths. First, edge samples will be milled out of each otolith to determine juvenile signatures deposited at the time the fish were caught. Next, core samples will be extracted to establish an early life history signature. After milling, core and edge samples from juvenile gray snapper otoliths will be compared. In addition, previously analyzed stable isotope data from otoliths of newly settled recruits will be compared with juvenile otoliths for both the Yucatan Peninsula and the Dry Tortugas. Similar isotopic signatures from each region's core samples could indicate similar origins or natal conditions experienced by newly settled recruits. Similarities between juvenile and newly settled recruits may indicate possible site fidelity. Conversely, different stable isotope signatures could suggest movement during the early life history stages or reflect the variable environmental conditions experienced by gray snapper.

## UNDERGRADUATE

### Engineering

## Jorge Ravelo

College of Engineering

Dr. Hongtan Liu, Mentor

### ***Spherical PEM Fuel Cell***

Patricia Custals; Ben Daniels

A major problem with standard PEM fuel cells is hydrogen leakage through the sides of the rectangular surfaces, i.e. the electrode and catalyst. Devices to mitigate this loss, such as large rods through the entire cell that are under axial compression, are complex and take up surface area of electrodes and catalyst. This project concerns the design, construction, and testing of a spherical fuel cell (SFC). A sphere was chosen as the ideal geometry because of a general lack of edges or sides through which hydrogen can leak out, thus forcing all hydrogen to react. The SFC is a PEM design constructed on three stainless steel hemispheres, of diameter 1.5, 3, and 3.5 inches. Holes were drilled into these spheres to allow gas to pass through. The rest of the construction is as of a standard PEMFC, but with alterations due to the spherical geometry. Hydrogen is pumped to the innermost sphere. It passes through the holes in the anode (the second sphere) and through a gas diffusion layer and carbon catalyst. Past these are platinum-coated silica balls. Finally, the gas passes through another gas diffusion layer, catalyst, and out the cathode. It is expected that this design improves the efficiency of the cell by reducing hydrogen loss. Any hydrogen that does leak through the one edge available will be forced to react. Furthermore, a sphere provides a large surface area, which increases the area available for reaction, hence improving output.

UNDERGRADUATE

**Art**

**Jared Richardson**

College of Arts and Sciences

Dr. Briennen; Dr. Harper; Prof. Otis, Mentor

***Represent! Kehinde Wiley's Remixed Representations of the Black Male***

Superficially, Kehinde Wiley's (photorealistic portrait painter) heroicized portraits only appear to privilege these young black males with a level of power and respect that society normally refuses them. These larger-than-life portraits are really investigations into the 'object' of black masculinity and its commodification, while creating ruptures in the legibility of the black male body-as-text. As the black male body performs certain gestures, assumes certain physical positions, cloaks itself in conspicuous branding, reveals its muscularity and is then juxtaposed with a myriad of feminine-coded patterns, the legibility of these paintings becomes a complex 'remix': the visual dialectic between the respective, opposing discursive practices of black male self-representation and Western European Portraiture reveals the artifice behind black masculinity and creates a space where the black male becomes an eroticized and effeminized object who is trapped in his conspicuous consumption

## UNDERGRADUATE

### Psychology

## Christine Romero

College of Arts and Sciences

Dr. Heather Henderson, Mentor

### ***The mediating role of parenting on the relation between gender and children's social problem-solving skills***

The purpose of this study was to examine whether maternal behaviors mediate the relation between gender and social problem-solving (SPS). To test this hypothesis, observations of maternal behavior (i.e., Supportive Nurturance, Directiveness, and Dismissiveness) during a fear-eliciting task when children were three years of age and observations of children's Disruptive SPS strategies during a laboratory task with an unfamiliar peer at four years of age were collected (N = 195). Results supported previous research showing that boys use more Disruptive SPS strategies than girls. Maternal behaviors did not significantly differ between for boys and girls. However, children whose mothers exhibited more nurturing behaviors engaged in less disruptive SPS behaviors than children whose mothers exhibited lower levels of nurturing behaviors. Nonetheless, there was no evidence for the role of maternal behavior as a mechanism linking gender and SPS. There may be other mechanisms, however, that influence the degree of gender differences in SPS skills, such as temperament or other maternal behaviors not captured in the present study. Alternatively, perhaps mothers do not treat their sons and daughters differently when children are expressing fear or sadness, but they may show differences in the presence of anger.

**Psychology**

**Amelia Rowley**

College of Arts and Sciences

Dr. Jennifer Durocher, Mentor

***Relationship between Individual Differences in Social Motivation and Autism Symptom Severity***

Autism Spectrum Disorders (ASD) are neurobiological disorders affecting a child's language, cognitive, and social development (DSM-IV-TR; APA, 2000). Thirty children diagnosed with an ASD were assessed for symptom severity and preference for adult attention. Autism severity was assessed through the Autism Diagnostic Observation Schedule (ADOS) severity metric (Gotham, Pickles & Lord, 2008). Preference for adult attention was assessed using the Forced Choice Preference Assessment for Adult Attention (FC-AAR; Split Room; adapted from Dube et al., 2004). It was hypothesized that children receiving higher severity scores on the ADOS will be less likely to direct their attention to the examiner in the Split Room assessment (indicating a lesser preference for adult attention). Also, children receiving lower severity scores will be more likely to direct their attention to the examiner in the Split Room assessment (indicating a greater preference for adult attention). Results indicated a significant negative relationship between overall ADOS severity scores and duration of time engaged with adult examiners ( $r = -0.478$ ,  $p = 0.010$ ). These findings indicate that social motivation may play an important role in autism symptom severity and have implications for clinical practice and future intervention-based research. Quantitative measures of social motivation (e.g., preference for adult attention) may be useful in identifying individual differences which may serve as predictors of positive outcomes.

UNDERGRADUATE

**Art**

**Diana Ruiz**

School of Communications

, Mentor

UNDERGRADUATE

Neuroscience

Sinthia Samad

College of Arts and Sciences

Dr. Vance Lemmon, PhD, Mentor

***The Effect of STAT3 Upregulation and HDAC Inhibition on Axon Regeneration in Cortical Neurons***

Peripheral nervous system (PNS) neurons have higher capacity to regenerate after injury compared to central nervous system (CNS) neurons. Barriers to regeneration in the CNS include inhibitory myelin-associated molecules and formation of glial scars which block axonal growth. Adult CNS neurons also exhibit an intrinsic inability to grow long axons in environments permissive for younger neurons. We hypothesize that neurons in the PNS express regeneration-associated genes which mediate an enhanced growth response after injury.

Signal Transducer and Activator of Transcription 3 (STAT3) is a transcription factor upregulated in the PNS after injury. Previous studies found overexpression of STAT3 causes 20 percent increase in total neurite growth in dorsal root ganglion (DRG) neurons and cerebellar granule neurons (CGNs). However, the effect of STAT3 on cortical neurons is poorly understood. Cortical neurons are a more vulnerable cell population compared to DRGs and CGNs, as shown by their rapid depolarization after ischemic stroke and traumatic brain injury. Furthermore, cortical neurons are vital to functional recovery because they mediate motor control via the corticospinal tract.

Here we show that overexpression of constitutively active STAT3 displays modest increases in total neurite growth in cortical neurons in vitro. To enhance the effects of STAT3 on neurite growth we take a combinatorial approach by overexpressing STAT3 in cortical neurons and treating them with pharmaceutical Histone Deacetylase (HDAC) inhibitors. HDAC inhibitors prevent removal of acetyl groups from chromatin, keeping chromatin in a loosened state thus facilitating transcription. Preliminary results suggest that the toxic effects of HDAC inhibitors may outweigh their neuroprotective role.

## UNDERGRADUATE

### Psychology

## Kristina Samour

College of Arts and Sciences

Dr. Durocher, Mentor

### ***The Relationship between Joint Attention and Language from Pre to Post Treatment in Children with ASD in a Randomized Control Study***

Stephanie Novotny

Children with Autism Spectrum Disorder have impairments in initiating joint attention (JA) skills, or sharing enjoyment with others around an interesting event. The current study involved a randomized control study of an 8-week joint attention intervention for children with ASD. Children in the treatment group were reinforced for performing spontaneous, independent, or prompted joint attention skills. Two assessments were administered to the child at pre- and post-treatment evaluations. The Early Social Communication Scale (ESCS; Mundy, Hogan & Doehring, 1986), which measures JA, as well as The Mullen Scales of Early Learning (MSEL; Mullen, 1995), which measures language, cognitive and motor skills. An age equivalent score was computed for Mullen receptive and expressive language scores at both time points. It was hypothesized that children with higher language skills would express higher joint attention skills in both pre and post assessments. In addition, it was expected that the relationship between joint attention and language would be more evident in the intervention group. Results indicated that for both the control and intervention groups, initial language scores were positively correlated with post-assessment language scores. Initial language skills were also positively correlated with post-assessment JA skills, but only for the intervention group. Further, there was a positive association between initial language scores and pre-to-post difference scores in JA skills, so that children with higher language skills exhibited greater changes in JA than those with lower language skills; this association was found only for the intervention group.

## Kasey Schultz

College of Arts and Sciences

Dr. Kevin Huffenberger, Mentor

### ***Analyzing Temperature Anisotropies in the Cosmic Microwave Background***

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The Cosmic Microwave Background, CMB, provides a picture of the universe at its earliest moments. This relic light was released 400,000 years after the Big Bang, early in the universe's 13.7 billion year history. Uncovering information from the anisotropies, variations in temperature with direction in the sky, in the CMB can tell us about the universe's large scale structure, composition, and origin. Maps of the CMB show that the radiation is extremely isotropic with very minute anisotropies on the order of 1 part in 100,000.

Since the CMB varies only slightly, it is extremely susceptible to contamination. As one looks out into space, all objects in the universe appear in front of the CMB. Even in the darkest patch of sky there are thousands of old, distant galaxies that prevent our viewing the CMB directly. These early galaxies are sources of radiation that contaminate the CMB. A more accurate modeling of the sources will lead to the removal of their effect on the CMB signal and to unbiased CMB data.

Most current CMB analysis assumes that the resolution of the microwave telescope used to collect the CMB data is insufficient to reveal any details about the sources. This research addresses that assumption. It is likely that the angular resolution and sensitivity of the latest CMB satellite, WMAP, were not sharp enough to discern whether the sources are point-like or if they are groups of galaxies; perhaps each group containing a bright source blended with dimmer companions. If this hypothesis is true, then current models for removing galactic interference are inadequate and oversimplified and cannot produce unbiased CMB data.

In our analysis, we construct radial temperature profiles for sources averaged over entire source catalogs. The resulting, stacked profile has been compared to the resolution of the WMAP satellite with intriguing results. The results have shown that the stacked profile appears wider than the calculated resolution of the satellite. If the averaged sources were smaller than the resolution, we might be able to support the point-like nature of the sources. We in fact seem to have the opposite scenario, that the averaged sources have a larger angular diameter than the resolution of the WMAP satellite.

UNDERGRADUATE

**Engineering**

**Steven Sloan**

College of Engineering

Dr. Jorge Bohorquez, Mentor

***Electrooculography computer interfacing as a means of communication with physically impaired patients***

Brain computer interfacing is a rapidly evolving field that continues to provide exciting applications for communication between computer technologies and complex neural networks. One such application involves establishing a novel means of communication for those individuals who are unable to communicate via normal verbal and physical outlets. The ocular signal is a useful signal for patients with neuromuscular disorders because most of these patients retain control over their ocular musculature despite the loss of voluntary muscle movements elsewhere in the body. Electrooculography (EOG) is a technique that detects eye movements by recording changes in the retino-corneal potential of the eye. We have designed an EOG computer interface that allows a patient to control a mouse cursor on a screen by translating horizontal eye movements (left, right) as well as vertical ocular movements (up, down) into cursor inputs. Other ocular cues, such as blinking, serve as an additional input variable and allow for greater user flexibility. The current model has demonstrated the capability of detecting eye movements with greater than 97% accuracy. The ability for patients to control a cursor on a computer screen, is an effective means of establishing communication. Ideally, those individuals who are plagued with degenerative diseases could use this device as both a psychological outlet, as well as a source for informative communication with loved ones, friends and medical professionals.

## UNDERGRADUATE

### Biology

## Steven Sloan

College of Arts and Sciences

Dr. Julia Dallman, Mentor

### ***Developmental plasticity of spinal cord patterning in glial glycine transporter-1 mutant zebrafish***

Both genetic and environmental cues play crucial roles in the developing nervous system by influencing the establishment of early neuronal circuits. The circuitry that underlies vertebrate locomotion involves the recruitment of a variety of excitatory and inhibitory neuronal populations that act in concert to produce coordinated behaviors. In the context of unusual perturbations, however, successful nervous system development depends on the ability to initiate compensatory responses. The glial glycine transporter-1 (GlyT-1) mutant zebrafish is an ideal model for understanding how a nervous system compensates when confronted with perturbation. GlyT-1 mutant fish exhibit embryonic paralysis as a result of elevated levels of CNS glycine. During development, however, these larvae recover full motor behavior. We have found that behavioral recovery in the mutant fish is associated with homeostatic alterations in the patterning of the spinal cord circuitry. As mutant fish first overcome paralysis, they express increased numbers of cholinergic neurons. We hypothesize that this functional class may compensate for elevated glycine by augmenting excitatory recruitment of motor neurons during swimming. Although cholinergic neurons are increased, the total number of cells in mutant and control spinal cords is nearly identical, suggesting that increases in populations of neuronal subtypes reflects reciprocal losses of other functional classes. Thus, we demonstrate that nervous system patterning in the zebrafish is a plastic phenomenon: when challenged with excess inhibition, the differential recruitment of neuronal subclasses is capable of producing functional behaviors.

## UNDERGRADUATE

### Engineering

## Megan Smyth

College of Engineering

Jamie Docherty, Mentor

### ***Implementation of a Water Distribution System in El Socorro, Honduras***

Alexei Bordas

The El Socorro Water Project consists of designing, building and monitoring a new water distribution system for the city of El Socorro, Honduras, a town of roughly 1400 residents. This initial system was built several decades ago to service a far smaller community, and only half the current population of El Socorro has regular access to the drinking water from home. These residents get water every day in the summer and every other day in the winter due to an insufficient supply of water from the source they are currently using. The other, newer, half of the community receives water from their home system every 15 days in the summer and every three months in the winter. To supplement this meager supply, these residents purchase water from the nearest town, Siguatepeque. The current system is very expensive and a true burden on the community. Consequently all community members want an improved system to distribute and pump water to all community residents. The proposed program is to build a new distribution system solely for the use of the population that does not get regular access, approximately 200 homes. In turn, this will then lessen the strain on the existing distribution system, so that the other half of the community will receive water on a daily basis. Water supply and distribution are the primary needs for El Socorro and is necessary to fulfill basic water demand for 100% of the population. We will design a new water distribution system, to include a spring box to protect the town's source of water, which will then flow into a storage tank located nearer to town. This storage tank will help to distribute water to the population that currently does not have regular access to water. In spring 2010, we will finish the design of the springbox and oversee initial construction. The town of El Socorro will also take part in construction, and we will train the town in proper maintenance techniques. By giving the town the necessary tools and skills to sustain the system on their own, they will be empowered to improve their quality of life. Under the supervision of EWB-USA, we have agreed to a five-year commitment to this project, extending through at least 2014.

**Biology**

**Krystal Sotolongo**

College of Arts and Sciences, School of Medicine

Jean-Marie Parel, PhD and Mariela Aguilar, MS, Mentor

***Evaluation of Paclitaxel Drug-Eluting Implant for Treatment of Glaucoma***

Glaucoma is a disease that is characterized by peripheral vision loss, raised intraocular pressure, and damage to the optic nerve, due to blockage in the trabecular meshwork. Controlled drug-delivery via a biocompatible Glaucoma drainage vehicle containing a drug is one treatment option that may have promising results.

Poly(styrene-block-isobutylene-block-styrene) (SIBS) is a thermoplastic elastomeric copolymer, FDA approved, and has shown excellent biocompatibility and time-release capability. The SIBS implant was loaded with a drug known as Paclitaxel. Paclitaxel is an anti-mitotic, anti-inflammatory, microtubule-stabilizing, and anti-angiogenic agent. In previous studies, Paclitaxel has been successful with the SIBS copolymer, which makes it a drug of great interest for controlled time-release treatment and management of diseases such as Glaucoma.

Our objective is to examine the in-vitro and in-vivo biocompatibility of a drug eluting Glaucoma drainage device (GDD) MIDI-RX loaded with Paclitaxel for potential treatment of Glaucoma. We hypothesized that a MIDI-RX implant coated with Paclitaxel would be safe and effective in treating Glaucoma. Pilot proof-of-principle studies were performed and indicated that even the lowest dose of Paclitaxel tested was too strong to be used in the eye, suggesting the use of a much lower concentration or utilizing another milder drug in the New Zealand White (NZW) rabbit model. However, the in-vitro studies indicated that the MIDI-RX loaded with Paclitaxel/SIBS/styrene-maleic anhydride copolymer (SMC) provided slow, controlled time-release, which may indicate more favorable results and demonstrate that the SIBS implant coated with Paclitaxel will be both safe and effective in the NZW rabbit model for treatment of Glaucoma.

UNDERGRADUATE

RSMAS

## Megan Stachura

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Daniel DiResta, Mentor

### ***Mortality of incidentally caught and released sablefish (*Anoplopoma fimbria*) in Alaskan longline fisheries***

Sablefish, *Anoplopoma fimbria*, are a commercially important fish in Alaskan waters that are primarily harvested using a longline fished on-bottom. Full retention of sablefish is required by law in the sablefish fishery but sablefish are often caught incidentally in other hook-and-line fisheries and released. Mortality associated with incidental hooking is largely unknown and creates a source of uncertainty in estimates of total mortality. We analyzed recovery rates from a tagging study to determine relative mortality of sablefish based on release condition. In 1989 and 1990, 10,508 sablefish were tagged on research surveys. A condition code was recorded for each fish assessing the hook injury location, hook injury severity, amphipod predation, and injuries sustained from the fishing gear. Of the fish released, 1,207 were subsequently recovered during research surveys or by the commercial fishery. Statistical analysis of relative recovery rates showed hook injury severity, amphipod predation, and capture depth to be significant in predicting mortality. Fish suffering from severe hook injuries and amphipod predation were found to have the greatest mortality, in accordance with previous research. However, fish captured at shallower depths had increased mortality rates, which contradicts previous research. The differential recovery of sablefish based on the injury factors considered indicates that mortality of incidentally caught and released fish does occur and should be taken into account in management of sablefish stocks.

## UNDERGRADUATE

### Business

## Emily Stanch

School of Business Administration

Elisah Lewis, Mentor

### ***U Shop On-Campus Delivery Service***

Paul Bousquet, Daniel Wilson, Michael Jones, Lindsey Adam

Our business, UShop, is essentially an errand and delivery service. We plan for our company to be a limited liability company. We chose to be an LLC because we would receive all the benefits of a corporation without several of the drawbacks. With an LLC, we would be allowed multiple owners and we are not subject to self-employment tax, as well as avoiding double taxation.

Our service would work as follows. Customers would simply log on to the UShop website and browse through a variety of products we offer. Examples of products would include food from a variety of nearby fast food restaurants, products from local drug stores (i.e. CVS), groceries from Publix or Whole Foods, and other convenience items. There would also be a section on the web site for customization where a consumer would be able to add specifications or special requirements for their order. After submitting the errand request order form, our client would wait a maximum of an hour to receive his or her order. The details of pricing are included later in the Business Plan.

The purpose of our business is to serve the needs of University of Miami students on the Coral Gables campus. At present there is no other business similar to ours in the area, however other locations do exist throughout the country. The need for our business is overwhelming, especially for freshmen. At the University of Miami, freshmen are not allowed to have cars; therefore they are greatly in need of an errand service. It can be difficult for young freshmen to navigate the city, and many may not have access to the Zipcar service, therefore UShop will be their only option for obtaining their necessities, whether it is late at night or just for weekly groceries.

UNDERGRADUATE

**Psychology**

**Marietta Suarez**

College of Arts and Sciences

Dr. Gail Ironson, Mentor

***Content and Frequency of Prayer of Patients with HIV/AIDS in Relation to Health Locus of Control, Depression, and Perceived Stress***

The purpose of this project was to relate the content and frequency of prayer of HIV/AIDS patients to factors such as health locus of control (HLOC), depression, and perceived stress, which have been associated with the progression of HIV/AIDS. Data was obtained at a single time point from questionnaires which HIV/AIDS patients completed as part of a larger longitudinal study. As hypothesized, patients with a "chance" HLOC pray for their health (i.e. positive correlation). It was also found that patients with an "other people" HLOC do not pray for their own well-being (i.e. negative correlation), and finally, patients who are less stressed pray for non-specific things (i.e. negative correlation).

## UNDERGRADUATE

### Biology

## Priyanka Surio

College of Arts and Sciences

Dr. Sondra Aiken, Mentor

### ***Promoting a Healthier Me***

Dr. Asma Aftab

Obesity is quickly becoming the number one preventable cause of death according to the World Watch Institute, World Health Organization, and CDC based on studies conducted in the United States showing that two-thirds of American adults are either obese or overweight. Medical providers are at the forefront for identifying and addressing obesity. For hospitals serving a predominantly disadvantaged population, the traditional mode of comprehensive weight management is unaffordable. Optimizing existing resources and finding effective and economical solutions are important. A preliminary investigation of the primary care setting of Jackson Memorial Hospital was conducted by surveying 50/120 providers' management of overweight/obese patients. For the survey questions relating to assessment of patients, doctors were addressing these issues less than twenty-five percent of the time with the exception of identifying obesity and discussing comorbidities. Doctors intervene fifty to seventy-five percent of the time but are inefficient when giving handouts, documenting weight goals, and nutrition referral. The National Institutes of Health's Obesity Guideline served as a reference for creating tools to modify the current system. Three-step visual handouts were developed to increase physician obesity intervention, along with planned seminars and events to teach providers how to use these tools. Additionally, a poster board was designed to prompt patients to ask their providers about weight management. The desired outcome is to increase physician assessment of obese patients by twenty-five percent or more.

## UNDERGRADUATE

### Business

## Robert Till

School of Business Administration

Dr. Edward Baker, Mentor

### ***Multivariate Optimization in Green Building Design***

The variety of options available for the design of green energy and environmentally conscious buildings presents the issue of choosing an optimum design mix of technologies, subject to constraints such as cost or energy efficiency. A multivariate optimization strategy is implemented to model these conditions by finding the spatial, physical, and economic interactions and trade-off effects among the different options. Specifically, we looked for an interaction and cost relation between daylighting, heating, and electricity use. This allowed us to find a design that best fits the set of given constraints by solving to find an optimal condition that minimizes costs, carbon footprint, energy use, etc. Such a method is an effective tool in decision analysis, and provides an ideal design for a building model.

## UNDERGRADUATE

### Psychology

## Ashley Tirado

College of Arts and Sciences

Jennifer Durocher, Mentor

### ***Predicting Change in Joint Attention Over Time***

Autism Spectrum Disorders (ASDs) are developmental disorders that affect the development of social and communication skills. Research shows that children with ASD typically have difficulties in social interactions and verbal and nonverbal communication. Joint attention (JA), a core deficit in ASD, involves sharing attention with others regarding objects or events. Research shows that better JA skills are associated with greater language development and better outcomes in cognitive development, language, and symbolic play skills. In the current study, JA was observed through a parent-child play assessment, which gathers information on the number of JA and requesting behaviors a child exhibits with his or her parent. Children were then randomly assigned to either a waitlist control or an intervention group; children in the intervention group received two 45-minute intervention sessions a week for 8-weeks, to teach joint attention skills. Children in both groups received Pre- and Post- assessments. The present study investigates whether initial language abilities, measured by the Mullen Scales of Learning, predict change in JA over time. We hypothesize that there will be a significant positive correlation between mean language scores and mean change in joint attention behaviors. Results indicate no significant correlations between pre-assessment language and change in JA for the whole sample, and for the control and intervention groups independently. However, a significant positive correlation was found between change in receptive language and change in JA for the intervention group only; the association between change in expressive language and change in requesting approached significance for the intervention group.

UNDERGRADUATE

RSMAS

## Erica Towle

Rosenstiel School of Marine and Atmospheric Sciences

Dr. Daniel DiResta, Mentor

### ***The ability of *Crepidula fornicata* to control brown tide blooms caused by *Aureococcus anophagefferens* in Long Island Estuaries***

Brown tide is a type of harmful algal bloom caused by *Aureococcus anophagefferens*, a picoplanktonic alga which reproduces asexually. It is associated with a brown discoloration of the water and normally occurs in shallow estuaries with long residence times and high salinities. These blooms have very deleterious ecological effects on shellfish populations. Dense blooms significantly reduce the ability of the hard clam *Mercenaria mercenaria* to filter feed, causing die-offs. Biological control of brown tide may be possible using suspension feeders. The removal of *Aureococcus* by suspension feeding benthic organisms could provide an effective top-down grazing control to prevent brown tide. The objective of this project was to assess the ability of suspension feeding *Crepidula fornicata* to control brown tide blooms. Firstly, we found that *Crepidula fornicata* is abundant in Long Island estuaries with densities in the hundreds per meter squared. Secondly, *Crepidula fornicata* filters *Aureococcus*, which is 2-3  $\mu$ m in size, as efficiently as it does larger phytoplankton cells. Thirdly, *Crepidula fornicata* suspension feeds at a rate 40-fold higher than *Mercenaria mercenaria* regardless of brown tide concentrations. Lastly, *Crepidula fornicata* is capable of actively filtering *Aureococcus* out of suspension during blooms while *Mercenaria mercenaria* cannot.

**Business**

**Richard Treichel**

School of Business Administration

Dr. Edward Baker, Mentor

***Binary Algorithm for The Set Partitioning Problem***

The set partitioning problem concerns how to satisfy several requirements using a set of inputs, each of which has a cost and may only be used once. The objective is to minimize the total cost of the selected inputs while still satisfying all the requirements. Solving this type of problem can become computationally intractable for large numbers of restrictions and input variables.

These types of problems are commonly encoded in matrix form, where each row represents a particular constraint and each column describes an input variable and which rows it affects if selected. One method that may decrease the amount of time necessary to solve set partitioning problems is to envision each column as a binary combination of which rows it can affect. Assigning each column a binary value allows the problem to be converted into a visual map of nodes, where the number of nodes depends on the number of combinations obtainable from each column's binary value. The objective now is to reach the final node in as few steps as possible, moving along the map according to the value of a chosen column's binary representation.

The set partitioning problem has several applications of interest. For example, airline crew scheduling involves a large number of possible flight schedules (the input variables) as well as daily flights that must have a crew to pilot them to their destination (the requirements). Choosing which schedules use the least number of crews while still satisfying all flights' crew requirements can result in substantial cost savings for an airline in the form of saved labor costs. Other applications include transportation, manufacturing, and financial asset allocation.

UNDERGRADUATE

**Psychology**

**Jessica Ulrich**

College of Arts and Sciences

Jennifer Durocher, Mentor

***Collateral Effects of Joint Attention Intervention on Pretend Play in Children with Autism***

Kristin Gillig

Autism Spectrum Disorders (ASD) are a group of developmental disorders characterized by impairments in social interactions, communication, and behavior. Children diagnosed with ASD often have deficits in joint attention (gaze shifting, pointing, showing), imitation, and pretend play; these behaviors tend to be correlated with one another. The current study is an extension of work done in our lab examining the collateral effects of a joint attention intervention on imitation and pretend play, and is part of a larger study looking at behavioral methodology for improving joint attention. It was hypothesized that children who received the intervention would improve more in imitation and pretend play than children who did not receive the intervention (children in a waitlist control group). Pretend play and imitation skills were measured with an Examiner-Child play assessment, involving free play and modeled pretend play acts. Results indicated no significant group differences between the intervention and control groups on any pretend play or imitation variable on either the pre- or post-assessments. However, while the results did not indicate clear collateral effects on imitation or pretend play from the joint attention intervention, some interesting findings emerged. The control group improved more in imitation from pre- to post-assessments. In contrast, the intervention group improved more in pretend play and novel pretend play acts, both of which were associated with changes in joint attention.

## UNDERGRADUATE

### Business

## Charles Walker

School of Business Administration

Dr. Edward Baker, Mentor

### ***Optimization and Cost Minimization of Airport Security***

Lindsey Morgado

Our project looks at a sample case of an airport looking to add-on an additional airport terminal to increase its capacity. Through the use of ARENA, the project seeks to meet certain objectives as outlined by the project details including:

- 99% of all passengers entering the airport making their flight if they arrive 120 minutes before take-off
- Time in security was to average no more than 24 minutes per person, and 90% of all passengers were to have spent any more than 45 minutes in security
- Minimized average cost per passenger

Along with these objectives, our group set out to identify the strategy the airport should use to make the new terminal profitable, as well as keeping the new airlines happy. Another issue of the project was to look at existing airport layouts and model the new airport design to established market standards while maintaining a cost saving aspect to the system.

## UNDERGRADUATE

### Interdisciplinary Studies

Rui Wang

Biomedical Engineering, School of Education

Dr. Joseph Signorile, Mentor

***MATLAB Interface (Assec) Development for Assisting the Comparative Study between Periodized Prescription-Based Exercise Intervention and Progressive Resistance Training in Building Physical Functional Independence***

Physical performance is closely related to the older persons' abilities to perform activities of daily living (ADL). Progressive resistance exercise training (PRT) and Periodized prescription-based exercise training (PPBET) will be investigated and compared with PRT using physical performance, ADL performance and exercise adherence variables. At least 90 veterans, 65+ years of age, will participate in a 21-week training study. Veterans will be randomly assigned to a standard PRT group (S), a PPBET group (P) or a non-training control group (C). We hypothesis that the P group will promote greater improvements in all measured variables compared to the Sand C groups. A MATLAB interface (Assec) is programmed to incorporate data recording of this study. The data recorded through Assec is directly exported and formatted in the Excel file for further statistical analysis using SPSS software.

UNDERGRADUATE

**Biochemistry and Molecular Biology**

**Ryan Warner**

College of Arts and Sciences

Dr. Antoni Barrientos, Mentor

***Insight into the Function of Mss51 in Cox1 Biogenesis***

The yeast *Saccharomyces cerevisiae* provides a powerful tool to study the proteins and mechanisms of mitochondrial diseases that are conserved from yeast to human. Cytochrome c oxidase (COX) is the last enzyme of the mitochondrial respiratory chain (MRC), which is essential for respiration and aerobic ATP production in eukaryotic cells. COX assembly is regulated by the translation of COX subunit 1 (Cox1). Nuclear encoded Mss51 participates in mitochondrial COX1 translation and is also involved in the maturation/stability of newly synthesized Cox1. Alignment of Mss51 orthologs from many organisms showed two conserved Cys-Pro-Val/Lys (CPX) motifs within the protein. Similar CPX motifs have been shown to bind heme for transcriptional activation, translational regulation, or heme lyase activity. To determine if Mss51 binds heme, we conducted binding assays using purified Mss51 and different types of heme. Our results showed that Mss51 binds heme a and heme b in vitro. Competition assays indicate that Mss51 binds heme b with higher affinity. We propose that Mss51 may bind heme b, acting as a translational regulator of Cox1 biogenesis. However, our results do not exclude Mss51 from delivering heme a to Cox1. Uncovering the mechanisms of COX assembly contributes to the understanding of human COX deficiencies.

UNDERGRADUATE

**Neuroscience**

**Danielle Weiss**

College of Arts and Sciences

Isaac Skromne, Mentor

***Role of Retinoic Acid Signaling in the Regulation of cdx4 in Zebrafish Embryos***

Spinal cord specification in zebrafish is under the control of the transcription factor Cdx4: cdx4 loss reduces spinal cord territory, whereas cdx4 over expression expands the spinal cord territory. Therefore, understanding cdx4 regulation is crucial for understanding spinal cord specification. Retinoic Acid, a derivative of Vitamin A, is known to regulate cdx4 expression in cell culture. However, the role of Retinoic Acid in restricting cdx4 expression to the spinal cord in the embryo is currently not well understood. Here we examine the expression patterns of numerous Retinoic Acid signaling pathway components to identify candidates that may limit the spatial distribution of cdx4 expression to the spinal cord. Currently we are functionally testing candidates to see whether their activity is important to induce or maintains cdx4 expression in the spinal cord or if their activity is important to down regulate cdx4 expression areas outside the spinal cord.

## UNDERGRADUATE

### Psychology

## Sierra Winings

College of Arts and Sciences

Dr. Youngmee Kim, Mentor

### ***Prevalence of Physical Examination among an Inner City Sample***

**Background.** Health disparities between racial and ethnic groups persist despite the effectiveness of preventative services. Routine physical examination is not only a normative procedure to check overall health, but also a common occasion when physicians recommend patients further preventive behaviors, such as cancer screening and behavioral lifestyle changes. Specific factors have been associated with lower rates of use of preventative services, such as cancer screening, such as lower socioeconomic status, lack of insurance, absence of a usual source of care, and lower education levels (Ross, 2008).

**Objective.** Since much of the morbidity and mortality disparities may be attributed to a lack of routine health examination, identifying specific, yet basic, socio-demographic factors may help health care professionals more effectively address patients' reluctance, doubts or misconceptions surrounding preventive care and help close the gap.

**Methods.** A community-based free health fair was held at the Jessie Trice Community Health Center in Liberty City, a neighborhood within the city of Miami. The site was selected based on its representation for low income (mean household income \$18,810) and high proportion of ethnic minority (95% African American and 3% Hispanic) population. A total of 61 patients participated in a brief questionnaire. Research staff approached health fair attendees, introduced the study, and assisted participants by reading each question to obtain a response. Answering survey questions served as consent, and all data were self-reported; no medical records were collected.

**Results.** Approximately 25% of our sample had never had physical examination during the past 11 years, which was comparable across different ethnic groups ( $p > .28$ ). Among participants who had had physical examination, our sample had an average of 4 total exams in the past 11 years, far lower than the recommendation of annual physical examination. This was the case across all ethnic groups ( $p > .72$ ).

**Conclusions.** We found no observable difference between ethnicity and their adherence to recommended yearly physical exams, suggesting that other socio-economic factors, such as family income, lack of insurance or source of usual care, or lower education levels may have more influence on access to health care for inner city populations in Miami.

UNDERGRADUATE

**Psychology**

**Mary Woody**

College of Arts and Sciences

Dr. Jutta Joormann, Mentor

***The Effects of Rumination and Gender on the Psychological and Biological Recovery From Stress***

Previous research has indicated individuals who have difficulty regulating emotional and biological states during stressful situations are at higher risk for depression, but these studies displayed unclear results about the causes of Major Depressive Episodes. This experiment sought to understand the effect emotion regulation and gender have on prolonged biological and psychological distress and how this relates to depressed and non-depressed individuals. It was hypothesized that rumination would prolong the psychological and biological recovery of stress in depressed individuals and females, and, during the stress reactivity phase, depressed participants would exhibit less psychological and biological response to stress. The hypothesis was tested using participants' physiological markers of stress, such as Heart Rate Variability (HRV), and anxiety ratings during three stressful activities and a manipulated emotion regulation task. A repeated measures ANOVA was run to determine if there was a main effect for group, time, or gender. As hypothesized, stress did play a role in anxiety ratings, but, unexpectedly, group and gender had no effect on HRV. The null hypothesis was accepted. The manipulation of the participants' emotion regulation may have obscured gender and group differences, and future research could examine unmanipulated emotion regulation and other physical markers of stress.

**Sociology**

**Xiang Xu**

College of Engineering

, Mentor

***The Potential for Biogas in the USA***

Biogas is gas produced by the biological break down of organic matter in the absence of oxygen. With this technology, we can generate energy from sewage manure, agricultural waste, food waste, biodegradable waste, wood waste. It is a well-developed technology which is already been used in many countries. And the cost is keep falling as new technologies emerge. In this project, we will analysis the potential for biogas in the USA. To complete this project, we will focus on the topic below

1. The potential production of biogas:

We will make a prediction about the maximum and minimum production of biogas in the future. For example: as much as 48 percent of UK's natural gas needs could be supplied from biogas by 2020, according national grid. Then how much biogas could generate in America?

2. The commercial potential for biogas

We will compare the cost of biogas to the other renewable such as wind. Find out the commercial advantage of biogas.

3. Frame work for biogas in America

How could we make biogas become an accessible and economical energy? How to deliver the biogas, how to collect the waste which is used for generating biogas is different in different country. What is the best method for America? We will make an analysis based on American?s current gas grid and social structure.

4. Government's Role

What should the government do to incentive the biogas to the USA? What policy should be making? What kind of frame work should be building?

## UNDERGRADUATE

### Biology

Lianne Zaragoza

College of Arts and Sciences

Dr. Rebeca Geffin, Mentor

#### ***Longitudinal Changes in HIV-1 Envelope Protein Sequences Associated with Neutralizing Antibody Responses in Infected Children***

Neutralizing antibodies are known to be an essential component of a healthy and functional human immune response, although their role in HIV-1 infection is poorly understood. It is known that neutralizing antibodies (Nab) are produced in infected individuals, but that the virus is capable of developing resistance to these antibodies. Previous studies in adults have shown specific changes associated with resistance to Nab. Many of these changes are located in the HIV envelope protein, in N-linked glycosylation sites. However, similar studies have not been published in infected children. We hypothesize that there will be significant longitudinal changes among HIV-1 env protein sequence associated with Nab responses in infected children. To answer this question, we have prepared complementary DNA from frozen viral RNA. Outer and nested PCR reactions were performed to obtain enough envelope gene molecules for cloning. DNA was purified, ligated to a cloning vector and bacteria were transformed. Transformants were selected. To determine whether selected clones contained the envelope DNA, the plasmids were run in agarose gels to determine size. Clones containing the envelope were sequenced, and the sequences were translated and aligned for analysis with the programs Generunner and Genedoc. Data suggests that in fact most fixed changes appear at glycosylation sites, which lead us to believe that neutralization sensitivity could be gained by single changes at these sites, eliminating Nab resistance and offering a solution to HIV. However, further research is needed.

